Handbook of Word-Formation

Edited by
Pavol Štekauer and
Rochelle Lieber

Studies in Natural Language & Linguistic Theory

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PREFACE

Following years of complete or partial neglect of issues concerning word formation (by which we mean primarily derivation, compounding, and conversion), the year 1960 marked a revival – some might even say a resurrection – of this important field of linguistic study. While written in completely different theoretical frameworks (structuralist vs. transformationalist), from completely different perspectives, and with different objectives, both Marchand's *Categories and Types of Present-Day English Word-Formation* in Europe and Lees' *Grammar of English Nominalizations* instigated systematic research in the field. As a result, a large number of seminal works emerged over the next decades, making the scope of word-formation research broader and deeper, thus contributing to better understanding of this exciting area of human language.

Parts of this development have been captured in texts or 'review' books (e.g. P.H. Matthews' *Morphology: An Introduction to the Theory of Word-Structure* (1974), Andrew Spencer's *Morphological Theory: An Introduction to Word Structure in Generative Grammar* (1991), Francis Katamba's *Morphology* (1993), Spencer and Zwicky's *Handbook of Morphology* (1998)), but these books tend to discuss both inflectional and derivational morphology, and to do so mostly from the generative point of view. What seemed lacking to us was a volume intended for advanced students and other researchers in linguistics which would trace the many strands of study – both generative and non-generative – that have developed from Marchand's and Lees' seminal works, on both sides of the Atlantic.

The ambitions of this Handbook of Word-formation are four-fold:

1. To map the state of the art in the field of word-formation.
2. To avoid a biased approach to word-formation by presenting different, mutually complementary, frameworks within which research into word-formation has taken place.

3. To present the specific topics from the perspective of experts who have significantly contributed to the respective topics discussed.
4. To look specifically at individual English word formation processes and review some of the developments that have taken place since Marchand's comprehensive treatment forty five years ago.

Thus, the *Handbook* provides the reader with the state of the art in the study of word formation (with a special view to English word formation) at the beginning of the third millennium. The *Handbook* is intended to give the reader a clear idea of the large number of issues examined within word-formation, the different methods and approaches used, and an ever-growing number of tasks to be disposed of in future research. At the same time, it gives evidence of the great theoretical achievements and the vitality of this field that has become a full-fledged linguistic discipline.

We wish to express our gratitude to all the contributors to the Handbook.

The editors

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BASIC TERMINOLOGY

ANDREW CARSTAIRS-MCCARTHY

1. THE NOTION OF THE LINGUISTIC SIGN

In this introductory chapter I will discuss the notions 'morpheme' and 'sign' in relation to word-formation. The starting-point will be Ferdinand de Saussure's notion 'sign' (*signe*) (Saussure 1973), which since the early twentieth century has influenced enormously how linguists have analysed words and parts of words as grammatical units. There will be no tidy conclusion, partly because Saussure himself was vague on crucial points, and partly because among contemporary linguistic theorists there is little agreement about even the most fundamental aspects of how word-formation should be analysed and what terminology should be used in describing it. But I hope that this chapter will alert readers to some of the main risks of misunderstanding that they are sure to encounter later.[1]

A handbook of English syntax in the twenty-first century would not be likely to begin with a discussion of Saussure. Why then does it make sense for a handbook on word-formation to do so? There are two reasons. The first is that syntax is centrally concerned not with individual signs in Saussure's sense but with combinations of signs. That makes it sound as if word-formation, by contrast, is concerned not with combinations of signs but only with individual signs. As to whether that implication is attractive or not, readers can in due course form their own opinions. For the present, it is enough to say that, in the opinion of most but not all linguists, the way in which meaningful elements are combined in syntax is different from how they are combined in complex words. The second reason has to do with Saussure's distinction between language as social convention (*langue*) and language as utterance (*parole*). Each language as *langue* belongs to a community of speakers and, because it is a social convention, individuals have no control over it. On the other hand, language as *parole* is something that individual speakers have control over; it consists of the use that individuals freely make of their *langue* in the sentences and phrases that they utter. Hence, because syntax is concerned with the structure of sentences and phrases, Saussure seems to have considered the study of syntax as belonging to the study of *parole*, not *langue* (the exception being those sentences or phrases that are idioms or clichés and which therefore belong to *langue* because they are conventional rather than freely constructed). So, because his focus was on *langue* rather than *parole*, Saussure had little to say about syntax.

[1] I will use 'Saussure' in this chapter as shorthand for 'Saussure's view as presented in the *Cours de linguistique générale*'. The *Cours* is a posthumous compilation based on notes of various series of lectures that Saussure delivered over a number of years. Apparent inconsistencies in the *Cours* may be due to developments in Saussure's thinking over time or faulty note-taking on the part of the compilers or both. Nevertheless, it is the *Cours* as a whole that has influenced subsequent linguists, and on that basis it is fair to discuss it as if it were created by one author as a single coherent work.

Štekauer P. and R. Lieber (eds.), Handbook of Word-Formation, 5—23.

Saussure introduced his notion 'sign' with a famous example: a diagram consisting of an ellipse, the upper half containing a picture of a tree and the lower half containing the Latin word *arbor* 'tree' (Saussure *Cours*, part 1, chapter 1; 99; 67).[2] The upper half of the diagram is meant to represent a concept, or what the sign signifies (its *signifié*), while the lower half represents the unit of expression in Latin that signifies it (the *signifiant*). As Saussure acknowledges, the term 'sign' in its normal usage seems closer to the *signifiant* than the *signifié*, and at first one is inclined to ask what the point is in distinguishing the *signifiant* from the sign as a whole. Saussure's answer lies largely in his view of how signs are related to each other. Signs (he says) do not function in isolation but rather have a 'value' (*valeur*) as part of a system (part 2, chapter 4; 155-69; 110-20). Concepts (*signifiés*) do not exist in the world indepently of language but only as components of the signs to which they belong. By this Saussure does not mean that (for example) trees have no real existence apart from language, but rather that the term for the concept 'tree' will differ in *valeur* from one language to another depending on whether or not that language has, for example, contrasting terms for the concept 'bush' (a small tree) or the concept 'timber' (wood from trees for use in building or furniture-making).[3] Each *signifié* has a wider or narrower scope, according to how few or how many are the related signs that its sign contrasts with. And with *signifiants*, too, what matters most is not the sounds or letters that compose them but their role in distinguishing one sign from another. Thus the Attic Greek verb forms *éphe:n* 'I was saying' and *éste:n* 'I stood' both have the same structure (a prefix *e-*, a root, and a suffix *-n*), but their *valeur* within their respective verbal paradigms is different: *éphe:n* is an 'imperfect' tense form while *éste:n* is 'aorist'.

So far, so good, perhaps. The Latin word *arbor* and the English word *tree* are simple words, not analysable into smaller meaningful parts, and each is in Saussure's terms a sign. But consider the word *unhelpfulness*, which seems clearly to consist of four elements, *un-*, *help*, *-ful* and *-ness*, each of which contributes in a transparent way to the meaning of the whole. Consider also the words *Londoner*, *Muscovite*, *Parisian*, *Roman*, and *Viennese*, all meaning 'inhabitant of ...', and all consisting of a stem followed by a suffix. What things count as signs here: the whole words, or the elements composing them, or both? It is at this point that Saussure's exposition becomes frustratingly unclear, as I will demonstrate presently.

Let us call these elements 'morphemes'. This is consistent with the usage of Baudouin de Courtenay, the inventor of the term, who speaks of 'the unification of the concepts of root, affix, prefix, ending, and the like under the common term, morpheme' (Baudouin de Courtenay 1972: 151) and defines it as 'that part of a word which is endowed with psychological autonomy and is for the very same reason not

[2] Because readers are likely to have access to Saussure's *Cours* in various different editions and translations, I will give first a reference to the relevant part and chapter, then a page reference to the 1973 edition by Tullio de Mauro, and finally a page reference to the 1983 translation by Roy Harris. I quote passages from the *Cours* in the translation by Harris. I use Saussure's original technical terms *langue*, *parole*, *signifiant* and *signifié*, for which no consistent English equivalents have become established.

[3] This illustration is mine, not Saussure's, but is in the spirit of Saussure's discussion of how two English words *sheep* and *mutton* correspond to one French word *mouton*.

further divisible' (1972: 153). It is also consistent with rough-and-ready definitions of the kind offered in introductory linguistics courses, where morphemes are characterised as individually meaningful units which are minimal in the sense that they are not divisible into smaller meaningful units.[4] The question just posed now becomes: Do morphemes count as signs, or do only words count, or both? Much of the divergence in how the term 'morpheme' is used can be seen as due to implicit or explicit attempts to treat morphemes as signs, despite the difficulties that quickly arise when one does so. These are difficulties that Saussure never confronts, because the term 'morpheme' never appears in the *Cours*. In Saussure's defence, one can fairly plead that he could not be expected to cover every aspect of his notion of the sign in introductory lectures. Yet the question that I have just posed about morphemes is one that naturally arises almost as soon as the notion of the sign is introduced.

A case can be made for attributing to Saussure two diametrically opposed positions relating to the role of signs in word-formation. I will call these the morpheme-as-sign position and the word-as-sign position. I will first present evidence from the *Cours* for morphemes as signs, then present evidence for words as signs.

1.1 Evidence for the morpheme-as-sign position in Saussure's Cours

The distinction between *langue* and *parole* is far from the only important binary distinction introduced by Saussure in his *Cours*. Another is the distinction between syntagmatic relationships (involving elements in linear succession) and associative relationships (involving elements that contrast on a dimension of choice).[5]

Elements that can be related syntagmatically include signs, and in particular the *signifiants* of signs, which are 'presented one after another' so as to 'form a chain' (part 1, chapter 1, section 3; 103; 70). Chains of items that form syntagmatically related combinations are called syntagmas (*syntagmes*) (part 2, chapter 5; 170-5; 121-5). Some syntagmas have meanings that are conventionalised or idiomatic. This conventionalisation renders them part of *langue*. An example is the phrase *prendre la mouche* (literally 'to take the fly'), which means 'to take offence' (part 2, chapter 5, section 2; 172; 123). However, the great majority of phrases and sentences have meanings that are transparent, not idiomatic. As such, they belong to *parole*, not to *langue*. As examples of syntagmas that belong to *parole*, Saussure cites *contre tous* 'against all', *la vie humaine* 'human life', *Dieu est bon* 'God is good', and *s'il fait beau temps, nous sortirons* 'if it's fine, we'll go out' (part 2, chapter 5, section 1; 170; 121). These phrases and sentences do not constitute signs as wholes; rather,

[4] This resembles Bloomfield's classic definition: 'a linguistic form which bears no partial phonetic-semantic resemblance to any other form' (1933: 161). One implication of the specification 'partial' is that two morphemes may display total phonetic identity (so as to be homonyms) or total semantic identity (so as to be synonyms).

[5] In the technical terminology of linguistics, the term 'paradigmatic', promoted by Louis Hjelmslev (1961), has come to replace 'associative' as the counterpart of 'syntagmatic'. But I will stick to Saussure's term in this chapter.

they are made up of smaller signs, namely the words or idiomatic expressions that they contain.

On this basis, the question 'Do morphemes count as signs?' can be refined as 'Can morphemes as such compose syntagmas that belong to *parole* rather than to *langue*?' At first sight, the answer is yes. In the very same passage where Saussure gives the examples just quoted, he cites the word *re-lire* 'to read again'. Saussure uses the hyphen to draw attention to the divisibility of this word into two elements, *re-* 'again' and *lire* 'to read'. The word *relire* thus has a meaning that is as transparent as that of *unhelpfulness*. Here, at least, it seems clear that Saussure intends us to analyse the morpheme *re-* as a sign, forming part of a syntagma that belongs to *parole* rather than to *langue*.

Further evidence for this 'morpheme-as-sign' position seems to be supplied by Saussure's discussion of suffixes such as *-ment* and *-eux*, and of zero signs. The words *enseignement* 'instruction', *enseigner* 'to teach' and *enseignons* 'we teach' clearly share what Saussure calls a 'common element'. Similarly, the suffixes *-ment* and *-eux* are 'common elements' in the set of words *enseignement*, *armement* 'armament' and *changement* 'change (noun)', and in the set *désir-eux* 'desirous' (from *désir* 'desire'), *chaleur-eux* 'warm' (from *chaleur* 'warmth'), and *peur-eux* 'fearful' (from *peur* 'fear') (part 2, chapter 5, section 3; 173-5; 123-5).[6] These common elements are morphemes, in terms of our rough-and-ready definition. Are they also signs, in Saussure's sense? Saussure hints at the answer 'yes' when he discusses a set of instances where overt suffixes contrast with zero. In Czech, the noun *žena* 'woman' illustrates a widespread pattern in which the genitive plural form *žen* is differentiated from the other case-number forms, such as the accusative singular *ženu* and the nominative plural *ženy*, simply by the absence of a suffix. Here the genitive plural has as its exponent 'zero' or 'the sign zero' (part 1, chapter 3, section 3; 123-4; 86). Surely then (one is inclined to think) the accusative singular suffix *-u* and the nominative plural suffix *-y*, both being morphemes in our sense, must have at least as much right as zero has to count as signs.

It is tempting to conclude that, in complex words, Saussure recognises individual morphemes as signs provided that the complex word is regularly formed and semantically transparent. A reader of the *Cours* who looks for explicit confirmation of this tempting conclusion will be frustrated, however. Many complex words other than *re-lire* and forms of *žena* are discussed, but always it is in contexts that emphasise the associative relationships of the word as a whole, rather than the syntagmatic relationship between the morphemes that compose it. These discussions point away from morphemes as signs and towards words as signs, therefore.

1.2 Evidence for the word-as-sign position in Saussure's Cours

Closely parallel in structure to *relire* is the verb *dé-faire* 'to undo', also discussed by Saussure (part 2, chapter 6, section 2; 177-8; 127-8). Again he uses a hyphen to draw attention to its internal structure. The meaning of *défaire*, at least in many

[6] The inconsistency in the use of hyphens here is Saussure's.

contexts, seems just as transparent as that of *relire*, on the basis of the meanings of *faire* 'to do' and *dé-* implying reversal. Indeed, Saussure draws our attention to this transparency by citing the parallel formations *décoller* 'to unstick', *déplacer* 'to remove' (literally 'to un-place') and *découdre* 'to unsew'. However, comparing the discussion of *relire*, we find an important difference in emphasis here. With *relire*, the emphasis was on syntagmatic relationships. With *défaire*, however, the emphasis is on the associative relationships that it enters into: not just with *décoller*, *déplacer* and *découdre* but also with *faire* itself, *refaire* 'to redo', and *contrefaire* 'to caricature'.

Now, it is clear that *contrefaire* is something of an outsider in this list, because its meaning cannot be predicted from that of its elements *faire* and *contre* 'against'. One might therefore have expected Saussure to say something like this: "Because of its unpredictable meaning, the syntagma *contrefaire* is conventionalised and belongs as a unitary sign to *langue*, so that *contre* and *faire* do not count as signs in this context. However, the meanings of the other complex words I have cited are predictable, so they are examples of syntagmas that belong to *parole*, and in them the morphemes *re-* and *dé-*, as well as the verb stems that accompany them, are signs." But what Saussure actually says is almost the opposite of that. The word *défaire* is decomposable into 'smaller units', he says, only to the extent that is 'surrounded by' those other forms (*décoller*, *refaire* and so on) on the axis of association. Moreover, a word such as *désireux* is 'a product, a combination of interdependent elements, their value [i.e. *valeur*] deriving solely from their mutual contributions within a larger unit' (part 2, chapter 6, section 1; 176; 126). Recall that *valeur* is a property of signs, dependent on their place within the sign system as a whole. Saussure's words here imply, therefore, that in *désireux*, the 'smaller unit' or 'element' *-eux*, though clearly identifiable, is not a sign. Saussure hints that even the root *désir*, in the context of this word, does not count as a sign either, although it clearly does so when it appears as a word on its own. We are thus left with a contradiction. The word *relire* is cited in a context that invites us to treat it as a unit of *parole*, not *langue*, composed of signs, just like the sentence *If it's fine, we'll go out*. On the other hand, the discussion surrounding *défaire* insists on its status as a unit of *langue*, a sign as a whole, composed of 'elements' or 'smaller units' that are not signs.

On the basis of my presentation so far, the evidence for the two positions (morpheme-as-sign and word-as-sign) may seem fairly evenly balanced. But there are solid reasons to think that the word-as-sign position more closely reflects Saussure's true view. Consider the French number word *dix-neuf* 'nineteen' (literally 'ten-nine'). In such a transparent compound as this, the two morphemes *dix* and *neuf*, being words (and hence signs) on their own, must surely still count as signs (one may think). But no, says Saussure: *dix-neuf* does not contain parts that are signs any more than *vingt* 'twenty' does (part 2, chapter 6, section 3; 181; 130). The difference between *dix-neuf* and *vingt*, as he presents it, involves a new distinction: between signs that are motivated and signs that are unmotivated. The sign *vingt* is unmotivated in that it is purely arbitrary: the sounds (or letters) that make it up give no clue to its meaning. The sign *dix-neuf*, however, contains subunits which give clues to its meaning that could hardly be stronger. Even so, according to Saussure,

dix-neuf is still a single sign on the same plane as *vingt* or *neuf* or *soixante-dix* 'seventy' (literally 'sixty-ten'). It is the *valeur* of *dix-neuf* in the system of French number words that imposes on it the status of a unitary sign, despite its semantic transparency. (Saussure might also have added that this transparency, real though it is, depends on a convention that belongs to French *langue*, not *parole*: the convention that concatenation of *dix* and *neuf* means 'ten plus nine', not 'ten times nine' or 'ten to the ninth power', for example. His neglect of this point reflects his general neglect of syntactic and syntagmatic convention.[7] Similarly, the English plural form *ships* is motivated because it 'recall[s] a whole series like *flags, birds, books*, etc.', while *men* and *sheep* are unmotivated because they 'recall no parallel cases'.

The plural suffix *-(e)s* is, in the English-speaking world, among the first half-dozen 'morphemes' that every beginning student of linguistics is introduced to. Yet for Saussure it does not count as sign; it is merely a reason for classifying the words that it appears in (*ships*, *flags* etc.) as relatively motivated signs rather than purely arbitrary ones. There is thus a striking discrepancy between the word-centred approach to complex words, predominant in the work of the pioneer structuralist Saussure, and the morpheme-centred approach that (as we shall see) predominated among his structuralist successors. In section 2 I will outline the attractions and pitfalls of morpheme-centred approaches.

2. MORPHEME AND WORD

Saussure recognised some of the difficulties inherent in using 'word' as a technical term (part 2, chapter 2, section 3). Nevertheless, when illustrating his notion 'sign', he chose linguistic units that in ordinary usage would be classified as words, such as Latin *arbor* 'tree' and French *juger* 'to judge' (part 1, chapter 1, section 1; part 2, chapter 4, section 2). This may be largely because the languages from which he drew his examples were nearly all well-studied European languages with a long written history and a tradition of grammatical and lexical analysis in terms of which the identification of words (in some sense) was uncontroversial. However, accompanying the theoretical developments in linguistics in the early twentieth century was an explosion in fieldwork on non-Indo-European languages, particularly in the Americas and Africa. In these languages, lacking a European-style tradition of grammatical description, identifying words as linguistic units often seemed problematic. In fact, there was a strong current of opinion according to which the word deserves no special status in linguistic description, and in particular no special status warranting a distinction between the internal structure of words ('morphology') and the internal structure of phrases and sentences ('syntax'). As Malinowski put it, 'isolated words are in fact only linguistic figments, the products of an advanced linguistic analysis' (Malinowski 1935: 11, cited by Robins 1990: 154). So what units are appropriate as tools for a preliminary linguistic analysis? It seemed natural to answer: those units that are clearly indivisible grammatically and

[7] I owe this point to Harris (1987: 132).

lexically, or, in other words, units of the kind that we provisionally labelled 'morphemes' in section 1. Thus, despite Saussure's leaning towards the word-as-sign position, the experience of fieldwork on languages unfamiliar to most European and American scholars imposed a preference for a version of the morpheme-as-sign position.

Where, then, does the morpheme-as-sign position leads us? Let us recall first the Saussurean norm of what constitutes a *signifiant*: a sequentially ordered string of sounds, such as Latin [arbor] (spelled *arbor*) or French [ʒyʒe] (spelled *juger*), such that every unit of *parole* is analysable exhaustively as a string of *signifiants* (part 1, chapter 1, section 3). What we will observe is a temptation towards signs with *signifiants* that deviate progressively further from this norm. The analyses that I will discuss are based on an approach to morphemes that was expounded in particular by Zellig S. Harris (1942), Charles F. Hockett (1947), Bernard Bloch (1947) and Eugene A. Nida (1948). None of these explicitly espouses the morpheme-as-sign position, because none of them cites Saussure. However, the issues that they discuss can all be seen as prima facie difficulties for that position. The fact that all these references are clustered more than half a century ago reflects the replacement of morphology by syntax at the centre of grammatical theory-construction. Nevertheless, I will comment in section 3 on uses of the term 'morpheme' since about 1960.

2.1 Case study: English noun plural forms (part 1)

For Saussure, as we have seen, the *-s* suffix of *flags* and *ships* is not a sign but an element that renders those words relatively motivated, by contrast with *men* and *sheep*. Let us say instead that this *-s* suffix is indeed a sign, with the *signifié* 'plural'. What is its *signifiant*? So far as English spelling is concerned, the answer is simple. When we turn to phonology, however, we encounter our first stumbling-block. In a conventional phonemic transcription for these two words, the suffix will appear in two different shapes, /z/ and /s/, (/flægz, ʃɪps/), and there is yet a third shape, either /ɪz/ or /əz/, according to dialect, found in words such as *roses*, *horses*, *churches* and *judges*.[8] Must we then recognise three different signs with the same *signifié*? Such an analysis would place these three signs on a par with sets of synonyms such as *courgettes* and *zucchini*, or *nearly* and *almost*. That is hardly satisfactory, because it neglects the role of phonology in determining the complementary distribution of the three shapes: /ɪz/ appears after strident coronal sounds, while elsewhere /z/ appears after voiced sounds and /s/after voiceless ones.

It was in relation to patterns such as this that the term 'allomorph' was first introduced in morphology. The intended parallel with the notions 'phoneme' and 'allophone' is evident. Just as sounds that are phonetically similar and in

[8] In my dialect, the third shape is /ɪz/, so that *taxes* sounds the same as *taxis*, but *roses* sounds different from *Rosa's*. For many speakers of other dialects, the homophony pattern is the other way round. The examples that I will discuss fit my own dialect, but similar examples can easily be constructed to make the same point for speakers with the other homophony pattern.

complementary distribution count as allophones of one phoneme, so individually meaningful units that are not divisible into smaller meaningful units, provided that they are synonymous and in complementary distribution, count as allomorphs of one morpheme. And just as it is the allophones of a phoneme that get pronounced, rather than the phoneme itself, a morpheme is likewise not pronounced directly, but represented in the speech chain by whichever of its allomorphs is appropriate for the context. This applies even to morphemes that have the same shape in all contexts, because there is no reason in principle why a morpheme should not have only one allomorph, just as a phoneme may have only one allophone.

Notice, however, that that phrase 'individually meaningful units that are not divisible into smaller meaningful units' is lifted from my provisional definition of 'morpheme' in section 1. It seems, then, that our exploration of the morpheme-as-sign position has led us already to a dilemma. If the units /ɪz/, /z/ and /s/ are Saussurean signs, just like the units /ʌn/ (*un-*), /help/ (*help*), /fʊl/ (*-ful*) and /nɪs/ (*-ness*) that served to introduce the 'morpheme' notion in section 1, then we must concede that the units that deserve 'sign' status, as an alternative to words, are not after all morphemes but allomorphs of morphemes.[9] Furthermore, if /ɪz/, /z/ and /s/ are all *signifiants* of signs whose *signifié* is 'plural', the morpheme that they all belong to seems somehow superfluous from the point of view of the Saussurean sign, constituting neither a *signifiant* nor a *signifié*. On the other hand, if we wish to continue to say that it is morphemes that are signs, rather than allomorphs, we must depart from the Saussurean doctrine that a *signifiant* is a linearly ordered string within the speech chain (/ɪz/, for example), and say instead that it is, or may be, a set of linearly ordered strings in complementary distribution (/ɪz/, /z/ and /s/, in this instance).

The fact that the distribution of these allomorphs is phonologically conditioned may suggest an escape from this dilemma. If the choice between the three allomorphs is determined purely by constraints of English phonology, then perhaps we can say that, in phonological terms at least (although not phonetic), we really are dealing with only one string within the speech chain, not three. If so, the problem of multiple *signifiants* disappears, and the plural *-s* suffix conforms to the norm for a Saussurean sign.

The stumbling-block is not quite so easily surmounted, however. English phonological constraints do not supply a conclusive verdict on which allomorph is appropriate in all contexts. There are many contexts where more than one of the three allomorphs is phonologically admissible, and some contexts where all three are. Consider the noun *pen* /pen/. Its plural form is /penz/, complying with the generalisation that the voiced form of the suffix appears after voiced sounds (other than coronal stridents). But this is not because the alternative suffix shapes yield bad phonotactic combinations. Both /pens/ and /ˈpenɪz/ are phonologically wellformed, and indeed both exist as words (*pence* and *pennies*). So something more than pure phonotactics is at work in the choice between the three allomorphs. Only in terms of a phonological theory more sophisticated than any available in Saussure's time (for

[9] This is the view defended by Meľčuk (1993-2000).

example, contemporary Optimality Theory) can we motivate a single phonological underlier for all three.

Around the middle of the twentieth century, problems such as the one we have just encountered were typically handled by positing a level of analysis in some degree distinct from both phonology and morphology, called morphophonology (sometimes abbreviated to morphonology) or morphophonemics. The terms 'morphophonology' and 'morphophonological' are sometimes used to mean simply '(pertaining to) the interface between morphology and phonology'. However, morphophonemics has a more specific sense, implying a unit called a morphophoneme. In this instance, one might posit a morphophoneme /Z/ (say), realised phonologically as /ɪz/, /z/ or /s/, according to the context.[10] This allows us to posit a single *signifiant* underlying /ɪz/, /z/ and /s/, but at the cost (again) of recognising a *signifiant* which departs from Saussure's norm in that it is not pronounceable directly.

The morphophoneme /Z/, as just described, is realised by allomorphs that are distributed on a phonological basis. But complementary distribution may be based on grammar rather than phonology. English nouns such as *wife*, *loaf* and *bath* supply an illustration of this. In the singular, they end in a voiceless fricative: /waif/, /louf/, /baθ/. In the plural, however, their stems end in a voiced fricative (/waiv/, /louv/, /bað/). (This difference between the singular and plural stems is reflected orthographically in *wives* and *loaves*, though not in *paths*.) The allomorph of the plural suffix that accompanies them is therefore, as expected, the one that appears after voiced sounds: /z/. Do the singular and plural stems therefore belong to distinct morphemes? To say so would be consistent with Baudouin de Courtenay's usage. However, more recent linguists, influenced by the identity in meaning and the near-complete identity in sound in pairs such as has *wife* and *wive-*, have always treated them as allomorphs of one morpheme. Yet there is nothing phonological about the plural suffix that enforces the selection of the voiced-fricative allomorph. The noun *wife* itself can carry the possessive marker *-'s* to yield a form *wife's* /waifs/ with a voiceless fricative in a phonologically wellformed cluster. Moreover, not all nouns whose stems end in voiceless fricatives exhibit this voicing in the plural; for example, it does not occur in the plural forms *fifes*, *oafs* or *breaths*. So the voicing is restricted both lexically (it occurs in some nouns only) and grammatically (it occurs only when the plural suffix /Z/ follows). Some morphologists have handled this by positing morphophonemes such as /F/ and /θ/, units that are realised as a voiced phoneme in the plural and a voiceless one in the singular (Harris 1942). These nouns

[10] The convention of using capital letters to represent morphophonemes was quite widespread in the mid twentieth century (see e.g. Harris 1942). But capital letters were also used to represent a purely phonological notion, the archiphoneme. An archiphoneme is a unit that replaces two or more phonemes in a context where the contrast between them is unavailable, as for example in German the contrast between /t/ and /d/ is unavailable in syllable codas. The [t] that appears in codas in German was often said to realise not /t/, which would imply a contrast with /d/, but an archiphoneme /T/, implying no such contrast. It is important not to be misled by notation into confusing morphophonemes with archiphonemes.

can then be represented morphophonologically (rather than phonologically) as /waiF/, /louF/ and /baθ/.

The morphophoneme can be seen as a device which enables a morpheme to be analysed as having a single *signifiant* (and thus as constituting a single Saussurean sign) even when in terms of its phonology it seems necessary to recognise multiple allomorphs and hence multiple *signifiants* – a possibility that Saussure does not allow for. But is the morphophoneme device capable of handling all multiple-allomorph patterns satisfactorily? The answer is no, as I will demonstrate in the next subsections.

2.2 Case study: the perfect participle forms of English verbs

I use 'perfect participle' to refer to the form in which the lexical verb appears when accompanied by the auxiliary *have*, as in *I have waited*, *I have played*, *I have swum*. The regular English perfect participle suffix *-(e)d* has three shapes, /t/, /d/ and /ɪd/.[11] These are distributed in a fashion closely parallel to the allomorphs of the noun plural suffix: /ɪd/ appears after coronal plosives, while elsewhere /d/ appears after voiced sounds and /t/ after voiceless ones. But, just as with the noun plural suffix, phonology alone does not always guarantee the correct choice of suffix. For example, /'kænɪd/, /kænd/ and /kænt/ are all phonologically possible words and indeed actual words: *canid* 'member of the subgroup of mammals to which wolves and dogs belong', *canned* 'contained in a can' and *cant* 'hypocrisy'. These suffix shapes therefore illustrate the same stumbling-block and the same dilemma as the three shapes of the plural suffix. One way of handling this, as with the plural suffix, is to posit a morphophoneme (say, /D/), realised as /t/, /d/ or /ɪd/, according to the phonological context.

However, the perfect participle exhibits complications, one of which is not paralleled in noun plurals. Some verbs have a perfect participle form with the suffix /t/ (orthographically *-t* rather than *-ed*) which appears even where /d/ would be expected, because the last sound of the verb stem is voiced, or where /ɪd/ would be expected, because what precedes is a coronal plosive. Examples of these 'orthographic-*t*' verbs are *build* (perfect participle *built*), *bend* (*bent*), *feel* (*felt*), *keep* (*kept*), *spell* (*spelt*), *lose* (*lost*), *teach* (*taught*), and *buy* (*bought*). Corresponding to each of these it is possible to find a verb with a similar stem shape but whose perfect participle is formed with /t/, /d/ or /ɪd/ according to the regular pattern:

(1)

Orthographic-t verbs		Regular verbs	
Base	Perfect participle	Base	Perfect participle
build	built	gild	gilded
bend	bent	tend	tended
feel	felt	peel	peeled

[11] In many dialects other than mine, the third allomorph is not /ɪd/ but /əd/. This does not affect my argument, however.

keep	kept	seep	seeped
leave	left	heave	heaved
spell	spelt	fell	felled
lose	lost	ooze	oozed
teach	taught	bleach	bleached
buy	bought	lie	lied

As is clear, a further characteristic of orthographic-*t* verbs is that they nearly always display a stem form that differs from the base or present-tense stem. What immediately concerns us is the suffix, however. Is it or is it not a distinct morpheme from the regular /t/ (spelt *-ed*) which is in complementary distribution with /ɪd/ and /d/?

If we answer 'yes', we implicitly claim that the fact that /t/ is a common allomorph of the *-ed* morpheme as well as the sole allomorph of the *-t* morpheme is a mere coincidence. But, just as with *wife* and *wive-*, it goes against the grain to posit two distinct morphemes with the same meaning and such similar shapes. Thus the consensus in analyses of English verb morphology is that 'orthographic-*t*' in an allomorph of the same morpheme that regular /t/, /d/ and /ɪd/ belong to.

Can this morpheme be analysed in terms of a single *signifiant*, so as to constitute an orthodox Saussurean sign? Yes, it can, with the help of a device such as the morphophoneme. So far, we have posited a morphophoneme /D/ realised as /t/, /d/ or /ɪd/, according to phonological context. But in relation to *wife* and *wive-* we noted that the complementary distribution of allomorphs may involve grammatical or lexical rather than phonological factors. With /D/, we observe something new: a combination of lexical and phonological (though not grammatical) factors. In a description of English that makes use of the morphophoneme /D/, it will be specified that /D/ is realised as /t/ not merely after voiceless sounds but also with all verbs in the lexically specified 'orthograpic-*t*' class.

What about the stems that accompany the /t/ suffix with orthographic-*t* verbs? For a few of these, there is little one need say. For example, *spell* is phonologically /spel/ and its perfect participle *spelt* has the same stem shape. Morphophonemically, therefore, *spelt* can be analysed as /spel + D/, realised phonologically as /spelt/. But for *leave*, whose two stem shapes /liv/ and /lef/ are not predictable in purely phonological terms (as the comparison with *heave* and *heaved* demonstrates), the search for a single-*signifiant* analysis points us towards positing two morphophonemes: /E/, realised as /e/ in the perfect participle and the past tense forms and as /i/ elsewhere, and /F/, realised as /f/ in the perfect participle and the past tense forms and /v/ elsewhere. We thus arrive at /lEF + D/, with morphophonemes outnumbering conventional phonemes.

We have allowed ourselves considerable freedom so far in positing morphophonemes, for the sake of maintaining a unique Saussurean *signifiant* for each morphemic sign. Is this freedom objectionable? Not necessarily, inasmuch as each morphophoneme has application in more than one verb. For example, /E/ appears not only in *leave* but also in *feel* and *keep*, and /F/, standing for /v/ and /f/,

has a parallel in how /z/ and /s/ are distributed in *lose* and *lost*, and could perhaps be equated with the /F/ that we posited for nouns such as *wife*. But consider now the set of verbs whose perfect participle forms end in /ɔt/. Here is a full list, contrasted with other verbs with similar bases that form their perfect participles in other ways:

(2)

Verbs with /ɔt/		Other verbs with similar stems	
Base	Perfect participle	Base	Perfect participle
bring	brought	sing, ping	sung, pinged
buy	bought	cry, fly	cried, flown
catch	caught	match	matched
seek	sought	peek, speak	peeked, spoken
teach	taught	bleach	bleached
think	thought	sink, wink	sunk, winked

In each of the /ɔt/ verbs, the perfect participle form shares with the base form an initial consonant or consonant cluster, but nothing else. There are only six such verbs, but they are all in common use (except perhaps *seek*) and the pattern that they exhibit is consistent. It therefore goes against the grain to say that this phonological resemblance is accidental. In line with our thinking so far, then, we want to analyse both *bring* and *brough-* (for example) as allomorphs of a single morpheme. But in order to achieve this by means of morphophonemes, we would have to posit a unique morphophoneme that I will call /X/, realised by /ɔ/ or /ɪŋ/ according to context. All the other verbs would require unique morphophonemes likewise. Is it reasonable to posit for each verb a single signifiant such as /brX$_1$/ for *bring*, /bX$_2$/ for *buy*, /kX$_3$/ for *catch* and so on, each of them containing a morphophoneme that appears in this verb alone? This analysis allows us to claim that each verb morpheme has a single *signifiant*, but only by resorting to such freedom in positing morphophonemes that the claim becomes almost vacuous. It seems more honest to acknowledge that each of these morphemes has two *signifiants*, even if this means severing the link between morphemes and Saussurean signs.

It is scarcely necessary to debate this particular issue further, because the original expectation that allomorphs of one morpheme should be phonologically similar has been generally abandoned for independent reasons. The kind of reason can be illustrated again with the English perfect participle forms. We have so far discussed the suffixes -(*e*)*d* and -*t*, arguably realisations of a morphophonemic representation /D/. But /D/ is in complementary distribution, on a lexical basis, with a phonologically quite dissimilar suffix, *-en* (/ən/). This appears in a number of common verbs, such as *broken* (base form *break*), *spoken* (*speak*), *taken* (*take*), *given* (*give*), and *ridden* (*ride*). On the strength of such examples, most twentieth-century morpheme theorists decided that sameness of meaning (or grammatical function) and complementarity of distribution were enough by themselves to justify classifying a set of affixes as allomorphs of one morpheme.

It is worth considering at this point how far we have come since initially positing the morphemes *un-*, *help*, *-ful* and *-ness* in section 1. Each of those morphemes was realised by a single string within the speech chain, which constituted its *signifiant*

and could also serve naturally as its name, e.g. 'the morpheme *un*-'. Moreover, semantically indivisible units of this kind were natural candidates for analysis as Saussurean signs in languages where establishing word-boundaries is problematic. But a morpheme whose allomorphs include /t/, /d/, /ɪd/ and /ən/ is quite a different sort of entity. The phonological shape of these allomorphs is no longer what motivates their inclusion in a single morpheme; all that matters is their shared function ('perfect participle') and complementary distribution. There is no longer any *signifiant* that can serve conveniently as the morpheme's name. Instead we are likely to identify it by what in Saussurean terms looks like a *signifié*, as 'the perfect participle morpheme' or suchlike. Indeed, in Saussurean terms 'perfect participle' can indeed be treated as a *signifié* – but as the *signifié* of at least two distinct signs, whose signifiants are /D/ and /ən/.

The gap that our discussion has thus opened up between morphemes and signs is due to the fact that a morpheme, so far from being a string within the speech chain, has become now almost equivalent to a grammatical feature. There is now no reason to exclude as allomorphs of the perfect participle morpheme even realisations of 'perfect participle' that do not involve a suffix at all: that is, realisations by means of what Saussure would have called a 'zero sign' (e.g. *hit*, *spread*, *come*) and ones exhibiting a vowel alternation with respect to the base form (e.g. *sung*, *sunk*). Our morphological analysis of a form such as *sold* (perfect participle of *sell*) will no longer be in terms of a morpheme *sell* and a morpheme /D/, with allomorphs /soul/ and /d/ respectively. Instead, we now find ourselves saying that the perfect participle morpheme, when combined with the morpheme *sell*, is realised through a combination of vowel change (or perhaps a morphophoneme E, phonemically /ou/ in this context) and a suffix /d/.

2.3 Case study: English noun plural forms (part 2)

When we left off discussing English noun plural forms in section 2.1, I had suggested reasons for treating the regular suffixes /ɪz/, /z/ and /s/ in terms of a morphophoneme /Z/, and also positing morphophonemes such as /F/ and /θ/ to handle alternations like those between *wife* and *wives* and between *path* and *paths*. These reasons rested on the endeavour to maintain a close relationship between morphemes and Saussurean signs. We implicitly identified morphemes in terms of their *signifiants*: a morpheme /Z/ and a morpheme /waiF/. It is time now to see what the discussion of the perfect participle forms in section 2.2 implies for the analysis of English noun plurals.

Let us now think in terms of a morpheme 'plural' rather than a morpheme /Z/, requiring only complementary distribution, not phonological similarity, between its allomorphs. We can bring under the umbrella of such a morpheme not only forms such as *cats*, *dogs* and *horses* but also forms such as *formulae* (plural of *formula*), *cacti* (*cactus*), *children* (*child*), *geese* (*goose*) and *series* (*series*). The form *series* displays what Saussure might have called 'zero sign', namely a zero allomorph of the plural morpheme. The other forms show allomorphs consisting of various

combinations of vowel change, suffixation and subtraction (for example, the plural of *cactus* is formed through subtraction of /əs/ from /kæktəs/ and suffixation of /ai/).

Again, it is worth comparing where we are now with where we started from when we set out at the beginning of section 2 to explore the morpheme-as-sign position. We set out to explore an alternative to Saussure's view of the plural forms *flags* and *ships* as single motivated signs. The distribution of /ɪz/, /z/ and /s/ led us towards a view of the morpheme as something more abstract than a minimal meaningful string within the speech chain. Instead, it became an entity composed in part of units (morphophonemes) whose effect is to enable us to 'spell' not a single minimal string but a set of minimal strings (allomorphs) in complementary distribution. But, having moved that far away from phonologically concrete morphemes, it was a small step to go one stage further, and recognise allomorphs that are not strings within the speech chain at all, but rather processes of sound substitution applied to other strings. So what seemed like a straightforward alternative to words-as-signs for handling internally complex words has led us to a notion of the morpheme that is far removed from Baudouin's prototype.

2.4 Complementary distribution and inflection versus derivation

Readers who are familiar with the distinction between inflection and derivation may have been struck by the fact that all the discussion in section 2 has related to inflectional morphology, not derivational. Plural formation in nouns and perfect participle formation in verbs both involve different forms of the same word (in some sense), not the creation of different words by morphological means. Yet, when I introduced the term 'morpheme' in section 1, I illustrated it with derivational examples, in which new words are created by means of affixes: the noun *unhelpfulness* is created by affixing *-ness* to the adjective *unhelpful*, the noun *Londoner* is created by affixing *-er* to the place name *London*, and so on. How do these fit into the discussion about morphemes as signs?

At first sight, the set of nouns *Londoner*, *Muscovite*, *Parisian*, *Roman* and *Viennese*, all of them exhibiting a suffix and all meaning 'inhabitant of X' for some city X, seems eminently suitable for analysis in terms of an 'inhabitant' morpheme with allomorphs *-er*, *-ite*, *-ian*, *-an*, *-ese* and perhaps others, in complementary distribution. This 'inhabitant' morpheme may seem parallel in behaviour to the morpheme 'perfect participle' with its allomorphs /D/, /ən/, vowel change, etc. in complementary distribution. Yet this sort of analysis for these names of inhabitants is much more seldom suggested than the parallel analysis of the inflected forms. The reason for this is the looser structure of derivation by comparison with inflection. An inescapable though uncomfortable conclusion is that the complementarity in distribution observed by the American structuralists and installed by many linguists as a central element in the notions 'morpheme' and 'allomorph' has more to do with inflection in particular than with morphemes in general, in Baudouin's sense.

The tight structure of inflectional morphology is evidenced in three ways. First, for every syntactic feature or combination of features that is expressed morphologically on words of some class (say, 'perfect participle' or 'plural', in

English), we can nearly always be sure that for every word in that class there will be a wordform to express it. Thus, we can rely on the existence of a plural form for *man*, *cactus* and *flag* just by virtue of the fact that they are all countable nouns, even though the way in which 'plural' is expressed in these three nouns differs. Secondly, for every syntactic feature or combination of features that is expressed morphologically, we can nearly always be sure that there will be no more than one wordform to express it. Thus, the plural form for any one noun is nearly always unique in any one variety of English. Even though (for example) *cacti* and *cactuses* may both be acceptable as plural forms, usually any one speaker will use only one of them, or else will differentiate them by meaning ('cactus plants' versus 'varieties of cactus', for example). Thirdly, in inflection we do not typically regard allomorphs of two distinct morphemes as the same item, even if they are homophonous. Thus, the *-s* suffix of nouns and the *-s* suffix of verbs (for the third person singular of the present tense) are usually treated as two distinct though homophonous suffixes; we do not usually regard them as a single suffix with two radically distinct functions, or *signifiés*. This is partly, perhaps, because if they were a single suffix we would seem to be tolerating a peculiar kind of overlap between distinct morphemes: an allomorph of the 'plural' morpheme, as such competing with vowel change and a range of other suffixes, would be also an allomorph of the 'present tense' morpheme, with no competitors

None of these three characteristics applies in derivation. First, derivational morphology is 'gappy'. We cannot always be sure that a word with a given meaning will exist in parallel with other complex words with analogous meanings. The existence of *Londoner* and *Parisian* does not guarantee that the parallel existence in English of a word meaning 'inhabitant of Madrid' or 'inhabitant of Edinburgh'. Second, derivational morphology tolerates what seems like unnecessary duplication. This is not so obviously demonstrable with words for inhabitants of cities (although *Liverpudlian* and *Scouse* provide perhaps one example), but is clearly seen in pairs with overlapping meanings such as *admission* and *admittance* from *admit*, *speciality* and *specialism* from *special*, and the nouns *leakage* and *leak* from the verb *leak*. I carefully said 'with overlapping meanings' rather than 'with the same meaning', because there is a deeprooted tendency in all languages to avoid perfect synonymy. The point is, however, that derivation typically does not operate so as to provide one and only one filler for each cell in a matrix of morphologically and semantically related words. Third, linguists are generally happy to treat the *-er* of *Londoner* as the same suffix as the *-er* of *writer*, *cooker* and *tenner* 'ten pound note'. Doing this allows them to discuss the variety of semantically related functions that this suffix performs. However, we could not conveniently talk in these terms if the *-er* of *Londoner* were regarded as an allomorph of an 'inhabitant' morpheme in complementary distribution with -(*i*)*an*, *-ese* and *-ite*. It would then be, for the purposes of word-formation, an entirely different item from the *-er* of *writer*, which would belong to (perhaps) an 'agent' morpheme with other allomorphs such as *-ist* (as in *typist*), *-eur* (*masseur*), and *-ian* (*phonetician*).

To avoid misunderstanding, I should add that nothing that I have said implies that inflectional morphology is in any fundamental way more productive than derivational morphology is. The term 'productivity' is used to denote a variety of

independent characteristics, including (a) semantic predictability or transparency, (b) formal regularity, and (c) lack of the gappy character just described as characteristic of much derivational morphology. Inflection may in general be more productive than derivation in sense (c), but this implies nothing about senses (a) or (b) (Carstairs-McCarthy 2002a: 85-99).

What emerges is that in derivational morphology we find much less temptation to deviate from the rough-and-ready sense of 'morpheme' (an unanalysable affix or root) towards a more abstract sense, because complementary distribution plays a much smaller role in derivation than in inflection. It seems, then, the emphasis that Zellig Harris and others placed on complementary distribution may have guided the theoretical discussion of 'morphemes' in an unhelpful direction, so that inflectional and derivational 'morphemes' end up with little in common. For Saussure, by contrast, complementary distribution was seen as one kind of associative relationship, and associative relationships hold between whole words, not parts of words, whether these parts of words are called 'morphemes' (as in Baudouin's usage) or 'allomorphs' (as in the usage of American structuralists). So, even though Saussure did not investigate explicitly whether morphemes or words should be treated as the more fundamental units of linguistic analysis, the investigation carried out here (on Saussure's behalf, so to speak) tends to support Saussure's evident bias toward words.[12]

3. 'MORPHEMES' SINCE THE 1960S

Treating morphemes as Saussurean signs thus has uncomfortable consequences. However, linguists generally escaped having to confront those consequences because of a historical accident: the replacement of morphology by syntax as the main focus of attention in grammatical theory since the late 1950s. That is not to say that the term 'morpheme' disappeared from scholarly writing, and there has indeed been a modest revival in the study of morphology and word-formation since the mid-1970s. So far as the term 'morpheme' is concerned, three attitudes can be distinguished:

(a) The term 'morpheme' continues to be used, but some or all morphemes are explicitly not regarded as Saussurean signs.
(b) The term 'morpheme' continues to be used as a convenient cover term for roots and affixes, but without much theoretical weight being attached to it.
(c) The term 'morpheme' is no longer used.

I will mention some of the scholars who adopt each of these attitudes.

Attitude (a) is that of Aronoff (1975) and Meľčuk (1993-2000). Aronoff draws attention to the common morphophonological pattern exhibited by latinate verb-

[12] This conclusion in respect of morphemes is bound to be controversial, because it conflicts with that of Hans Marchand, discussed by Dieter Kastovsky (this volume). Marchand takes the view that any 'word-formation syntagma' must have a 'determinant-determinatum' structure, and both the determinant and the determinatum must be signs.

noun pairs such as *assume*/*assumption* and *deceive*/*deception*. Verbs containing the element *-sume*, such as *assume*, *presume*, *resume* and *consume*, all have corresponding nouns in *-sumption*. It would be unsatisfactory to treat this pattern of verb-noun correspondence as a set of coincidences. We thus need to state a generalisation concerning the verbal element *-sume* and the shape of corresponding nouns. However, this verbal element has no identifiable meaning; that is, there is no common semantic thread linking *assume*, *presume*, *resume* and *consume*, such that the differences between them can be straightforwardly ascribed to the different prefixes. Therefore *-sume* cannot be regarded as a Saussurean sign, because it has no identifiable *signifié*. The same point can be made in relation to the element *-ceive*, as in the verbs *perceive*, *deceive*, *conceive*, *receive*, etc., all of which have a corresponding noun in *-ception*. Aronoff's answer is that *-sume* and *-ceive* (as well as the prefixes that combine with them) are morphemes, but morphemes are not always signs. For at least some complex words, then, Aronoff adopts the word-as-sign position.

Meľčuk's resolution of this dilemma involves rejecting the morpheme-as-sign position entirely. For Meľčuk, morphemes are never signs, but (allo)morphs always are. Thus, the English plural morpheme is not a sign; rather, its allomorphs /z/, /s/, /ɪz/ and /ən/ are four distinct signs that share the same *signifié*. (The first three allomorphs, whose distribution is phonologically predictable, also share a more abstract 'underlying' or 'basic allomorph'). Elements such as *-sume* and *-ceive*, precisely because they have no identifiable *signifié*, are not morphs (much less morphemes), but rather 'submorphs'. In a word such as *assume*, it is only the word as a whole that counts as a morph.

Versions of attitude (b) are adopted by Halle (1973), McCarthy (1981), Lieber (1992) and Halle and Marantz (1993). For Halle, 'morphemes' are simply roots and affixes, combined by rules of word formation to yield potential words. McCarthy's interest is in the nonconcatenative morphology of Semitic languages such as Arabic and Hebrew, where typically the lexical content of a word is expressed by three consonants, while derivational and inflectional information is conveyed by the vowels that intervene between them and by the prosodic template (of consonantal and vocalic positions) to which they are linked. McCarthy uses the term 'morpheme' for (among other things) the elements /a/ and /u i/ which are linked to the vowel positions in Arabic *katab* 'write' and *kutib* 'be written'. Many of these elements could be regarded as Saussurean signs with discontinuous *signifiants*. However, what interests McCarthy is not what they mean so much as how they are linked via 'autosegmental tiers', and for him the term 'morpheme' seems a label of convenience without much theoretical freight. The same applies to Halle and Marantz. They propound an approach to morphology involving a level of structure at which 'Vocabulary items' (roots such as *give* or affixes such as *-en*) are inserted at 'terminal nodes' which may consist of lexical place-holders such as 'Verb Stem' or complexes of syntactic features such as [+participle, +past] (the features with which they label what I have called the perfect participle in English). In a structure where a Stem node and a [+participle, +past] node are sisters, in that order, the suffixes *-en* and *-d* respectively are clearly the appropriate Vocabulary items to insert at the

second node if *give* and *live* respectively are inserted at the first. As for the term 'morpheme', Halle and Marantz announce that they will apply it to terminal nodes both before and after Vocabulary insertion, so that the feature bundle [+participle, +past] and the suffixes *-en* and *-d* all count as morphemes, 'although nothing hinges on this terminology' (1993: 114).

Versions of (c) have been adopted in approaches that attribute little or no theoretical importance to the difference between concatenative morphology (stems and affixes) and nonconcatenative (vowel change, stress alternations, and the like), or to boundaries within complex wordforms (Anderson 1992; Stump 2001). Another version of (c) is Carstairs-McCarthy's approach (1994, 2002b). Carstairs-McCarthy, like Anderson and Stump, does not use the term 'morpheme', but, like Halle & Marantz, he attaches importance to the difference between concatenative and nonconcatenative phenomena. He explores the possibility that morphology is constrained by a requirement that every stem and affix should have a distinct *signifié*. This requirement is at first sight comprehensively falsified by numerous examples, such as the fact that *-en* and /D/ both function to express 'perfect participle' in English. However, it yields interesting empirical consequences if, under precise conditions, *signifiés* are allowed to include phonological and morphological information as well as semantic and syntactic information. Here, then, is an approach that exploits the Saussurean sign and treats affixes and stems (not just words) as signs, but makes no use of the notion 'morpheme'.

Faced with this diversity of usage and assumptions, my advice to readers is predictable. Whenever they encounter the term 'morpheme', they should be wary. They should establish whether the emphasis is on the phonological shape of minimal units, so that (for example) the suffixes in *given* and *lived* count as distinct morphemes, or on the meanings or functions of these units, so that the suffixes in *given* and *lived* count as belonging to the same morpheme.[13] It will be understandable if many readers conclude that the term 'morpheme' has hindered rather than helped our understanding of how morphology works.

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REFERENCES

Anderson, Stephen R. 1992. *A-Morphous Morphology*. Cambridge: Cambridge University Press.

[13] A similar warning is offered by Mugdan (1985).

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. (Linguistic Inquiry Monographs, 1). Cambridge, Massachusetts: MIT Press.
Baudouin de Courtenay, Jan. 1972. *A Baudouin de Courtenay Anthology*, ed. by Edward Stankiewicz. Bloomington: Indiana University Press.
Bloch, Bernard. 1947. "English verb inflection." *Language* 23, 399-418. (Reprinted in Joos 1957)
Bloomfield, Leonard. 1933. *Language*. New York: Holt.
Carstairs-McCarthy, Andrew. 1994. "Inflection classes, gender and the Principle of Contrast." *Language* 70, 737-88.
Carstairs-McCarthy, Andrew. 2002a. *An Introduction to English Morphology*. Edinburgh: Edinburgh University Press.
Carstairs-McCarthy, Andrew. 2002b. "How stems and affixes interact: stem alternants as morphological signata." In: S. Bendjaballah; W. U. Dressler; O.E. Pfeiffer; and M.D. Voeikova (eds.), *Morphology 2000 (Proceedings of the 9th International Morphology Meeting, Vienna, 2000)*. Amsterdam: John Benjamins, 49–57.
Halle, Morris. 1973. "Prolegomena to a theory of word formation." *Linguistic Inquiry* 4, 3-16.
Halle, Morris and Marantz, Alec. 1993. "Distributed Morphology and the pieces of inflection." In: K. Hale and S. J. Keyser (eds.), *The View from Building 20*. Cambridge, Massachusetts: MIT Press, 111-76.
Harris, Roy. 1987. *Reading Saussure*. La Salle, Illinois: Open Court.
Harris, Zellig S. 1942. "Morpheme alternants in linguistic analysis." *Language* 18,169-80. [Reprinted in Joos 1957].
Hockett, Charles F. 1947. "Problems of morphemic analysis." *Language* 23, 321-43. [Reprinted in Joos 1957].
Hjelmslev, Louis. 1961. *Prolegomena to a Theory of Language* (revised English edition). Madison: University of Wisconsin Press.
Joos, Martin. 1957. *Readings in Linguistics I: The Development of Descriptive Linguistics in America 1925-56*. Chicago: University of Chicago Press.
Lieber, Rochelle. 1992. *Deconstructing Morphology: Word Formation in Syntactic Theory*. Chicago: University of Chicago Press.
Malinowski, Bronislaw. 1935. *Coral Gardens and their Magic* (Vol. 2). London: Allen & Unwin.
McCarthy, John J. "A prosodic theory of nonconcatenative morphology." *Linguistic Inquiry* 12, 373-418.
Meľčuk, Igor. 1993-2000. *Cours de morphologie générale* (5 volumes). Montreal: Les Presses de l'Université de Montréal.
Mugdan, Joachim. 1986. „Was ist eigentlich ein Morphem?" *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 39, 29-43.
Robins, R. H. 1990. *A Short History of Linguistics* (3rd ed.). London: Longmans.
Saussure, Ferdinand de. 1973. *Cours de linguistique générale* (ed. by Charles Bally, Albert Sechehaye and Albert Riedlinger; critical edition by Tullio de Mauro). Paris: Payot.
Saussure, Ferdinand de. 1983. *Course in General Linguistics* (translated by Roy Harris). London: Duckworth. (Republished 1986 by Open Court, La Salle, Illinois)
Stump, Gregory T. 2001. *Inflectional Morphology: A Theory of Paradigm Structure*. Cambridge: Cambridge University Press.

WORD-FORMATION AND PHONOLOGY

ELLEN M. KAISSE

1. INTRODUCTION

If phonology deals in sounds – their production, arrangement, alternations, relative prominences, and so on – one might expect the ideal phonological process to refer only to phonological entities: features, segments, tones, syllables, metrical structure, and the like. One would not expect morphological information to play any role in determining whether or how the phonology operated. Why should the consonant cluster at the end of the verb *collápse* attract stress to the final syllable while the similar clusters at the end of the third person form *édit+s* or the noun *lárynx* do not? Why should the strings of syllables in *còndènsátion, còmpensátion, and Pènnsylvánia,* which are phonologically nearly identical as far as the characteristics that determine stress go, result in a secondary stress falling on the second syllable of *còndènsátion* but not on the second syllables of the latter two words? The phonologies of languages in general and of English in particular, abound in cases like these, where the morphological make-up of a word has a considerable influence on its pronunciation.Word formation, in particular, has strong effects on English phonology: the presence of a secondary stress on the second syllable of *còndènsátion* has everything to do with there being main stress on the corresponding syllable of its base, *condénse*. To take another example, the preantepenultimate stress and string of three unstressed syllables in adverbs like *signíficantly, húmorously,* and *pérsonally*, otherwise very unusual in English, is obviously related to their derivation from the innocuously antepenultimately stressed adjectives *signíficant, húmorous,* and *pérsonal*. We will look in more details at cases like these and others in this chapter.

Reasoning along the same lines, if morphology deals in meaningful units and their arrangement, we could imagine that the ideal system, from the morphology's standpoint, would result in the same phonological event always being associated with a given morpheme. There should be no allomorphy caused by the requirements of the phonological system. Why should the plural morpheme in *cats* be [s] but [z] in *dogs*? Why should the stresses in *phótogràph* fall on the first and third syllables of the stem, but on the second syllable in *photógraphy,* resulting in such wholesale allophony in the vowel qualities and, for North American speakers, in the /t/ as well? Yet again, languages are replete with phonologically mandated alternations of morphemes. Indeed, in languages with concatenative morphology, much of the phonology seems to be triggered by the combination of sounds put together by morpheme combination.

Finally, if morphology were to have its way, we would not expect the phonology ever to place limits on what combinations of meaningful units the morphology could

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 25—47.

put together. Yet in numerous well-documented cases taken from diverse languages, there are instances where morphological processes cannot even occur if a certain phonological output would result, or, to look at it another way, where the morphology must make reference to phonological properties, properties frequently not present in the underlying representation.

There is, therefore, an inherent tension between the goals of the morphology and of the phonology. And there is an interaction between them which must be modeled in any theory, derivational or constraint-based. In this chapter, we will look at some of the major processes of English in which morphological effects can be seen in phonological rules, and in which phonological effects can be seen in morphology. Clearly we cannot hope to cover all such interactions, and the reader is encouraged to consult the many detailed treatments of English phonology-morphology relationships that have appeared in the literature. I have tried to refer to a cross-section of them here, but my bibliography is only meant as a starting point and leaves out more significant pieces of scholarship than it is able to mention.

2. EFFECTS OF LEXICAL CATEGORY, MORPHOLOGICAL STRUCTURE, AND AFFIX TYPE ON PHONOLOGY

In English, the most striking and pervasive effects of morphology on the application of phonological processes can be seen in the stress system. English *stress rules* are sensitive to

(a) the morphological category of the word being stressed – for example, verb *vs.* noun;
(b) whether or not the word has an affix – for example, suffixed adjectives are stressed like nouns while unsuffixed ones are stressed like verbs;
(c) the type of affix involved – some affixes affect stress, others are 'stress-neutral'; this explains for instance why the addition of the adverb-forming suffix *-ly* noted above can result in stress four syllables from the end of the word;
(d) whether the word is related to an independently occurring word – the so-called cyclic effect, which in part explains the difference in stress between *còndènsátion* and *Pènnsylvánia.*

2.1 Effects of lexical category and of morphological complexity

The basic metrical system of English favors moraic trochees, much like that of many languages (Hayes 1995). One of the last two syllables of a word is stressed, and alternating syllables before the stressed one also receive stress, resulting in a phonologically pleasing alternating pattern of weak and strong syllables:

(1) a. *púrple*, *áqua*, *crímson*, *fúchsia*, *magénta*, *siénna*
b. *maróon*, *ovért*, *políte*, *maríne*, *robúst*
c. *àmarýllis*

The adjectives above have stress on the penultimate syllable (1a) unless the final syllable is extra-heavy, that is, contains two consonants or a long vowel (1b). When the word gets long enough, as in (1c), a secondary stress appears two syllables back from the righthand stress, as in the first *a* of *àmarýllis.* There aren't very many morphologically simple but long adjectives in English to fill out the (1c) examples, but there are dozens of other monomorphemic long words in English that show us this rhythmic repeating strong-weak pattern, such as the place names: *Mìssissíppi*, *Còlorádo*, *Shèndandóah*, *Càrolína.*

Verbs, like unsuffixed adjectives, are stressed on last syllable if it is heavy, otherwise on penult. The (a) forms in (2) below have long vowels or diphthongs in the ultima, while the (b) forms have the two consonants needed to make a syllable heavy after final consonant extrametricality is taken into account. The forms in (c) end in a single short vowel plus a single consonant, so they are stressed on the penult.

(2) a. *obéy*, *atóne*, *arríve*
b. *molést*, *usúrp*, *tòrmént*,[1] *collápse*
c. *astónish*, *édit*, *devélop*

Verbs too show an alternating pattern when they are long enough to require additional stresses:

(3) *démonstràte*, *récognìze*, *mánifèst*, *expérimènt*

However, observations made first in Chomsky and Halle (1968; henceforth *SPE*) will show us how morphology intervenes.

First, the lexical category of the word matters in English.[2] While verbs and unsuffixed adjectives show the quantity-sensitive trochaic pattern we have been observing, *SPE* argues at length that nouns in English do not show this final/penultimate stress pattern, but rather have all the action shifted one syllable to the left, so that stress appears on a heavy penult (forms in 4c) or, if the penult is light, on the antepenult (4a, b). The weight of the final syllable becomes largely irrelevant, as the forms in (4b) show.[3]

[1] The secondary stress on this form is due to its initial syllable being heavy.

[2] Some views of phonology are sufficiently restrictive as to refuse to categorize a process as phonological if it must mention specific lexical categories. See Bermúdez-Otero and McMahon (in press) for discussion.

[3] An added complication is that long vowels in the final syllable of a noun do attract stress (SPE: 77-79; Hayes 1982).

(4) a. *aspáragus*, *jávelin*, *América*[4]
b. *expériment*, *lábyrinth*, *témpest*, *hárvest*, *lárynx*
c. *agénda*, *uténsil*, *veránda*, *aróma*, *appéndix*

Morphology also intervenes in another way: adjectives containing a certain group of suffixes are stressed according to the noun pattern rather than pattern for verbs and underived adjectives. The adjectives in (1) are all underived – they contain no suffix. *SPE* shows that derived adjectives in English do not show this final/penultimate stress pattern, exhibiting instead the penult/antepenult behavior of the nouns.

(5) a. *ínnoc+ent*, *signífic+ant*, *ómin+ous*, *magnánim+ous*, *pérson+al*, *munícip+al*, *prím+itive*
b. *malígn+ant*, *momént+ous*, *autúmn+al*, *àdjectív+al*, *expéns+ive*

Notice in particular that the suffixes *-ent/-ant* end in two consonants, but those consonants do not attract stress as they do in the simple adjectives *ovért, robúst.* So the mere presence or absence of a suffix may affect the phonology of stress. *SPE* (38ff) notes a similar affix-dependency for nouns. While, as we've seen, a heavy penult normally attracts stress in a noun, those nouns derived with the affix *-y* as in *índustry, énergy, módesty*, and *gálaxy,* skip the heavy penult and place stress on the antepenult.[5]

2.2 Cohering and non-cohering affixes

If the English stress system did not already seem intricate enough, it turns out that it involves one more major complication. Not only lexical category and the simple presence or absence of an affix affects English stress. Like many other languages, English has two different kinds of suffixes (and prefixes), often referred to as *cohering* and *non-cohering*.[6] The adjectival suffixes *-ous* and *-al* and the others

[4] While stress in English is largely rule governed, there are cases where the stress rules strictly limit but do not uniquely predict the correct output. For instance, many vowel-final nouns in English receive stress on the penult even when it is light (Nessly 1977). Thus, while *América* and *Pámela* have the generally expected penultimate stress, vowel-final *spaghétti*, *Colorádo*, and *Mississíppi* show the sub-regularity of penultimate stress.

[5] Some treatments of English stress treat noun-forming *-y* and adjectival suffixes like *-ent*, *-al*, *-ous,* and even the multi-syllabic *-ative* and *-atory* as 'extrametrical', that is, that they are ignored in the syllable count. Extrametricality should not be confused with being non stress-affecting or non-cohering (see immediately following section, especially example (6)), as they do affect position of stress in the base to which they are added and have multiple other effects on the syllabification and segmental phonology of their bases.

[6] A welter of overlapping but not entirely equivalent terms exists to refer to the bipartite division of affixes. *SPE* refers to them as *stress-affecting* and *stress-neutral*, and uses the juncture symbols *+ vs. #* in attaching them to bases. Whitney (1889), in his discussion of Sanskrit, uses the terms *primary* and *secondary*. Work after Siegel (1974) often uses the terms *class 1* and *class 2*, while Lexical Phonology and Morphology calls them *level* (or stratum) *1* and *level* (or stratum) *2* (Kiparsky 1982). One often finds reference to *stem-level vs word-level* affixes (based on the idea that cohering affixes

illustrated in (6) are cohering – that is, they interact with the rest of the word in determining its phonology. Note that adding those suffixes can result in the main stress falling in a different place than it does in the unaffixed word:

(6) *móment* *moméntous*
áutumn *autúmnal*
ádjective *àdjectíval*

The presence of the suffix may also result in the laxing of a vowel, according to the rule of *Trisyllabic Laxing*, which requires vowels three syllables or more from the end of a word to be lax, so long as the following syllable is unstressed:

(7) *o#men* *ŏminous*
mali#gn *malĭgnant*
li#ne *lĭnear*
compe#te *compĕtitive*
pe#nal *pĕnalty*

And a vowel-initial cohering suffix can provide the nucleus to which a stem-final sonorant consonant will attach as onset. When the suffix is absent, that sonorant must become the nucleus of a syllable itself. (*SPE*: 85-86).

(8) *disastr-ous/disaster, hindr-ance/hinder, cycl-ic/cycle, rhythm-ic/rhythm*

To summarize, in the so-called cohering suffixes, the phonology is sensitive to the presence of the suffix. However, English has many non-cohering or 'neutral' suffixes as well. These do not seem to have any effect on the position or degree of stress. The non-cohering suffixes of English consist of virtually all inflectional suffixes,[7] plus a subset of the derivational ones. I list some of the more common neutral derivational suffixes in (9), using the criterion of whether the suffix is taken into account when assigning stress.

(9) *-able*, *-er (agentive)*, *-en*, *-ful*, *-hood*, *-ish*, *-ism*, *-ist*, *-ize*, *-less*, *-like*, *-ment*, *-ness*, *-ly*, *-wise*, *-y (adjective-forming)*

In (10) are some of the major stress-affecting suffixes.

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seem able to attach to bound stems as well as to independent words while non-cohering affixes attach only to words). Cohering affixes are said to be in close juncture, while non-cohering ones are in open juncture.

[7] Kiparsky (1982) makes the point that some inflectional suffixes have allomorphs that are added at level 1 and have phonological (cohering) effects on their bases: *keep/kept*, *hide/hidden*, *child/children.*

(10) *-age, -al*, *-an*, *-ant*, *-ance, -ary*, *-ate*, *-ic*, *-ion*, *-ify*,[8] *-ity*, *-ory*, *-ous*, *-y (noun-forming)*

We saw in (2) that verbs are typically stressed on an extra-heavy ultima or on the penult. However, inflectional suffixes do not affect the syllable count nor cause verbs to be stressed as if they ended in two consonants. The same is true of a stress-neutral suffix like verb-forming *-ize*:

(11) *astónishing*, *astónishes*, *édits*, *devélops*, *Áfricanize*, *partícularize*

English also has a general rule that tells us which of a number of stresses in a word will be the main stress – that is, which of the feet contains the head of the metrical structure: it is the rightmost stress that has at least one syllable after it.[9] In other words, the very last syllable of words with more than one stress is not usually the one that receives the main stress.[10] Only a final foot that branches gets to contain the head syllable of the word. So, in the following monomorphemic words with alternating stresses, the last stress wins out as main stress in (12a) because the last stressed syllable has another syllable following it. In (12b), however, the second-to last-stress emerges as the main stress and the final stressed syllable receives only secondary stress:

(12)

a.		b.	
Mìssissíppi		*Pánamà*	
Thèodóra		*Théodòre*	
Càrolína		*Cárolìne*[11]	
Tìcònderóga		*níghtingàle*	

In the examples in (13), a stress-affecting suffix counts for making a syllable non-final and thus eligible for the main stress.

(13)

dialèct	*dìaléctal*
ánecdòte	*ànecdótal*
óriènt	*òrièntátion*
Páragùay	*Pàragúayan*
mánifèst	*mànifèstátion*

[8] Raffelsiefen (2004) argues that *-ify* is not really stress-affecting. Rather, it selects already-existing stems with stress that may happen to fall in a different place than in the underived adjective. Thus, for instance, she argues that *solídify* is based on the (stressed) stem of *solídity* rather than the word *sólid*. See section 7 for further discussion.

[9] This generalization was first noted, I believe, in *SPE*. It has been restated and refined repeatedly in subsequent years.

[10] There are several suffixes, such as *-ése*, which receive main stress in contradiction to this large generalization. Other sub-regularities as well as this one, such as the tendency of word-final verb stems to be stressed (*injéct*, *conféss*) are discussed at some length in Liberman and Prince (1977.)

[11] The example is relevant, of course, only in the pronunciation where the final syllable is unreduced [àjn].

However, the stress-neutral suffixes are not visible to this rule – they do not count as adding a final syllable and their presence therefore does not result in the preceding syllable receiving main stress.

(14) *dialècthood*, *ánecdòte-like*, *mánifèstly*, *òriènting*

Similarly, these neutral suffixes are not relevant in determining the position of the rightmost stress (that is, the rightmost foot) – words containing them have stress in the position it occupies in the word they are derived from, even if that results in unstressed closed syllables, sequences of unstressed syllables (lapses), or rightmost stresses falling more than three syllables from the end of the word. Compare the position of stress in the words in (15a), their unchanged derivatives with stress-neutral affixes in (15b), and their derivatives with stress-affecting affixes in (15c).

(15)	a. *rígid*	b. *rígidness*	c. *rigídity*
	órigin	*óriginless*	*oríginal*
	módern	*módernism*	*modérnity*
	hóspital	*hóspitalize*	*hòspitálity*

Turning to phonological phenomena other than stress, we notice that the neutral suffixes cannot rescue an otherwise unsyllabifiable stem-final sonorant consonant.[12]

(16)	a. *hinder*	b. *hindering*	c. *hindrance*
	rhythm	*rhythm-y*	*rhythmic*
	meter	*metering*	*metrical*

And they do not provide the syllable count needed to trigger Trisyllabic Laxing.

(17)	a. *me#ter*	b. *me#tering*	c. *mĕtrical*
	na#tion	*na#tionhood*	*năational*
	o#men	*o#menlike*	*ŏminous*
	spi#ne	*spi#nelessness*	

Neutral suffixes also do not trigger the rule of velar softening.

(18) a. *pirate*, *pirac+y* b. *meat*, *meat#y*

We have now seen that English phonology must have access to the morphological structure of a word, its lexical category, and the distinction between

[12] Indeed, Booij (1977, 1995) argues that, at least for Dutch, which shows a similar bifurcation in its affixes, the effect that an affix has on syllabification is the main criterion on which to decide which class it falls into. Affixes that don't interact in the basic syllabification of a word are considered to fall outside the phonological word. Such affixes show a mismatch between their morphological structure (one morphological word) and their phonological structure. For more discussion of 'co-present' and possibly conflicting morphological and phonological structures, see Inkelas (1994).

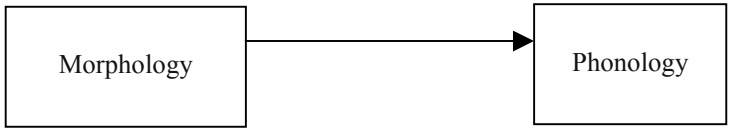
two kinds of affixes. In this way, morphology may interfere in the normal workings of phonology, creating clashing stresses (*còn**dènsá**tion*), strings of unstressed syllables (*ór**iginless)*, heavy syllables with no stress on them (*rí**gid**ness),* non-primary rightmost stresses followed by another syllable (*día**lècthood)*, syllabic sonorants before vowels (*hinder**ing)*, and other otherwise mysterious complications in the sound patterns of the language. We turn now to interactions of the opposite kind, where morphology seems to be required to take phonological factors into account. In section 6 we will to return to discuss another kind of morphological influence on phonology – the so-called *cyclic effect* seen in *còndènsátion*, where some aspects of the pronunciation of a word are carried over into words formed from that word.

3. MORPHOLOGY LIMITED BY THE PHONOLOGICAL FORM OF THE BASE OF AFFIXATION

The literature contains a number of cases where phonology influences the ability of morphology to act as it otherwise would if unfettered. Hargus (1993: 48-52) contains an excellent summary and evaluation of the most convincing cases of this kind, though she does not talk about any English examples at length. In one common type, a suffix has different allomorphs depending on the length of the base, the base's stress pattern, or the segment in which the base ends. Thus in German (Hall 1990), one deverbal suffix has the allomorph *-erei* when added to verb stems with final stressed syllables, while *-ei* is added to other verb stems. Perhaps the most often-cited case of affixal sensitivity to phonology is that of the affixation of *-al* to verbs to form nouns. Siegel (1974) discovered that this *-al* (not to be confused with the adjective-forming *-al* found in *autumnal)* can only be added to verbs with final stress. Thus we find *arrival, bestówal, reférral, avówal, renéwal,* and so on, but not **édital, *énteral,* or any other non-finally stressed verb plus *-al*.[13] Another thoroughly documented case is that of *-ize* (Marchand 1969, Orgun and Sprouse 1999, Raffelsiefen 2004), which can only be productively affixed to items with non-final stress. In both these cases, the interest for the phonology-morphology interface is clear. Stress is a derived, largely predictable phonological property, not present in underlying forms. If we did not have to deal with such cases, the simplest theory of how phonology and word formation interact would be for them to have a single interface. Word formation would assemble all the morphemes, after which phonology would deal with the result.

[13] Hargus (1993) argues that *-al* affixation is too lexically unpredictable to serve as a clear example of morphology dependent upon phonology. For instance, *arrival* exists but **derival* does not. While I continue to think that final stress is a necessary, if not sufficient, condition for *-al* affixation, the case of *-ize* is more extensively documented. Siegel also finds stress-dependent behavior for deverbal *-ful (forgétful),* which attaches to verbs with final stress, and syllable counting behavior for de-adjectival *-en*.

(19)



In such a model, which is basically that of *SPE*, there is no obvious way for a morphological rule to have access to derived phonological information such as the position of stress. Such models may be called *non-interactionist*.[14] An *interactionist model*, on the other hand, proposes that some affixes can be added, followed by some phonological operations, followed by additional affixation:

(20) *arrive* → *arríve* → *arríval*

One of the most widely adopted views of morphology-phonology interaction in the 1980's and early 1990's was *Lexical Phonology and Morphology* (LPM) (Kiparsky 1982, Mohanan 1982, Kaisse and Shaw 1985, Hargus and Kaisse 1993 and many others.) LPM adopts Siegel's interactionist view that morphological and phonological operations can be interspersed, again with stress assignment potentially occurring before some morphological affixation. We will discuss LPM and its problems in section 2.1.4.

In a non-derivational model like Optimality Theory, one can use constraint ranking to allow phonological considerations like those disfavoring clashing or lapsing stresses to outweigh the generally productive ability of the morphology to form new words. Raffelsiefen (2004) provides an interesting way of looking at the tension between morphology and phonology. She asks us to consider the lexically stressed suffixes *-ée*, *-ése*, and *-éer*. Each of these suffixes not only receives stress, as we might expect of a suffix containing a tense vowel, but must be marked in the lexicon to receive main stress.[15] When *-ée*, *-ése*, or *-éer* are added to bases that end in unstressed syllables, no problem arises with respect to the resulting stress pattern. Forms like *exàminée, vìsitée, mòuntainéer,* and *mèdicalése* do not have adjacent, hence clashing stressed syllables. However, the phonology finds a different solution for each of these three suffixes when the morphology attempts to coin words on bases with final stress.

For *-ése*, the solution is a repair: stress is shifted off the final syllable of the base to a preceding syllable:

[14] See Odden (1993) for a proposal about how one might replace the interactionist models current in the heyday of Lexical Phonology and Morphology and return to a non-interactionist model that maintains, nonetheless, the segregation of lexical from postlexical phonology.

[15] Recall that normally a final syllable does not receive the main stress in English. Certain morphemes and other strings, such as the *óon* of *ballóon* and *pòntóon* must be marked to receive main stress in contradiction to this generalization.

(21) Taiwán+ése → Tàiwanése
Japán → Jàpanése

The result violates a general family of constraints called *paradigm uniformity* constraints. The iambic stress pattern of the base is not maintained in the derivative. But at least the morphology is permitted to create the new word. Within Raffelsiefen's analysis, it is better to move the stress than to allow adjacent stresses. *CLASH dominates PARADIGM UNIFORMITY (PU) [STRESS]. The constraint that forces the phonology and morphology to compromise and create some form, M-PARSE (Prince and Smolensky 1993), also dominates PU [STRESS].[16]

(22) Ranking for *-ése*: *CLASH, M-PARSE >> *PU[STRESS]

For *-éer*, however, the result is a gap. No adjustment is made by the phonology, and the morphology suffers by having no word formed at all. Raffelsiefen uses the tool of Google searches to discover what kinds of new words English speakers can form productively. Her searches turned up virtually no words of the form **baton-eer,* that is, *-éer* derivatives formed on bases with final stress. Raffelsiefen concludes that different suffixes in English invoke different constraint rankings. For *-éer*, M-PARSE is dominated both by the phonologically motivated *CLASH and by the morphologically motivated PU, so no compromise is reached and no pronounceable form emerges at all.

The factorial typology would predict we might also find cases where PU [Stress] wins out and *CLASH is violated, and Raffelsiefen argues that this ranking is instantiated for *-ée.* Finally-stressed bases are permitted to combine with this suffix, resulting in outputs with clashing stresses but where the derived form maintains the stress of the base. She finds many coinages like *selèctée,* and *retìrée.* In these cases, the morphology is not inhibited by the phonology, with the result that outputs which would not occur in morphologically simple words are readily found in derivatives.

4. LEXICAL PHONOLOGY AND MORPHOLOGY AND ITS ILLS

One of the most attractive features of the LPM model was its unification of apparent generalizations about the phonology of cohering suffixes, their interaction with morphology (especially their triggering of *cyclic rule* application), and their linear order. LPM adopts and elaborates the *level ordering hypothesis* (also known as the affix ordering generalization) of Siegel (1974). This hypothesis claims that cohering, stress-affecting (+-boundary) affixes (called level 1 affixes in LPM) will occur close to the root, while non-cohering, stress neutral (#-boundary) affixes,

[16] One goal of Raffelsiefen's (2004) article is to support the original M-PARSE explanation for phonologically induced gaps over the revision to OT proposed by Orgun and Sprouse (1999). These authors have proposed that the EVAL(UATION) module of OT be supplemented with a CONTROL module, which contains inviolable constraints. If there is no way to satisfy the constraints in CONTROL, the 'null parse' results. This means that the morphology fails to parse the morphemes into a coherent, pronounceable word and a gap appears in word formation.

called level 2 affixes, will always occur outside the cohering ones. In other words, level 1 affixes cannot attach to a word to which a level 2 affix has already been attached. We can illustrate this claim with the schematization in (23), where A_C stands for a cohering affix and A_{NC} for a non-cohering affix.

(23) A_{NC} # A_{NC}# … # A_C + A_C + … +[root] + A_C + A_C …# A_{NC} # A_{NC}# … #

Thus, according to Siegel, Kiparsky (1982) and other LPM work, the non-existence of words like **happi#ness+al* or **sing#er+ous* comes from the fact that they contain a word formed with a non-cohering affix (*#ness, #er)* to which a cohering affix (*+al, +ous)* has been affixed. There is nothing wrong with these words as far as the part of speech of the base to which the final affix is added, since *-al* and *-ous* do attach to nouns (*person+al, danger+ous)*. Affix ordering permits words like *person+al+ity*, since both *+al* and *+ity* are level 1 suffixes. The word *danger+ous#ness* is also fine, since it contains a level 1 suffix followed by a level 2 suffix. And words with strings of level 2 suffixes are also fine: *seamlessly, seamlessness*. The correlation with phonology is that all the affixes starting from the stem outward to the first non-cohering affix should form part of the visible input to level 1 lexical phonological rules, while all of the affixes starting from the first non-cohering affix outward will not be the trigger or target of any such rule, and will only undergo postlexical rules, the ones that apply between words.[17]

In (24) I present a diagram of the workings of the LPM model, modified somewhat from the one found in Kiparsky (1982: 133).

(24)

	MORPHOLOGY		PHONOLOGY
Level 1 (stem level)	+boundary inflection and derivation; zero-derivation of nouns from verbs	⇔	stress rules, trisyllabic laxing, velar softening, sonorant syllabification. etc.
Level 2 (word level)	# boundary derivation and compounding, zero-derivation of verbs from nouns, most inflection		compound stress
syntax			postlexical phonology

In this model, morphological operations occur one affix at a time. Each time an affix is added at level 1, the form is passed to the level 1 phonology, which applies to the string as it is currently concatenated. The form is then passed back to the morphology at that same level, over to the phonology again, and so on until all level 1 affixes for that word are added. (Hence the ⇔ symbol between the level 1

[17] Borowsky (1993) achieves this result by ordering all phonological rules at level 2 (the word level) *before* all morphological operations at level 2.

morphology and phonology.) The cyclic application first introduced in *SPE* results from this interleaving of phonological and morphological operations at level 1. Then the form passes on to level 2. In English, it appears that all the cyclic phonological rules apply at level 1.

To illustrate the segregation of morphological operations into levels and the concomitant applicability of certain phonological rules only to strings created at that level, consider a point about the zero-derivation of nouns from verbs versus that of verbs from nouns made in Kiparsky (1982). As is well known, when nouns are derived from verbs with final stress, they preserve that stress as a secondary prominence but add a penultimate, primary stress of their own, as befits a noun. Thus we find noun/verb pairs such as *cónvìct* from *cònvíct, pérvèrt* from *pèrvért,* and *tórmènt* from *tòrmént.* In a derivational theory such as LPM, one would say that nouns are zero-derived from verbs at level one, and are thus subject to another cycle of the stress rules after that affixation occurs. However, Kiparsky argues, the zero-derivation of verbs from nouns takes place at level 2. Since the stress rules of English do not apply at level 2, the stress does not change in denominal verbs like *to páttern,* even though, as we noted above, primary verbs ending in two consonants receive final stress. Thus we could say that deverbal -∅ is a level 1, cohering suffix while denominal -∅ is a level 2, non-cohering suffix.

Classical LPM was probably the last model of phonology-morphology interaction to enjoy a wide consensus (Noyer 2004). However, it has been recognized for some time that it embodies at least one strong claim about word formation that is probably not correct, certainly not for English, namely the affix ordering hypothesis. Problems with any theory of the level ordering of affixes had been recognized as early as Aronoff (1976). Most well-known, at least among phonologists, are cases where affix ordering proves to be too strong a theory, ruling out combinations that actually occur such as *#ment+al* (*governmental)* and #iz+ation (*neutralization)*. As we have mentioned *-ment* and *-ize* are stress-neutral, as witnessed by a form like *góvernment,* with stress in the same position as its source verb and no stress on its heavy penult (compare the underived noun *appéndix*), and *márginalize*, with stress four syllables from the end of the word. But *-al* and *-ation* are stress-affecting. The unpredicted existence of syntactic phrases inside of compounds, and the existence words with sub-compounds inside co-compounds and of words with co-compounds inside sub-compounds, discussed for Malayalam by Mohanan (1982), form another class of difficulties for the affix ordering hypothesis, as do bracketing paradoxes like *un#grammatical+ity,* and *re#organiz+ation*. These and many other cases have demonstrated that the affix ordering hypothesis undergenerates.[18]

Equally interesting and less often discussed is Fabb's (1988) demonstration that the affix ordering hypothesis is too weak and overgenerates. Fabb notes that affix

[18] Within LPM, loops permitting a return to an earlier level of affixation were one major proposal for accounting for unexpected orderings and compound types; also helpful was reduction of the number of levels posited for a language, so that many affixation and compounding processes were available at every level. However, none of these LPM proposals was really satisfactory, and as far as I know, none could deal with the results of Fabb (1988) discussed shortly. See Spencer (1991: 397-420) for a discussion of the many proposals for dealing with bracketing paradoxes.

ordering restrictions account for only a small percentage of the sequences of affixes that simply don't occur in English. He lists 43 common affixes in English. If there were no affix ordering hypothesis, we might expect around 600 grammatical combinations of these affixes, if we simply made sure that affixes that selected for a particular part of speech were combined only with that part of speech, and that the particular stress requirements of the affixes like deverbal *-al* were met. With affix ordering, we can pare that number down to an expected 459 combinations. But English words actually contain only about 50 pairs of suffixes! The main reason for this is that 28 of the common suffixes – more than half – never combine with another suffix. Six suffixes combine with only one suffix; for instance *-ic* only attaches to unsuffixed stems or words (*comic, metallic)* or to the suffix *-ist* (*modernistic*). Six other suffixes are semi-productive: noun-selecting *-al,* for instance, combines with three cohering and non-cohering affixes *-ion, -ment,* and *-or*. Only *-able*, deverbal *-er*, and *-ness* show no selectional restrictions beyond part of speech. I am unaware of a response to Fabb's work within the LPM model.

The inevitable conclusion seems to be that the affix ordering hypothesis must be rejected, at least for English,[19] and with it, that part of Lexical Phonology and Morphology that rests upon it. I suspect that the enduring contributions of LPM will lie rather in its recognition of a set of fundamental characteristics of lexical rules and a largely complementary set that inhere in postlexical rules.[20]

In contrast to their rejection of the affix ordering hypothesis, both Fabb (1988) and Aronoff and Sridhar (1987) continued to believe in another tenet of level ordering, namely that the *word-boundary* (#) and *morpheme boundary* (+) affixes could be sorted into two coherent groups on the basis of their phonological behavior, just as had been claimed in *SPE* and LPM. The +boundary suffixes were available to rules of stress assignment – both those assigning stress, that is creating foot structure; and those choosing which of these would be the primary stress, that is, the head foot); they were available for syllabification so that the vowel-initial ones could bleed *Sonorant Syllabification* (*hinder, hinder#ing*, but *hindrance)*; and syllabification rendered their content visible to Trisyllabic Laxing so that they could provide sufficient material to place a vowel three syllables from the end of the word. I am not aware of many discussions that place this claim under the scrutiny that the affix ordering generalization has received. However, Raffelsiefen (2004) presents evidence that the division of affixes into two clear groups is too strong a claim. We return to her proposal in section 7.

[19] I do not know if arguments like Fabb's go through for languages with highly productive agglutinative suffixation, such as Turkish.

[20] Kaisse and Hargus (1993) summarizes the findings of the contributors to the volume *Studies in lexical phonology* and contains a discussion of the counterexamples to the predictions of LPM that had been amassed through 1990, when the conference on which the volume was based took place. They conclude that though almost every claim of LPM runs into counterexamples, the overall predictions of the theory continue to be valuable.

5. MORE RECENT DEVELOPMENTS OF LEXICAL PHONOLOGY AND MORPHOLOGY

With the arrival of *Optimality Theory*, much work in phonology in the last decade has simply turned to matters which are ancillary to the concerns of Lexical Phonology and Morphology.[21] As Hammond (2000) points out, few students in the United States are exposed to more than a cursory introduction to the results of that theory, and the question of whether Lexical Phonology is defunct is certainly worth asking. However, the answer seems to be 'no,' or at least 'not exactly'. In one response to earlier difficulties, Giegerich (1999) proposes to keep the basics of LPM while replacing its *affix-driven stratification* with a stratal organization that relies on the base to which affixation applies. Roots, which do not belong to any lexical category, are listed in the lexicon along with a list of the *root-level affixes* that can attach to each one. This listing accounts for the relative non-productivity and non-compositional semantics of such morphology. Once a root is converted to a word by having a lexical category label assigned to it, it enters the *word-level morphology* and can receive the more productive, semantically compositional affixes. Since affixes are not restricted to a single stratum, they can show both stem- and word-level properties and ordering. Hammond comments that the critical process of conversion to word is really not well explained in Giegerich's model – how, why and when does this happen, and what accounts for the fact that some bases become nouns while others become verbs or adjectives? Nonetheless, the idea of *base-driven stratification* may be worth pursuing.

Lexical Phonology and Morphology also survives in newer versions where it is married with Optimality Theory. Work by Kiparsky (2000), Bermúdez-Otero (1999, forthcoming,) and Rubach (2000), among others, uses ranked and violable constraints in conjunction with a division among stem-level, word level, and postlexical strata. Constraints can be ranked differently at each stratum, and the output of each stratum is used as the input to the next. Kiparsky (2000) goes so far as to say that on the stem level, every stem is a cyclic domain. Thus, presumably, there could be a new evaluation of candidates every time a stem-level suffix was added. However, an extended treatment of English morphology-phonology interactions within *Stratal Optimality Theory* has not yet appeared, to my knowledge.

[21] Noyer (2004), points out that various critical parts of the LPM theory are incompatible not only with classical monostratal Optimality Theory but also with the theory of Distributed Morphology (DM; see for instance Embick and Noyer 2001). He explains that LPM's inclusion of a lexical morphological and phonological module, which operates before syntactic structure is available, makes no sense within DM. In DM, the inputs to the syntax are not fully formed words but abstract morphemes whose assembly into both words and phrases is performed by syntax and post-syntactic morphology. Nonetheless, Noyer regrets the loss of the ability to characterize the *lexical syndrome*, that is the segregation of characteristics of lexical *vs.* post-lexical rules. I do not know of any treatments of English morphology-phonology interactions in DM.

6. HOW DO RELATED WORDS AFFECT EACH OTHER? THE CYCLE, TRANSDERIVATIONAL EFFECTS, PARADIGM UNIFORMITY AND THE LIKE

One of the major preoccupations of phonologists at least since *SPE* has been the question of how to capture the influence that the pronunciation of one word can have on other words related to or derived from it via word formation or inflection. Indeed, some form of this preoccupation goes back to the Neogrammarians, under the rubric of *analogical sound change*.[22] Perhaps the earliest influential modern treatment is that of Kurylowicz (1949). The topic returns us to wondering in what ways morphology – in this case, the relation of one word to another – can intervene in the otherwise purely sound-oriented basis on which phonology would prefer to operate .

The cycle of *SPE*, especially when put together with Brame's (1974) restrictions on when new word-internal cycles can be motivated, provided a constrained method of capturing some of these interactions. To oversimplify a bit, Brame argued that a morphologically complex word can undergo a second cycle of rule application only if it contains an independently occurring word that contributes its full meaning to the larger word. In Brame's most celebrated example, Arabic, /fihim#na/ 'he understood us' contains the third person verb /fihim/ (with a zero 3p. masc. sg. affix)) and thus maintains traces of the word-initial stress of the surface form *fíhim*, in this case by preserving the initial vowel rather than deleting it, emerging as *fihímna*. However, /fiihm+na/ 'we understood', does not contain the independent word 'he understood'; it does not contain any independent word but only the bound stem /fihim-/. Therefore, it undergoes only one application of stress assignment, receiving only penultimate stress, and its initial vowel must therefore be elided, yielding *fhímna.* The cases under which one word can influence the pronunciation of another, then, are relatively constrained and formally easy to state within a cyclic, derivational theory.[23] Cases in which a base-derivative relationship exerts an influence on pronunciation are solely ascribed to the cycle.

However, starting in the early 1990's, for reasons largely orthogonal to morphology-phonology concerns, many phonologists turned away from rules and derivations to Optimality Theory. Most versions of OT involve only one evaluative step – potential output candidates are evaluated simultaneously for their satisfaction of constraints on pronunciation or perceptibility (markedness constraints) and for their satisfaction of the requirement to resemble their underlying representations as closely as possible (faithfulness constraints.) There are no intermediate representations which can form the input to a second round of cyclic rule application. Though, as we have noted, there are versions of Stratal OT that maintain the gross architecture of the derivational LPM theory and can therefore recapitulate some results of a level 1/level 2/postlexical division, most approaches to base-derivative resemblances in OT have either relied upon output-output constraints that

[22] See Lahiri (2003) for a recent introduction to the concept of analogy in linguistics.

[23] However, as we shall see shortly, not every case where we might expect cyclic effects necessarily exhibits those effects. Sometimes complex words are stressed as if they were simplex.

enforce resemblances among the pronunciation of related words; or they have employed alignment constraints that enforce a match-up of phonological boundaries (such as feet and syllables) with morphological boundaries. An early instantiation of the latter approach can be found in Kenstowicz (1995). His analysis encodes the effect of the stem-suffix boundary on stress in Indonesian with a constraint requiring the right edge of a stem to coincide with the right edge of a foot. The high ranking of this constraint results in different stress patterns for morphologically simple and morphologically complex words.

Benua (1995, 1997) pioneered the use of output-output correspondence constraints to capture cyclic phenomena with a *non-stratal OT*. In Benua's *Transderivational Correspondence Theory*, a morphologically derived surface form such as *còndènsátion* is more faithful if it closely resembles the base on which it is formed, in this case, *condénse,* which has a full vowel and a stress on the syllable *-dense*. One of her most accessible examples deals with the nickname pair *Larry/Lar.* The truncated form, pronounced [lær] in dialects where the long, source form is pronounced [læ.ri], violates an otherwise general restriction against tautosyllabic [.ær.] The pressure for the truncated form to resemble its base outweighs the phonological markedness constraint. McCarthy (in press) contains a lucid comparison of various OT treatments of the analogical influences one form can have on another. He points out that Benua's *Base Priority Principle* disallows influences from derived forms to base forms, just as the phonological cycle did. On the other hand, *Uniform Exponence* (Kenstowicz 1996) and *Anti-Allomorphy* (Burzio 1996), which require consistent realization of morphemes in all their phonological properties, allow influence in both directions. McCarthy argues that both kinds of correspondence constraints are needed.

Steriade (1999) introduces another allomorphy-minimizing, paradigm uniformity principle, *Lexical Conservatism*: "Newly coined forms are penalized if they do not closely resemble already existing forms." She points out that the English level 2 affixes generally obey lexical conservatism much better than level 1 affixes, though they often do so at the expense of phonological well-formedness. Thus we recognize *ínvalidism* as being related to *ínvalid v*ia the addition of a level 2 suffix because it maintains the stress of the stem in isolation. The string of four unstressed syllables that results is the price the phonology pays for the success of the morphology in maintaining identity between base and derivative. The apparent level 1/level 2 distinction, she argues, is an artefact: so-called level 2 forms are just forms based on *impoverished paradigms*, where there is no phonologically preferable form on which to base a new derivative.

How does one handle the somewhat opposite fact that cyclic effects do not always occur even where one might expect them to? Pater (2000) is one of the most developed accounts of English stress and cyclicity written recently within Optimality Theory. He juxtaposes the following cases, where the examples in (25a) and (b) show an effect of the base on the derived form, while those in (25c) and (d) show no such effect.[24]

[24] Pater bases his transcription of non-reduced (secondarily stressed) *vs* .reduced vowels on Kenyon and Knott (1953) and, where there is disagreement, on Webster (1981) as well. For a few of the second

(25)

a.	b.	c.	d.
condénse	*còndènsátion*	*infórm*	*ìnformátion*
exhórt	*èxhòrtátion*	*tránspórt*	*tránsportátion*
contést	*còntèstátion*	*consúlt*	*cònsultátion*
impórt	*ìmpòrtátion*	*sègmént*	*sègmentátion*
àugmént	*àugmèntátion*	*tránsfórm*	*tránsformátion*
àuthéntic	*àuthèntícity*		

In the (b) cases, preserving some stress on the syllable before *-átion* results in a stress clash; we find adjacent stressed syllables. We know that phonologies, including that of English, prefer to alternate stresses rather than tolerating or creating clashes. Pater speculates that as words become more lexicalized, familiar, and established, the pressure for the base they contain to influence their pronunciation reduces and they become more likely to be treated as the phonology would have liked to treat them all along. Thus he asks us to compare the more frequent, everyday word *information* with *exhortation.* In *information*, the second syllable reduces, so that *information* is stressed like the underived words *Pennsylvania* or *gorgonzola.* The foot structure [ìnfor][má]tion is more optimal, phonologically speaking, than in [ìn][fòr][má]tion would be.[25] But [èx][hòr][tá]tion is chosen over [èxhor][tá]tion because only *exhortation* is lexically marked as subject to a special high-ranked constraint called *Ident(ity)-Stress-*S_1. Words which show the cyclic effect of stress preservation are lexically marked with a diacritic that makes them subject to this output-output constraint, while those, like *information*, which do not preserve stress, have no marking and thus do not override the constraint against clash in order to maintain the stress of their bases. A high-ranked identity constraint like Ident-Stress-S_1 is cloned from the general Ident-Stress constraint of the language. But the general constraint is ranked below the phonological markedness constraint *Clash, so that *ìnformátion* emerges as the optimal form.

7. DO THE COHERING AFFIXES FORM A COHERENT SET? SPLIT BASES, SUBCAT^{WORD} AND PHONETICS IN MORPHOLOGY

At the end of section 4, we asked whether the traditional division of suffixes into two groups could be maintained. We are now ready to understand a recent challenge to this claim raised in Raffelsiefen (2004).

Because she works within a version of Optimality Theory in which different affixes invoke different constraint rankings, Raffelsiefen's equivalent to a coherent grouping of stem-level versus word-level affixes would be a group of affixes which cause the forms to which they attach to be evaluated by one ranked set of constraints

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syllables of the words in (25d), Webster permits a secondary stress to appear in an alternate pronunciation, while Kenyon and Knott cite only a reduced vowel pronunciation.

[25] I adopt here the common metrical notation that uses square brackets to show the grouping of syllables into feet. The brackets do not indicate phonetic transcription.

versus a second set which call up another ranking of those constraints. But, as we saw earlier in the discussion of *-ése, -éer* and *-ée,* she argues that in fact every affix has its own individual constraint ranking and that there are no coherent sets. She compares at some length ranking of the constraints which control *-ize* affixation with the ranking controlling the affixation of another verb-forming suffix *-ify*. The former suffix is usually classified as stress neutral, the latter as stress-shifting. (*flúid, flúidize fluídify).*

Consider first the verb-forming suffix *-ize*, which can attach productively to nouns (*Clintonize*, *skeletonize)* and adjectives (*randomize*, *marginalize*). The productivity and semantic compositionality of *-ize* formations suggest it is word-level (level 2) as does the fact that it can be added to antepenultimately stressed bases like *skéleton* and *márginal* without inducing a stress-shift to repair the sequence of unstressed syllables. On the other hand, *-ize* is able to select pre-existing stems, rather than words,[26] as a base, a clear stem-level (level 1) characteristic, if this will allow it to avoid stress clash (26a) and other unfortunate phonological results such as repeated identical onset consonants (26b).

(26) a. *súblimìze* based on *sùblimátion* rather than *sublíme*
immunìze based on *ìmmunólogy* rather than *immúne*

b. *máximize* (**máxi**mu**mize,* cf. *rádiumize*)
áppetize (**áppe**tit**ize*, cf. *párasitize*)

If no source which can avoid clash is available, no word is coined. Thus **Búshìze* is all but unattested in Google searches, while *Clíntonìze* gets over 100 hits – this despite the fact that the base *Bush* is much more commonly encountered in contemporary searches than the base *Clinton*.

Now consider the behavior of *-ify,* standardly seen as a stress-affecting + boundary affix (*SPE*). Raffelsiefen argues that *-ify* does not gratuitously attach to stems any more than *-ize* does. It does so only to avoid other ill-formed phonological results, and only when a suitable stem already exists in a related word in the speaker's lexicon. Thus *týpify* with the lax initial vowel preferred by Trisyllabic Laxing can be coined because *týpical* existed first within the paradigm. *fluídify,* with a stress configuration that avoids a *LAPSE violation could be coined in 1857 due to the prior existence of *fluídity,* first attested according to the *OED* in 1603. But when there is no plausible source for a form that satisfies Trisyllabic Laxing, speakers coin forms with tense vowels: *ste#elify, sto#nify, gro#ssify*, etc. And when there is no source with a stress shift that avoids a violation of *LAPSE, a gap results: *rándom+ify, prívat +ify tunnel+ify,* etc. yield no output whatsoever, since there is no **randómity* or other form with stress on the second syllable to supply a stem. Thus, argues Raffelsiefen, neither *-ify* nor *-ize* are genuine stress-shifters. Both require a

[26] Raffelsiefen formalizes this ability as the domination of $\text{SUBCAT}^{\text{WORD}}$, a constraint that requires word formation to follow Aronoff's (1976: 21) injunction that affixes should attach to words, not stems. For Raffelsiefen, a stem used as a base of word formation is a surface form, critically a form with stress assigned to it.

source to which to match their stressed syllables. Therefore they are stress-neutral. Yet they are also cohering, if judged by other criteria Furthermore, both are phonologically interactive with their bases in different ways. *-ize* ranks *LAPSE as relatively unimportant and thus does not seek out bases with stress near the end of the word, but it ranks *CLASH so highly that it attaches to bound stems or leaves gaps in word formation where no suitable stem exists. It ranks TRISYLLABIC LAXING low (*ra#diumize)*. The affix *-ify,* on the other hand, ranks TRISYLLABIC LAXING fairly high (*tȳpify*)and cannot violate *LAPSE at all. Raffelsiefen's claim, which may or may not turn out to be right, is that virtually any ranking of constraints supplied by the factorial typology may be found for an affix. Of course, in order for this argument to go through, one must accept independent rankings called up by different affixes, a controversial proposal. If she is correct, though, the second major claim of level ordered phonology will also lose its force. Not only will level ordering fail to predict the linear order of affixes, it will also fail to predict their phonological behavior.

Raffelsiefen is not the only author to note that the pre-existence of a phonologically suitable word may be necessary in order to permit a new coinage. Steriade (1999) introduces a similar phenomenon which she calls the split-base effect and which is closely related to the principle of lexical conservatism which we discussed above.[27]

While similar in concept, the split-base effect differs from Raffelsiefen's proposal in that Steriade thinks a word can have distinct semantic, morphological and phonological bases. Thus in the triad *rémedy* (vb.), *remédial*, *remédiable*, Steriade would argue that the verb *rémedy* is the morphological base of *remédiable*, since *-able* requires a verb as its base, but that *remédial* is the phonological base of *remédiable*, since an output based on the phonology of *remédial* better satisfies *LAPSE. Raffelsiefen, in contrast, does not think that *-able* can take anything but a verb as its base, and argues instead that both the morphological and phonological base is the verb *remédiate*, with *remédiable* formed by violating $\text{SUBCAT}^{\text{WORD}}$ to choose the already-stressed stem *remédi* as the base. This disagreement indicates the difficulty of determining just what can form a base exerting influence on a derivative, given our current state of understanding. Both authors are clearly on the right track, as they predict that the form *párodiable* will have to suffer the lapse of four unstressed syllables because there is no existing word, be it **paródial* or **paródiate*, which could form a model for the phonologically more pleasing **paródiable.*

Steriade (2000) proposes a more radical influence of paradigm uniformity on phonology than what we have considered so far. Her claim is that derivational morphology is powerful enough to coerce a derived word to agree even in phonetic details with other members of its paradigm.[28] Her English example involves the rule

[27] Steriade notes that the split base effect was independently proposed by Burzio (1997).

[28] Steriade's definition of a paradigm is "a set of words sharing a morpheme (e.g. {*bomb*, *bombing*, *bombard*,...}) or a set of phrases sharing a word (e.g. {*bomb*, *the bomb*, …})." The reader may notice that this definition is considerably more flexible than that used traditionally. For instance Spencer (1991: 11-12) defines a paradigm as "the set of all the *inflected* [emphasis mine – EMK] forms which

of North American English known as Flapping. Flapping is, at the very least, an automatic, allophonic process, of the sort that derivational theories argue applies late in derivations – postlexically within the LPM model. According to Steriade, the process is actually not even what would traditionally be called phonological at all. It distributes a non-contrastive and continuous timing value rather than a binary feature, and is thus is phonetic.[29] Drawing on work by Withgott (1983), Steriade points out that the first /t/ in *càpitalístic* is flapped, matching the flap in its base *cápital.* However, the first /t/ in *mìlitarístic* is not flapped, matching the aspirated [t^{h}] in its base, *mílitàry*, where the aspiration is the regular outcome before a stressed vowel, as in *-àry.* Steriade believes the carry-over of non-flapping from *military* to *militaristic* means the length of the *t* of the base is encoded in the lexicon, where it can be copied onto a derivative.

However, Bermúdez-Otero and McMahon (in press) and Davis (2004) independently point out another way to look at these facts, citing the relevance of Jensen's (2000) interpretation of Withgott's discovery. Jensen had argued that all that is going on here is the maintenance of foot structure – a phonological, not a phonetic construct – from base to derivative. The aspirated [t^{h}] in [mìli][tarístic] is just the regular pattern of phonetic interpretation for this foot structure as seen in underived [Mèdi][terránean] and [Nàvra][tilóva]. Davis agrees that *capitalistic*, with its flap, does indeed result from a paradigm uniformity effect with *capital*, but again, it is the foot structure of *capital* that is the basis of analogy, not the flap itself.

Raffelsiefen (in press) also challenges the idea that phonetic features implicated in similarities between base and derivative necessarily mean that phonetic features are in the lexicon. Instead, she argues, these similarities may be due to the phonology acting in its *boundary-delimiting function* – that is, helping to mark the beginnings and ends of morphemes. Consider, for instance, the pair *shyness* vs. *minus.* These words do not rhyme. The diphthong in the first syllable of *shyness* is longer than that in *minus* and the *n* which begins the suffix *-ness* is longer than that in morpheme-internal position in *minus* (Umeda and Coker 1974: 5). One might argue that paradigm uniformity is responsible: the diphthong of *shyness* wants to be as long as that of the base *shy*. But in that case, where does the effect on the *n* of *-ness* come from? Raffelsiefen argues that it is not Paradigm Uniformity that is enforcing the odd phonology of *shyness* but rather an alignment constraint. As we mentioned in section 6, such constraints favor structures where the phonology and morphology line up to give the same parsings – for instance, where vowels that end morphemes also end the syllables of the morphemes they belong to , and where consonants that begin morphemes do not belong to the syllables of preceding

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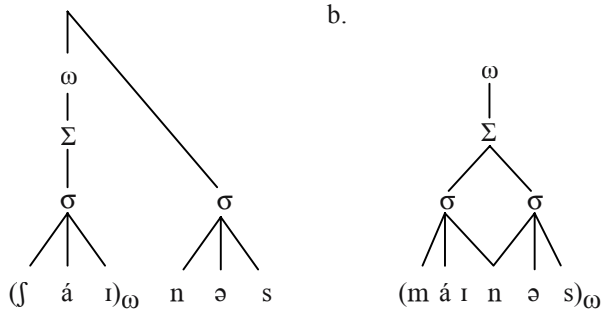
an individual word assumes [or even] … some specifiable subpart of the total paradigm." Obviously the question of what forms can influence one another's' pronunciation and thus be the subject of Paradigm Uniformity constraints is a difficult and complicated one, which is unlikely to be easily resolved. See also McCarthy (in press) and several of the other papers in that same volume, (Downing et. al. (eds.) 2004) and in Lahiri (2003) for recent views on the subject.

[29] Steriade's goal is to argue that the division of processes into phonological and phonetic is ultimately misguided and that phonetic detail figures into the proper understanding of phonological patterns. This is a fairly radical proposal, though Steriade is certainly not alone in championing it. It will probably be several years before the dust settles on this debate.

morphemes. For Raffelsiefen, then, the prosodic structures of the two words differ, and the length in the [aj:] of *shyness* comes from its being final in a prosodic word. The lengthening of the [n] of *shyness* is due to its being solely syllable initial, while the [n] is ambisyllabic in *minus*:

(27) a. b.



where
ω = prosodic word
Σ = foot

Now all the details of vowel and consonant length can be assigned on the basis of prosodic structure, within the phonetics or the postlexical phonology.

8. CONCLUSION

Phonology can get in the way of word formation, causing gaps in derivation where no suitable compromise between the goals of morphology and pronunciation can be found, and inducing allomorphy where morphology would prefer uniformity. Phonology can also aid morphology, applying differently in derived and underived forms; helping to delimit morphological boundaries with syllabifications and foot structures that are phonologically sub-optimal; stressing one part of speech differently from another; and so forth. Word formation responds in kind, getting in the way of phonology by concatenating phonologically displeasing strings; subverting the realization of well-formed strings of sounds in order to maintain easily reconstructed relations between base and derivative; and causing non-cohering affixes to be unavailable to the phonology, again in aid of maintaining base-derivative resemblances. Whatever model we choose to describe these interactions, it cannot be an impoverished one, for the relation between word formation and phonology is complex.

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REFERENCES

Aronoff, Mark. 1976. *Word formation in generative grammar.* Cambridge: MIT Press.

Aronoff, Mark. and Sridhar, Shikaripur N. 1987. "Morphological levels in English and Kannada." In: E. Gussman (ed.), *Rules and the Lexicon*, 9-22.

Benua, Laura 1995. "Identity effects in morphological truncation." J. Beckman, L. Walsh-Dickey, and S. Urbanczyk (eds.), *Papers in Optimality Theory* (University of Massachusetts Occasional Papers 18), Amherst: GLSA, 78-136.

Benua, Laura. 1997. *Transderivational identity: phonological relations between words.* Doctoral dissertation, University of Massachusetts.

Bermudez-Otero, Ricardo. 1999. *Constraint interaction in language change: quantity in English and Germanic.* Doctoral dissertation, University of Manchester.

Bermúdez-Otero, Ricardo (forthcoming). *Stratal Optimality Theory: synchronic and diachronic applications. Oxford Studies in Theoretical Linguistics* Oxford: Oxford University Press.

Bermúdez-Otero, Ricardo and McMahon, April. (in press) English phonology and morphology. In: B. Aarts and A. McMahon *The Handbook of English Linguistics.* Oxford: Blackwell.

Booij, Geert. 1977. *Dutch morphology: a study of word formation in generative grammar*. Dordrecht: Foris.

Booij, Geert. 1995. *The phonology of Dutch*. Oxford: Clarendon Press.

Borowsky, Toni. 1993. "On the word level." In: S. Hargus and E. Kaisse (eds.), 199-234.

Brame, Michael K. 1974. "The cycle in phonology: stress in Palestinian, Maltese, and Spanish." *Linguistic Inquiry* 5, 39-60.

Burzio, Luigi. 1996. "Surface constraints versus underlying representation." In: J. Durand and B. Laks (eds.), *Current Trends in Phonology: Models and methods*. Paris-X and Salford: University of Salford Publications, 123-42.

Burzio, Luigi. 1997. "Multiple correspondence." *Lingua* 103, 79-109.

Chomsky, Noam and Halle, Morris. 1968. *The sound pattern of English.* New York: Harper & Row.

Davis, Stuart (2004). "Capitalistic vs. militaristic: the paradigm uniformity effect reconsidered." In: P. Downing et al. (eds.), 107-121.

Downing, Laura, J.; Hall, Alan T.; and Raffelsiefen, Renate (eds.). (2004). *Paradigms in phonological theory*. Oxford: Oxford University Press.

Embick, David and Noyer, Robert Rolf. 2001. "Movement operations after syntax." *Linguistic Inquiry* 32, 555-595.

Fabb, Nigel. 1988. "English suffixation is constrained only by selectional restrictions." *Natural Language and Linguistic Theory* 6, 527-539.

Giegerich, Heinz. 1999. *Lexical strata in English: morphological causes, phonological effects*. Cambridge: Cambridge University Press.

Hall, Alan T. 1990. *Syllable structure and syllable-related processes in German*. Doctoral dissertation, University of Washington.

Hammond, Michael. 2000. "Review of Giegerich (1999)." *Phonology* 17, 287-290.

Hargus, Sharon. 1993. "Modeling the phonology-morphology interface." In: S. Hargus and E. Kaisse (eds.), 45-74.

Hargus, Sharon and Kaisse, Ellen (eds.) 1993. *Studies in lexical phonology*. San Diego: Academic Press.

Hayes, Bruce. 1982. "Extrametricality and English stress." *Linguistic Inquiry* 13, 227-276.

Hayes, Bruce. 1995. *Metrical stress theory: principles and case studies.* Chicago/ London: University of Chicago Press.

Inkelas, Sharon. 1993. "Deriving cyclicity." In: S. Hargus and E. Kaisse (eds.), 75-110.

Jensen, John T. 2000. "Against ambisyllabicity." *Phonology* 17, 187-236.

Kaisse, Ellen M. and Hargus, Sharon. "Introduction." In: S. Hargus and E. Kaisse (eds.), 1-19.

Kaisse, Ellen M. and Shaw, Patricia. 1985. "On the theory of lexical phonology." *Phonology Yearbook* 2, 1-30.

Kenstowicz, Michael. 1995. "Cyclic *vs.* non-cyclic constraint evaluation." *Phonology* 12, 397-436.

Kenstowicz, Michael. 1996. "Base-identity and uniform exponence: alternatives to cyclicity." In: J. Durand and B. Laks (eds.), *Current Trends in Phonology: Models and methods*. Paris-X and Salford: University of Salford Publications, 363-93.

Kenyon, John S. and Knott, Thomas A. 1953. *A pronouncing dictionary of American English.* 4th edition. Springfield, Mass.: Merriam.

Kiparsky, Paul. 1982. "From cyclic phonology to lexical phonology." In: H. v.d. Hulst and N. Smith (eds.), *The structure of phonological representations, Pt. I.* Dordrecht: Foris, 131-175.

Kiparsky, Paul. 2000. "Opacity and cyclicity." *The Linguistic Review* 17, 351-365.

Kurylowicz, Jerzy. 1949. "La nature des procès dits analogiques." In: J. Kurylowicz. 1960. *Esquisses linguistiques*, Wroclaw: Zakad Narodowy Menia Ossolinskich Wydawnictwo Polkiej Akademii Nauk, 66-86.

Lahiri, Aditi (ed.) 2003. *Analogy, leveling, markedness: principles of change in phonology and morphology.* Berlin: Mouton de Gruyter.

Lahiri, Aditi. 2003. *Introduction.* In: A. Lahiri (ed.), 1-14.

Liberman, Mark and Prince, Alan. 1977. "On stress and linguistic rhythm." *Linguistic Inquiry* 8: 249-336.

Marchand, Hans. 1969. *The categories and types of present-day English word formation: a synchronic-diachronic approach*. 2nd edition. München: Beck.

McCarthy, John (in press). "Optimal paradigms." In: L. Downing et al. (eds.), 170-210.

Mohanan, Karuvannur Puthanveettil. 1982. *Lexical phonology.* Doctoral dissertation, Massachusetts Institute of Technology.

Nessly, Larry. 1974. *English stress and synchronic descriptions*. Doctoral dissertation, University of Michigan.

Noyer, Rolf. 2004. "Some remarks on the architecture of grammar with special attention to absolute neutralization." Paper delivered at the *CUNY Symposium on Phonological Theory.*

Odden, David. 1993. "Interaction between modules in lexical phonology." In: S. Hargus and E. Kaisse (eds.), 111-144.

OED (1992) *The Oxford English Dictionary.* Second edition on compact disk, Oxford: Oxford University Press.

Orgun, Cemil Orhan and Sprouse, Ronald L. 1999. "From M-PARSE to CONTROL: deriving ungrammaticality." *Phonology* 16, 191-224.

Prince, Alan and Smolensky, Paul. 1993 *Optimality theory: constraint interaction in generative grammar*. Manuscript, Rutgers University and University of Colorado.

Raffelsiefen, Renate. 2004. "Absolute ill-formedness and other morphophonological effects. *Phonology* 21, 91-142.

Raffelsiefen, Renate (in press). "Paradigm uniformity effects versus boundary effects." In: P. Downing et al. (eds.), 211-262.

Rubach, Jerzy. 2000. "Glide and glottal stop insertion in Slavic languages: a DOT analysis." *Linguistic Inquiry* 31, 271-317.

Siegel, Dorothy. 1974. *Topics in English morphology,* Ph.D. dissertation, MIT. (Published 1979 by Garland: New York).

Spencer, Andrew. 1991. *Morphological theory.* Oxford: Blackwell.

Steriade, Donca. 1999. "Lexical conservatism in French adjectival liaison." in B. Bullock, M. Authier and L. Reed (eds.), *Formal Perspectives in Romance Linguistics*. Amsterdam: John Benjamins, 243-270.

Steriade, Donca. 2000. "Paradigm uniformity and the phonetics-phonology boundary. In M. Broe and J. Pierrehumbert (eds.), *Papers in laboratory phonology V. Acquisition and the Lexicon.* Cambridge: Cambridge University Press, 313-334.

Umeda, Noriko and Coker, Cecil. 1974. "Allophonic variation in American English." *Journal of phonetics* 2, 1-5.

Webster's New Collegiate Dictionary. 1981. Springfield, Mass.: Merriam.

Whitney, William Dwight. 1889. *Sanskrit grammar.* Cambridge, Mass.: Harvard University Press.

Withgott, Meg. 1983. *Segmental evidence for phonological constituents*. Doctoral dissertation, University of Texas at Austin.

WORD-FORMATION AND INFLECTIONAL MORPHOLOGY

GREGORY T. STUMP

1. THE CONCEPTUAL DIFFERENCE BETWEEN INFLECTION AND WORD-FORMATION

In morphological theory, it is customary to distinguish inflectional morphology from word-formation. At the root of this distinction is an ambiguity in the everyday meaning of 'word'. To see this, consider first the sentences in (1).

(1) a. I will put the book away.
b. When I leave, I put the book away.
c. When I left, I put the book away.
d. I have put the book away.

If we think of words as units of phonological analysis, then all four of the sentences in (1) can be regarded as containing the same word [p^{h}ut]. But if we think of words as units of grammatical analysis, then *put* must be regarded as a distinct word in each of of the sentences in (1): an (unmarked) infinitive word in (1a), a finite non-past-tense word in (1b), a finite past-tense word in (1c), and a past participial word in (1d). The fact that the four instances of *put* in (1) constitute a single *phonological word* but four different *grammatical words* is, of course, a peculiarity of the verb *put*; the corresponding grammatical words in the paradigm of the verb *be* are expressed by four distinct phonological words, as the examples in (2) show.

(2) a. I will be on vacation.
b. Next week, I am on vacation.
c. Last week, I was on vacation.
d. I have been on vacation.

But the examples in (2) suggest that yet a third sense of 'word' must be distinguished: The words *be*, *am*, *was*, and *been* can n as four distinct phonological words or as four distinct grammatical words, but in another sense, they are all forms of the same word. That is, one can abstract away from both the phonological and the grammatical differences among *be*, *am*, *was*, and *been* to arrive at a single, abstract word BE[1] whose essential properties remain constant across these

[1] Here and throughout, I follow the convention of representing lexemes in small capital letters.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 49—71.

(and other) phonological/grammatical words; abstract words such as BE are customarily referred to as *lexemes*. A lexeme is *realized by* one or more words (whether in the phonological or the grammatical sense); the full system of words realizing a lexeme is its *paradigm*. Some of the (phonological and grammatical) properties of a word are properties of the lexeme that it realizes; others are not. Thus, the lexeme BE is assumed to possess the properties shared by the words *be*, *am*, *was*, and *been*, but to be unspecified for the properties that distinguish these four words.

Given the distinction between phonological words, grammatical words, and lexemes, one can draw a related distinction between two sorts of morphology. On the one hand, *inflectional morphology* allows one to deduce the phonological and grammatical properties of the words realizing a lexeme. On the other hand, *word-formation* allows one to deduce the properties of one lexeme from those of one or more other lexemes.

The grammatical properties expressed by a language's inflectional morphology (properties such as 'plural', 'past', and 'superlative') are generally referred to as *morphosyntactic properties*; these fall into various *inflectional categories* (such as number, tense, and degree). As Booij (1996) shows, it is useful to distinguish two sorts of inflection on semantic grounds: *inherent* inflection expresses morphosyntactic properties that embody independent semantic information about the referent of the inflected word, while *contextual* inflection expresses morphosyntactic properties that do not embody such information, but are associated with the inflected word purely as an effect of its syntactic context; for instance, a noun's number inflection is one sort of inherent inflection, while an agreeing adjective's number inflection is instead contextual.

2. THE INFLECTIONAL CATEGORIES OF ENGLISH

Languages vary with respect to both the inflectional categories to which their morphology is sensitive and the morphosyntactic properties which those categories comprise. The inflectional categories to which English morphology is sensitive include those summarized in Table 1. Properties of number are inherent in nouns as well as demonstrative, personal and reflexive pronouns, and are contextually associated with demonstrative determiners as the effect of a relation of number agreement between nouns and their determiners. Properties of person are inherent in personal and reflexive pronouns. Together, properties of person and number are contextually associated with finite verb forms as an effect of subject agreement, but not all person/number combinations receive overt expression in a verb's inflectional morphology; indeed, most verbs only distinguish person and number in the present indicative, where third-person singular forms are distinguished by the suffix *-s*. Exceptionally, the verb BE also distinguishes the first person singular in the present indicative and distinguishes singular from plural in the past indicative; but neither verbs nor pronouns other than the reflexives ever exhibit number contrasts among their second-person forms.

Lexical category	Inflectional category	Inflectional properties		
Verb	Person	3rd	1st	other
	e.g.	*she is* *she sees*	*I am*	*you are* *I see, you see*
	Number	Singular		Plural
	e.g.	*she sees* *she was*		*they see* *they were*
	Tense	Past		Nonpast
	e.g.	*she walked*		*she walks*
	Mood	Indicative		Subjunctive
	e.g.	*that she is* *if she was*		*that she be* *if she were*
	Finiteness	Finite		Nonfinite
	e.g.	*she sees*		*to see*
	Participiality	Present		Past
	e.g.	*seeing*		*seen*
Noun	Number	Singular		Plural
	e.g.	*dog* *alumnus*		*dogs* *alumni*
Noun phrase	Case	Genitive		other
	e.g.	*someone else's*		*someone else*
Personal pronoun	Person	1st	2nd	3rd
	e.g.	*I*	*you*	*she*
	Number	Singular		Plural
	e.g.	*I*		*we*
	Case	Nominative	Accusative	Genitive
	e.g.	*I*	*me*	*my / mine*
Reflexive pronoun	Person	1st	2nd	3rd
	e.g.	*myself*	*yourself*	*herself*
	Number	Singular		Plural
	e.g.	*myself*		*ourselves*
Demonstrative pronoun or determiner	Number	Singular		Plural
	e.g.	*this*		*these*
Relative or interrogative pronoun	Case	Nominative	Accusative	Genitive
	e.g.	*who*	*whom*	*whose*
Adjective	Degree	Positive	Comparative	Superlative
	e.g.	*tall*	*taller*	*tallest*
Adverb	Degree	Positive	Comparative	Superlative
	e.g.	*soon*	*sooner*	*soonest*

Table 1 *Categories of inflection in English*

Besides inflecting for person/number agreement, finite verbs are associated with properties of tense and mood; inflection for tense and mood is generally inherent (though the sequence-of-tense phenomenon might be argued to involve contextual tense inflection). English verb inflection distinguishes past from nonpast ('present') and indicative from subjunctive; present subjunctive forms generally lack overt exponents of tense or mood and past subjunctives are generally identical to their indicative counterparts; the neutralization of all agreement distinctions in the subjunctive does, however, cause *(if) she were* (past subjunctive) to contrast with *(if) she was* (past indicative). Imperatives are morphologically indistinguishable from present subjunctives.

In the inflection of English verbs, properties of person, number and mood coincide with properties of tense. A verbal lexeme's tense-inflected forms contrast with its tenseless forms with respect to a category of finiteness; modal verbs are defective in that they lack tenseless (nonfinite) forms. A nonmodal verb's nonfinite forms ordinarily include an infinitive (which is devoid of overt inflectional marking, hence identical to the verb's stem) and two participles. The latter are traditionally labelled as 'present participle' and 'past participle'; this terminology is somewhat misleading, since participles are themselves uninflected for tense (hence present participles may enter into the formation of past progressives and past participles may enter into the formation of present perfects).

In the contextual inflection of personal, interrogative and relative pronouns, three properties of case are distinguished: nominative, accusative and genitive. In the genitive case, personal pronouns have two distinct forms (e.g. *my* and *mine*), one of which serves as a determiner and the other of which heads its own noun phrase. In the contextual inflection of full noun phrases, two cases are distinguished by the presence or absence of the genitive marker *-'s*; unlike the other English inflectional markings, *-'s* is situated at the periphery of the phrase whose properties its helps encode.[2]

Gradable adjectives and adverbs inherently inflect for degree by means of the comparative suffix *-er* and the superlative suffix *-est*. Both suffixes, however, are highly restricted in their use, as the following decline in acceptability reveals: *taller*, *friendlier*, ?*womanlier*, ??*righter*, **correcter*, **outlandisher*, **dependenter*. This has sometimes been taken as evidence that degree morphology is derivational (by the criterion (B) discussed in section 3 below); but these limits on the use of *-er* and *-est* are compensated for by the use of *more* and *most* in periphrastic expressions of degree such as *more dependent*, *more outlandish*, and so on.

Such compensatory periphrasis raises an important issue for the analysis of inflection: in the definition of a lexeme's inflectional paradigm by rules of morphology, is periphrasis simply another mode of morphological expression comparable to affixation or stem gradation, or do periphrases instead arise purely through the operation of ordinary rules of syntax, outside of the domain of morphology? Syntactic theories have tended to favor the latter assumption, but the

[2] See Lapointe (1990), Miller (1991) and Halpern (1992) for discussion of the properties of such "edge inflections".

evidence motivating the former assumption is compelling (Börjars, Vincent & Chapman 1997, Sadler & Spencer 2001, Stump 2002, Ackerman & Stump 2004). On this view, English verb inflection involves two inherent inflectional categories beyond those listed in Table 1, namely the categories of aspect and voice: both the perfect and the progressive aspects are expressed periphrastically (e.g. *have gone*, *am going*), as is the passive voice (e.g. *was seen*). Since the categories of aspect and voice crosscut the categories of verb inflection listed in Table 1, the notion that inflectional paradigms incorporate periphrases entails a significant increase in the size assumed for verbal paradigms in English, which will, on this assumption, include present and past perfects, progressives, passives, perfect progressives, perfect passives, progressive passives, perfect progressive passives, and so on.

Although the conceptual distinction between inflection and word-formation is clear enough, the postulation of this distinction raises some non-trivial questions. What are the criteria that allow one to classify a particular morphological marking as an expression of inflection or of word-formation? What sorts of properties do the two types of morphology have in common? In what ways do they interact? What do these facts imply for the architecture of morphological theory?

3. PRACTICAL CRITERIA FOR DISTINGUISHING INFLECTION FROM WORD-FORMATION

Inflectional operations are often claimed to be distinguishable from word-formation operations by a range of practical criteria,[3] but none of the operative criteria is unproblematic. Consider first criterion (A).

(A) An operation of word-formation may impose membership in a particular part-of-speech class, but an operation of inflection cannot. For this reason, the part of speech of an expression arising as the effect of an operation of word-formation may differ from that of the expression(s) from which it arises, while the part of speech of an expression arising as the effect of an inflectional operation cannot.

According to (A), the operation relating the noun *speaker* to the verb *speak* must be a word-formation operation rather than an inflectional operation. Notwithstanding the apparent usefulness of criterion (A) in many instances, it is limited in its usefulness to the extent that it fails to distinguish inflection from word-formation in those instances in which an expression's part of speech matches that of the expression from which it arises; that is, (A) identifies a sufficient but not a necessary distinction between inflection and word-formation.

Moreover, the essential content of (A) – that inflection never affects an expression's part of speech – might be challenged. Consider, for instance, the present participle *discouraging*. This is ordinarily seen as an inflected form of the

[3] For additional discussion of such criteria, see Anderson (1985), Dressler (1989), Matthews (1991), Stump (1998), and Booij (2000).

verbal lexeme DISCOURAGE; yet, in the phrase *the most discouraging news*, it appears as an attributive adjective in the superlative degree. One could, of course, dismiss this evidence by postulating a separate word-formation operation converting present participles into adjectives; in support of such an analysis, one might cite the fact that present participles allow bare noun-phrase complements (as in *They are discouraging everyone*), which adjectives generally do not allow. The strength of this counterargument is, however, diminished by evidence from many other languages, in which present participles never appear without declensional morphology that is unmistakably that of an adjective. In order to maintain (A) as a valid criterion, one would evidently have to abandon the claim that participles arise as an effect of inflectional operations in such languages.

A second criterion for distinguishing inflectional operations from word-formation operations is that of *completeness*:

(B) Inflectional operations tend to be complete; operations of word-formation tend not to be.

According to this criterion, inflectional operations that apply to expressions of some category tend to apply without exception, while word-formation operations that apply to expressions of some category tend to apply sporadically. For instance, the rule which suffixes *-s* to a verb's third-person singular present indicative form applies to nonmodal verbs virtually without exception. By contrast, there are idiosyncratic limits on the application of the rule that derives deadjectival inchoative verbs through the suffixation of *-en*; for instance, this rule applies to *white*, *dark* and *straight* but not to *trite*, *stark* or *late*.

The utility of this criterion hinges on a particular interpretation of the notion of completeness. Consider, for illustration, the rule of *-ed* suffixation and that of [i/æ] substitution, which apply in the inflection of past-tense verb forms. If we consider these rules in isolation, then clearly neither qualifies as a complete operation on its own, since only the former rule applies in the inflection of *sip* and *ship* while only the latter applies in the inflection of *sit* and *spit*; this would seem to suggest that the rule of *-ed* suffixation and that of [i/æ] substitution are rules of word-formation. This would, however, be a problematic conclusion, since other criteria suggest that these rules are instead inflectional. But if all of the rules realizing past tense are considered together, then, as a set, they are complete: for virtually every verb in the language, there is an operation defining its past-tense form. This interpretation of the notion of completeness suggests that the rules of *-ed* suffixation and [i/æ] substitution are rules of inflection – a conclusion more consistent with other criteria.

Still, there are inherent limits on the usefulness of criterion (B). On one hand, lexemes sometimes have defective paradigms – that is, they sometimes fail to inflect for a set of morphosyntactic properties for which they would be expected to inflect. For instance, the verb USE in *They used to live here* has no present-tense forms, and therefore diminishes (if only minutely) the completeness of rules expressing the present tense. On the other hand, rules which, by other criteria, are unquestionably rules of word-formation are in some cases fully as complete as any rule of inflection.

For example, virtually every nonmodal verb in English has a nominal derivative in *-ing*. For these reasons, criterion (B) cannot be plausibly seen as providing either a necessary or a sufficient correlate of the distinction between inflection and word-formation.

Another criterion for distinguishing inflection from word-formation is that of *semantic regularity*:

(C) Inflectional operations tend to be semantically regular, while operations of word-formation are frequently less than fully regular in their semantic effect.

By this criterion, the inflectional expression of a particular set of morphosyntactic properties has the same semantic effect from one lexeme to another. For instance, the meaning expressed by the past-tense inflection of *sang* is identical to that expressed by the past-tense inflection of *broke*. By contrast, operations of word-formation often express meanings that are at least partially unpredictable. Consider, for example, the words *barnumize*, *dollarize*, and *posterize* (all recent additions to the lexicon of English): even if one knows the meanings of *Barnum*, *dollar*, and *poster* and possesses a native command of the rule forming denominal verbs in *-ize*, these do not suffice to allow one to deduce the meanings of these verbs: because the *-ize* rule underdetermines the meanings of denominal verbs in *-ize*, one must simply infer the meaning of each such verb when one first hears it and store this meaning in lexical memory for later use.[4]

Although (C) seems to be a valid criterion in such cases, other instances cast doubt on its reliability. Operations which may, by other criteria, be unequivocally classified as instances of word-formation sometimes show high semantic regularity; for instance, adverbs arising from adjectives through the suffixation of *-ly* generally have the meaning "in an X manner", where the adjectival base supplies the meaning X. By the same token, operations which otherwise seem to be inflectional do occasionally show semantic irregularity; for instance, as a plural form of *brother*, *brethren* has an idiosyncratic meaning distinct from that of *brothers*. Like (B), criterion (C) affords neither a necessary nor a sufficient correlate of the distinction between inflection and word-formation.

The most robust criterion for distinguishing inflection from word-formation is the criterion of *syntactic relevance*:

(D) Inflection, unlike word-formation, is syntactically determined.

According to this criterion, a particular syntactic context may necessitate the choice of a particular inflected form, but no syntactic context ever necessitates the choice of a form arising as the effect of a particular word-formation operation. For instance, the phrasal context [*every* ___] requires the choice of a head noun

[4] To barnumize something is to publicize it hyperbolically, to dollarize one's economy is to convert it to one based on the American dollar, and to posterize one's opponents is to humiliate them ostentatiously.

inflected for singular number; any verb in the phrasal context [*hasn't* ___] must be inflected as a past participle; and any adverb in the phrasal context [___ *than ever*] must be inflected for comparative degree. By contrast, there is no syntactic context that is restricted to forms defined by a particular word-formation operation; thus, any syntactic context allowing the morphologically complex noun *teacher* allows the morphologically simplex noun *friend*, any allowing the complex verb *proofread* allows the simplex verb *edit*, and any allowing the complex adverb *extremely* allows the simplex adverb *very*.

Criterion (D) holds true because particular syntactic contexts are associated with particular sets of morphosyntactic properties, and such contexts necessitate the inflectional expression of the morphosyntactic properties with which they are associated. Even so, (D) raises a question. Is syntactic determination a necessary property of inflectional contrasts, or do some inflectional contrasts fail to correlate systematically with differences of syntactic context? This is a significant question, since syntactic context may, for example, fail to determine choices among tense inflections: thus, in English, it is not clear that there is any syntactic context that necessitates the choice of one tense over another.[5] One might regard this as evidence against regarding tense as an inflectional category in English, but this isn't a necessary conclusion. There are syntactic contexts which require the use of a finite verb form (for instance, subordinate clauses introduced by the complementizers *that* and *if* must have finite verbs), and an English verb form is finite if and only if it belongs to one or the other tense; thus, one could say that tense is syntactically determined in English insofar as the presence of a tense property is a necessary and sufficient correlate of finiteness.

A final, widely-cited criterion for distinguishing inflection from word-formation is (E); this is often seen as a corollary of assumption (E′).

(E) In the structure of a given word, marks of inflection are peripheral to marks of word-formation.

(E′) In the definition of a word's morphology, derivational operations apply before inflectional operations.

According to (E)/(E′), an inflectional affix should never be able to be situated between a stem and a derivational affix. Although this generalization is apparently satisfied by most English words (one cannot, after all, say **a thornsy plant* or **several shoesless children*), there do seem to be occasional counterexamples, such as *worsen* or *betterment* (counterexamples if degree morphology is inflectional) or such dialectal forms as *scareder* and *rockin'est* (counterexamples if degree morphology is derivational). Other languages, however, provide more robust counterevidence.

[5] Tense choice may, of course, be determined by semantic considerations, as in *#I left tomorrow*, but that is not the issue here.

In Breton, for example, affixally inflected plurals are subject to category-changing derivational processes. Thus, each of the denominal derivatives in Table 2 has a plural noun as its base (Stump 1990a,b).[6] Moreover, Breton has a productive pattern for the formation of plural diminutives in which two exponents of plural number appear, one on either side of the diminutive marker: *bag-où-ig-où* 'little boats' ['boat-PLURAL-DIMINUTIVE-PLURAL']; parallel formations for diminutives or augmentatives appear in a number of languages, e.g. Kikuyu (*tũmĩtĩ* 'little trees'; Stump 1993), Portuguese (*animaizinhos* 'little animals'; Ettinger 1974: 60), Shona (*mazivarume* 'big men'; Stump 1991), and Yiddish (*xasanimlex* 'little bridegrooms'; Bochner 1984, Perlmutter 1988).

Before dismissing such examples as highly-marked exoticisms, one should likewise note that marks of word-formation appear peripherally to marks of inflection as an effect of morphological head-marking in a vast number of languages (Stump 1995; 2001: Chapter 4). Consider, for example, the Sanskrit verb stem *ni-pat-* 'fly down': because this stem is headed by the root *pat-* 'fly', it inflects through the inflection of its head; thus, in the imperfect form *ny-a-patat* 's/he flew down', the tense marker *a-* is prefixed directly to the root, and is therefore positioned internally to the preverb *ni-*. Cases of this sort are legion; indeed, English itself furnishes examples in forms such as *mothers-in-law*, *hangers-on*, *understood*, and the purportedly paradoxical *unhappier* (Stump 2001: Chapter 8; concerning *unhappier*, cf. Pesetsky (1985), Sproat (1988), and Marantz (1988)). Examples of this sort are, if anything, more devastating than those of Table 2 for the tenability of criterion (E) or assumption (E′): counterexamples such as those in Table 2 generally involve inherent but not contextual inflection; but instances of head-marking may involve either type of inflection. This evidence is of considerable theoretical significance, since assumption (E′) has sometimes been elevated to the status of a principle of grammatical architecture, in the form of the *Split Morphology Hypothesis* (Perlmutter 1988; cf. Anderson 1982).

The criteria in (A)-(E) distinguish inflection from word-formation according to their synchronic grammatical behavior; but this distinction also has correlates in the diachronic domain. For instance, inflected forms of the same lexeme are more likely to influence one another analogically than forms standing in a derivational relationship; thus, although the intervocalic rhotacism of *s* in the inflection of early Latin *honōs-* 'honor' (sg. nom. *honōs* but gen. *honōr-is*, dat. *honōr-ī*, acc. *honōr-em*, etc.) leads to the analogical nominative singular form *honor* in Classical Latin, no such analogical development takes place in the inflection of the derived adjective *hones-tus* 'honored', which preserves its stem-final *s*. Such instances provide compelling evidence for the psychological reality of the distinction between inflection from word-formation, but are of limited value as practical criteria for delineating this distinction because of their inevitably anecdotal character. Psycholinguistic criteria for distinguishing inflection from word-formation are also

[6] In Table 2, verbs in infinitival *-i* and adjectives in *-ek* exhibit a strengthening of *ou* to *aou* in tonic (penultimate) position; verbs in infinitival *-a* exhibit the devoicing of a final obstruent in their nominal base; and privative adjectives in *di-* exhibit initial lenition of their nominal base. All of these modifications are independently observable in Breton.

somewhat problematic: experimental evidence suggests that inflected forms are often analyzed online while derived forms and compounds are instead simply stored whole in memory; but irregularly inflected forms likewise give evidence of being stored whole, as do high-frequency forms exhibiting regular inflection (Aitchison 1994: 122ff). The utility of psycholinguistic criteria is further mitigated by the fact that the experimental studies on which they are based have tended to focus on the morphological systems of European languages, which fall far short of instantiating the full range of morphological types found in human language.

Noun			Denominal derivative	
Singular		Plural	Verbs in infinitival *–i*	
barr	'rain shower'	*barroù*	*barraoui*	'to shower (rain)'
delienn	'leaf'	*delioù*	*deliaoui*	'grow leaves'
			and *dizeliaoui*	'pull leaves from'
pilhenn	'rag'	*pilhoù*	*pilhaoui*	'collect rags, go door-to-door'
preñv	'worm'	*preñved*	*preñvedi*	'become wormy'
			Verbs in infinitival *–a*	
goz	'mole'	*gozed*	*gozeta*	'to hunt for moles'
gwrac'h	'wrasse'	*gwrac'hed*	*gwrac'heta*	'to fish for wrasses'
krank	'crab'	*kranked*	*kranketa*	'to fish for crabs'
labous	'bird'	*laboused*	*labouseta*	'to hunt birds'
merc'h	'girl'	*merc'hed*	*merc'heta*	'to chase girls'
pesk	'fish'	*pesked*	*pesketa*	'to fish'
			Adjectives in *–ek*	
delienn	'leaf'	*delioù*	*deliaouek*	'leafy'
draen	'thorn'	*drein*	*dreinek*	'thorny'
korn	'horn'	*kerniel*	*kerniellek*	'having horns'
maen	'rock'	*mein*	*meinek*	'full of rocks'
preñv	'worm'	*preñved*	*preñvedek*	'wormy'
spilhenn	'pin'	*spilhoù*	*spilhaouek*	'having pins'
truilhenn	'rag'	*truilhoù*	*truilhaouek*	'raggedy'
			Privative adjectives in *di-*	
boutez	'shoe'	*boutoù*	*divoutoù*	'shoeless'
draen	'thorn'	*drein*	*dizrein*	'having no thorns'
loer	'sock'	*leroù*	*dileroù*	'sockless'

Table 2 *Denominal derivatives based on inflected plurals in Breton (Stump 1990a,b)*

4. PRACTICAL CRITERIA FOR DISTINGUISHING INFLECTIONAL PERIPHRASES

If periphrasis is regarded as a mode of morphological expression, as suggested in §2 above, then criteria for distinguishing periphrases (morphologically defined word combinations) from ordinary, syntactically defined word combinations must be identified. Ackerman & Stump (2004) propose three such criteria. The first of these is that of *featural intersectiveness*:

(F) If an analytic combination C has a featurally intersective distribution, then C is a periphrase.

Criterion (F) entails that if the intersection of properties P and Q is always expressed by an analytic combination C even though neither P nor Q is always expressed analytically on its own, then C is a periphrase. In Latin, for example, the intersection of the properties 'perfect' and 'passive' is always expressed by analytic combinations such as those in the shaded cells of Table 3; on the other hand, neither 'perfect' nor 'passive' is always expressed analytically on its own. For this reason, the forms in the shaded cells in Table 3 are periphrases by criterion (F).

		Active voice	Passive voice
Nonperfect	Present	*capimus*	*capimur*
	Past	*capiēbāmus*	*capiēbāmur*
	Future	*capiēmus*	*capiēmur*
Perfect	Present	*cēpimus*	*captī sumus*
	Past	*cēperāmus*	*captī erāmus*
	Future	*cēperimus*	*captī erimus*

Table 3 *1st-person plural indicative forms of Latin* CAPIŌ *'take'*

The second criterion of periphrastic status is that of *noncompositionality*:

(G) If the property set associated with an analytic combination C is not the composition of the property sets associated with its parts, then C is a periphrase.

Criterion (G) entails that analytic combinations whose property sets are not deducible from those of their parts are periphrases. In French, for example, the forms of the passé composé are preterite in tense, as their appearance with past-tense time adverbs shows: *Hier j'ai chanté*. Yet, they are formed with an auxiliary inflected for present tense and a participle that is uninflected for tense; forms of the passé composé are therefore periphrases by criterion (G).

The third criterion of periphrastic status is that of *distributed exponence*:

(H) If the property set associated with an analytic combination C has its exponents distributed among C's parts, then C is a periphrase.

Criterion (H) entails that an analytic combination is a periphrase if its morphosyntactic properties are an amalgamation of the properties of its parts. In Udmurt, for example, each of the negative future-tense realizations of MÏNÏ 'go' in Table 4 is the periphrastic combination of a form of the negative verb U with a special 'connegative' form of MÏNÏ; the latter expresses number but not person, while the former expresses person but not number – except in the first person, where *ug* and *um* express both person and number (Ackerman & Stump 2004).

Singular	1st	*ug mïnï*
	2nd	*ud mïnï*
	3rd	*uz mïnï*
Plural	1st	*um mïne(le)*
	2nd	*ud mïne(le)*
	3rd	*uz mïne(le)*

Table 4 *Negative future-tense forms of Udmurt MÏNÏ 'go'*
(Csúcs 1988: 143)

All three of the criteria in (F)-(H) are sufficient indicators of periphrastic status, but none is necessary. Further research into the nature of periphrasis will therefore be needed to identify and refine the range of criteria used to distinguish word combinations that are morphologically defined from those that are syntactically defined. Correspondingly, a more carefully articulated theory of lexical insertion must be devised to accommodate the assumption that a lexeme's realizations may include word combinations as well as individual words.

5. SOME SIMILARITIES BETWEEN INFLECTION AND WORD-FORMATION

Notwithstanding the clarity of the conceptual distinction between inflection and word-formation (section 1) and the many practical criteria that are invoked to distinguish inflectional operations from operations of word-formation (section 3), the boundary between inflection and word-formation can, in fact, seem quite elusive, for a number of reasons.[7] Most obviously, the formal operations by which words are inflected are not distinct from those by which new words are formed. Indeed, the very same marking may serve as an inflectional exponent in one context and as a mark of derivation in another; thus, the present participle *reading* in *I am reading* is an inflected form of READ, but the noun READING in *the assigned readings* is a

[7] Indeed, some researchers have concluded that there are no good grounds for distinguishing inflection from word-formation in morphological theory; see e.g. Lieber (1980: 70), Di Sciullo & Williams (1987: 69ff), and Bochner (1992: 12ff).

derivative of READ. More generally, both the domain of inflection and that of word-formation involve affixation, segmental and suprasegmental modifications, and identity operations; both involve relations of suppletion, syncretism, and periphrasis; just as an inflected form may inflect on its head, so a derived form may carry its mark of derivation on its head; and just as an inflected form that is lexically listed may 'block' an inflectional alternative, so a derivative that is lexically listed may block a derivational alternative. Examples illustrative of these parallelisms are listed in Table 5.

Operation or relation	Inflectional domain	Domain of word-formation
Affixation	*bake* → *bake-s*	*bake* → *bak-er*
Segmental modification	*sing* → *sang*	*house* → *hou*[z]*e*
Suprasegmental modification	No English examples, but cf. e.g. Somali *díbi* 'bull' → *dibí* 'bulls'	*reject* → *reject*
Identity operation	*deer* (sg.) → *deer* (pl.)	*cook* (v.) → *cook* (n.)
Suppletion	*sad* → *sadder* but *bad* → *worse*	*president* → *presidential* but *governor* → *gubernatorial*
Syncretism	*walked* (past tense) = *walked* (past participle)	*Mexican* (adjective) = *Mexican* (noun)
Periphrasis	*walk* → *is walking*	*look* + *up* → *look up*
Head marking	*understand* → *understood*	*pass by* → *passerby*
Blocking	*went* blocks **goed*	*judge* (n.) blocks **judger*

Table 5 *Parallelisms between inflection and word-formation*

6. COMPLEX INTERACTIONS BETWEEN INFLECTION AND WORD-FORMATION

The task of distinguishing inflection and word-formation is further complicated by the various ways in which the two sorts of morphology may interact. As was seen in section 3, operations of word-formation tend to precede inflectional operations in the definition of a word's morphology, but word-formation operations sometimes apply to inflected forms; thus, one cannot assume that rules of word-formation and rules of inflection are situated in distinct grammatical components such that one simply feeds the other.

Moreover, there are instances in which a lexeme's derivative is incorporated into that lexeme's inflectional paradigm. Consider a case of this sort from Breton. One of the distinctive characteristics of Breton morphology is its highly productive suffix *-enn*. One of its functions is as a singulative suffix: it joins with a collective noun to produce a noun with singular reference, as in Table 6. In addition, *-enn* joins with

noncollective expressions of various sorts: it may combine with a mass noun to produce a count noun, and it may join with a count noun or an adjective to produce a semantically related noun; cf. Table 7. Whatever the properties of the base with which it joins, *-enn* always produces a feminine noun.

Collective noun		Singulative noun
'worms'	*buzhug*	*buzhugenn*
'midges'	*c'hwibu*	*c'hwibuenn*
'glasses'	*gwer*	*gwerenn*
'trees'	*gwez*	*gwezenn*
'cabbages'	*kol*	*kolenn*
'flies'	*kelien*	*kelienenn* (and *kelién,* by haplology)
'walnuts'	*kraon*	*kraonenn*
'mice'	*logod*	*logodenn*
'ants'	*melien*	*melienenn* (and *melién,* by haplology)
'slugs'	*melved*	*melvedenn*
'nits'	*nez*	*nezenn*
'pears'	*per*	*perenn*
'strawberries'	*sivi*	*sivienn*

Table 6 *Breton collective nouns and their singulatives in -enn (Stump 1990b)*

Base		Derivative	
Mass noun		Count noun	
douar	'earth, ground'	*douarenn*	'plot; terrier'
geot	'grass'	*geotenn*	'blade of grass'
kafe	'coffee'	*kafeenn*	'coffee bean'
kolo	'straw'	*koloenn*	'wisp of straw'
Count noun		Related noun	
boutez	'shoe'	*botezenn*	'a kick'
c'hoant	'a want'	*c'hoantenn*	'birthmark'
enez	'island'	*enezenn*	'island'
lagad	'eye'	*lagadenn*	'eyelet'
lod	'part'	*lodenn*	'part'
lost	'tail'	*lostenn*	'skirt'
prezeg	'preaching'	*prezegenn*	'sermon'
Adjective		Related noun	
bas	'shallow'	*basenn*	'shoal'
koant	'pretty'	*koantenn*	'pretty girl'
lous	'dirty'	*lousenn*	'slovenly woman'
uhel	'high'	*uhelenn*	'high ground'

Table 7 *Breton derivatives in -enn having noncollective bases (Stump 1990b)*

Is the suffix *-enn* inflectional or derivational? Given that it converts adjectives to nouns and that it always determines the gender of the form to which it gives rise, *-enn* is clearly derivational by criterion (A). Moreover, although *-enn* joins very freely with collective nouns, it is much more sporadic in its combinations with mass nouns, count nouns, and adjectives; thus, *-enn* can be plausibly regarded as derivational by criterion (B). Similarly, although the semantic relation between collectives and their singulatives is quite regular, the semantic relations between nominal derivatives in *-enn* and their bases are much less regular in instances such as those in Table 7; thus, criterion (C) also favors the conclusion that *-enn* is a mark of derivation. And given that *-enn* may precede a derivational suffix (as in forms such as *gwerennad* 'glassful' [← *gwerenn*, singulative of *gwer* 'glasses']), criterion (E) might be claimed to add further force to this conclusion.

This conclusion is, however, apparently disconfirmed by criterion (D), since the choice between a singulative noun and its collective counterpart is determined by precisely the same syntactic contexts as the choice between an ordinary singular noun and its plural counterpart; for instance, the syntactic contexts that determine the choice between the singular noun *potr* 'boy' (lenited form *botr*) and its plural counterpart *potred* 'boys' in Table 8 likewise determine the choice between the singulative noun *sivienn* 'strawberry' (lenited form *zivienn*) and its collective counterpart *sivi* 'strawberries'. Thus, by criterion (D), *-enn* must seemingly be seen as an inflectional suffix.

	POTR 'boy'	SIVI 'strawberries'
	Singular: *potr*	Singulative: *sivienn*
Singular contexts	*ur potr bennak* 'a certain boy'	*ur zivienn bennak* 'a certain strawberry'
	meur a botr 'many a boy'	*meur a zivienn* 'many a strawberry'
	Plural: *potred*	Collective: *sivi*
Plural contexts	*un nebeud potred* 'some boys'	*un nebeud sivi* 'some strawberries'
	kalz potred 'a lot of boys'	*kalz sivi* 'a lot of strawberries'

Table 8 *Forms of POTR 'boy' and SIVI 'strawberries' in singular and plural contexts*

This contradiction among criteria is, however, only apparent. Distinct stems often participate in the definition of distinct parts of a lexeme's paradigm. Accordingly, one would, in the absence of contrary evidence, expect that the stems participating in the definition of a lexeme's paradigm might in some cases include the stem of a derivative of that lexeme. Thus, in the paradigm of a Breton collective noun such as SIVI 'strawberries', the plural cell is apparently associated with the

collective stem (*sivi*), while the singular cell is instead associated with the stem of the singulative derivative (SIVIENN). The fact that *-enn* is a derivational suffix in no way excludes the participation of *sivienn-* in the definition of SIVI's inflectional paradigm.

Just as a derivational process may (as in Table 8) have a role in expressing a lexeme's inflection, a lexeme's inflection may likewise have a role in expressing its status as a derivative. Quite frequently in language, the sole morphological expression of a lexeme's derivation is the way in which it inflects. Inflectionally expressed derivation of this sort can arise in more than one way. On one hand, a lexeme's status as a derivative may be morphologically expressed purely by its inflection for a particular set of morphosyntactic properties. Thus, Kikuyu has a productive process for the derivation of diminutive nouns whose morphological effect is to shift nouns into gender 13/12; the sole sign of diminutivization in the derivatives arising by means of this process is the fact that they inflect as members of gender 13/12.[8] For instance, the Kikuyu noun ARA 'finger' (stem *-ara*) ordinarily inflects as a member of gender 7/10, exhibiting the class 7 prefix *kĩ-* in the singular (*kĩara*) and the class 10 prefix *ci-* in the plural (*ciara*); the diminutive derivative of ARA still has *-ara* as its stem, differing from its base only in that it takes the class 13 prefix *ka-* in the singular (*kaara*) and the class 12 prefix *tũ-* in the plural (*tũara*).

	Inflection class	Inflection-class affix	Sample present-system stem	
Thematic conjugations	I	*-a*	*bhava-*	'be'
	IV	*-ya*	*dīvya-*	'play'
	VI	*-a*	*tuda-*	'thrust'
	X	*-aya*	*dveṣaya-*	'cause to hate'
Athematic conjugations	II	(none)	*dveṣ-*	'hate'
	III	reduplicative prefix	*juho-*	'sacrifice'
	V	*-no*	*suno-*	'press out'
	VII	infix *-na-*	*runadh-*	'obstruct'
	VIII	*-o*	*tano-*	'stretch'
	IX	*-nā*	*krīṇā-*	'buy'

Table 9 *The ten traditional present-system conjugation classes in Sanskrit*

A lexeme's derivative status may likewise be revealed purely by the sort of inflection-class marking which it exhibits. Sanskrit, for example, has a productive process for the derivation of causative verbs; in morphological terms, however, this process simply amounts to shifting a verb into the tenth conjugation.[9] For instance, the verb DVIS 'hate', a member of the second conjugation, gives rise to a causative

[8] Facts of this sort are sometimes cited in support of the claim that Bantu noun-class inflections have both inflectional and derivational functions; see, for example, Mufwene (1980).

[9] It is therefore sometimes assumed that the tenth conjugation is actually a derivational class rather than an inflection class; see Stump (2004) for arguments against this conclusion.

derivative whose sole sign of causativization is its inflection as a member of the tenth conjugation; that is, the morphological difference between *dveṣṭi* 's/he hates' and *dveṣayati* 's/he causes to hate' is purely an effect of their contrasting positions in the system of inflection classes in Table 9.

7. INFLECTIONAL PARADIGMS AND WORD-FORMATION PARADIGMS

Modern research on inflectional morphology (e.g. Matthews 1972, Zwicky 1985, Anderson 1992) suggests that a language's inflectional rules are realizational, in the sense that they apply to the pairing ⟨X,σ⟩ of a stem X with a morphosyntactic property set σ to yield an inflected word form *w*, the REALIZATION of ⟨X,σ⟩; on this view, English has, for example, an inflectional rule which applies to the pairing ⟨*walk*, {3rd singular present indicative}⟩ to yield the realization *walks*. If the cells in a lexeme's paradigm are regarded as pairings of the type ⟨X,σ⟩, then a language's inflectional morphology can be seen as a system of rules for assigning realizations to the cells in inflectional paradigms. (See Stump 2001 for an extensive justification of this realizational approach to inflectional morphology and a formal elaboration of its principles.)

This conception of inflectional morphology is quite distant from the 'morpheme-based' conception inherited from American structuralism: in a *morpheme-based approach*, a word's morphosyntactic properties are built up incrementally through the addition of its component morphemes; in a *realizational approach*, by contrast, a word's morphosyntactic properties serve to determine the sequence of operations spelling out its morphological markings. Of the two approaches, only the latter affords a natural and parsimonious account of certain widely observable phenomena, including extended exponence, nonconcatenative exponence, and the underdetermination of a word's morphosyntactic properties by its inflectional markings (Stump 2001: 3-12).

If a language's patterns of inflection are defined by a rules realizing a paradigmatic system of cells, what of its patterns of word-formation? Recent work (e.g. Bauer 1997, Booij 1997) has raised the possibility that word-formation (specifically, derivation) involves a paradigmatic system of organization as well. Indeed, many of the arguments that motivate the postulation of paradigms in the inflectional domain have straightforward analogues in the domain of derivation. As two cases in point, consider again the phenomena of head marking and blocking.

7.1 Paradigms and head marking in inflection and derivation

The notion of *head marking* ultimately rests on a fundamental distinction among word-formation rules – the distinction between category-preserving and category-changing rules. A *category-preserving rule* of word-formation is a rule which applies to base *b* to produce value *d* and in so doing allows one or more of *b*'s morphosyntactic properties to persist to *d*; a *category-changing rule*, by contrast, allows none of *b*'s properties to persist, but instead simply imposes all of *d*'s

properties. Given this distinction, a *headed* expression can then be defined as one arising through the application of a category-preserving rule; in particular, the *head* of a headed expression *d* is the base from which one or more of *d*'s properties persist. Category-preserving rules are themselves of two sorts: those that apply either to an uninflected stem or to a fully inflected word, and those that apply only to an uninflected root; rules of the former sort have been termed *word-to-word rules*.

In the inflectional domain, head-inflected forms such as *mothers-in-law* present an important problem: does *mothers-in-law* arise from *mother-in-law* through the application of a special "head operation" which suffixes *-s* to a complex noun's head, or does *mothers-in-law* arise from *mothers* through the application of a word-to-word rule of compounding? In formal terms, the issue here is whether head-inflected forms arise because certain inflectional operations are stipulated as being head operations or because certain word-formation operations are, by stipulation, allowed to apply to inflected forms. The head-operation approach (assumed by Hoeksema 1984, Anderson 1992, and others) entails that if an inflectional rule functions as a head operation in one case then it should do so in all cases; the word-to-word approach, by contrast, entails that the same inflectional rule may sometimes give rise to head marking and sometimes not, depending on whether the word-formation rule with which it interacts is or is not a word-to-word rule. Moreover, the word-to-word approach entails that if a given stem exhibits head marking anywhere in its paradigm, it should do so everywhere in its paradigm, and that stems arising through the application of the same rule of word-formation should be alike in either exhibiting or failing to exhibit head marking.

Empirical evidence confirms the word-to-word approach (Stump 2001: 112-119). Thus, consider first the Breton inflectional rule which suffixes *-(i)où* to plural nouns: this rule gives rise to head marking in loose compounds (e.g. TOK-SIVI 'strawberry hull' ['hat-strawberries'], pl. *tokoù-sivi*) but not in derivatives of temporal duration in *-vez* (e.g. NOZVEZ 'a night's duration', pl. *nozvezioù*/**nozioùvez*, cf. *nozioù* 'nights').[10] This contrast is inexplicable under the head-operation approach, according to which the inflectional rule of *-(i)où* suffixation should either always function as a head operation or never do so. Under the word-to-word approach, by contrast, one can account for the contrast between *tokoù-sivi* and *nozvezioù* by assuming that the rule of loose compounding is a word-to-word rule but that the rule of *-vez* suffixation is not. Consider in addition the third-person singular imperfect active form *ny-a-patat* of the Sanskrit verb NI-PAT 'fly down': this form clearly exhibits head marking, since its preterite prefix is positioned on the head of the stem *ni-pat-* rather than at its periphery. This means that under the word-to-word approach, the rule of preverb+verb compounding must be a word-to-word rule; this in turn entails that all forms of NI-PAT should exhibit head marking (which they do) and that all other verbs arising, like NI-PAT, through the application of the rule of preverb+verb compounding should likewise exhibit head marking (which they do).

[10] A derivative in *-vez* is headed by its base noun because the base noun's gender persists to the derivative; for instance, *nozvez* 'duration of night' inherits the feminine gender of *noz* 'night' (Stump 2001: 113).

These facts suggest that morphological theory need not incorporate a special category of head operations. Moreover, they suggest that the inflectional realizations of a stem which exhibits head marking are projected from those of its head by means of a universal principle having the following formulation:

(3) Head-Application Principle (Stump 2001: 118):

> Where stem *d* arises from stem *b* through the application of a word-to-word rule *r*, then for each cell ⟨*b*,σ⟩ in *b*'s paradigm, if ⟨*b*,σ⟩ has realization *x*, then the corresponding cell ⟨*d*,σ⟩ in *d*'s paradigm has realization *r*(*x*).

If derivation involves a paradigmatic system of organization, then one would expect the Head-Application Principle to apply in the domain of derivation as well as in that of inflection. In fact, it does. Suppose the cells in a derivational paradigm are pairings of the form ⟨*d*,σ⟩, where σ is a lexicosemantic category rather than a morphosyntactic property set. In that case, the derivational paradigm of the verb PASS might contain the cell ⟨*pass*, personal noun⟩ having the realization *passer*. On the assumption that the English rule of verb+particle compounding is a word-to-word rule, the Head-Application Principle then correctly predicts that the cell ⟨*pass by*, personal noun⟩ in the derivational paradigm of the derivative verb PASS BY should have *passer by* as its realization. Thus, on the assumption that the Head-Application Principle regulates the phenomenon of head marking, its applicability in both the inflectional and derivational domains favors the conclusion that both domains involve a paradigmatic system of organization.

7.2 Paradigms and blocking in inflection and derivation

In instances of blocking, a lexically listed element excludes the use of an equivalent competitor. If derivation, like inflection, is assumed to possess a paradigmatic system of organization, then the fact (cf. Table 5) that blocking relations are found in both the inflectional and the derivational domains can be attributed to this paradigmatic organization. In particular, one can assume that if two forms compete to realize the same paradigmatic cell, Pāṇini's principle determines the outcome of this competition. Thus, because the lexical stipulation that the cell ⟨*go*,{past}⟩ is realized by *went* applies more narrowly than the rule that realizes a cell ⟨X_V,{past}⟩ as X*ed*, *went* blocks **goed*; in the same way, *judge* (n.) blocks **judger* because the lexical stipulation that the cell ⟨*judge* (v.), personal noun⟩ is realized by *judge* (n.) is narrower than the rule that realizes a cell ⟨X_V, personal noun⟩ as X*er*.

The notion that blocking relations are regulated by Pāṇini's principle receives clear confirmation in those instances in which a word blocks a competing combination of words. As an example of this sort, consider the periphrastic future-tense paradigm of Sanskrit DĀ 'give' in Table 10. Most of the forms in this paradigm are periphrastic combinations consisting of the nominative singular form

of DĀ's agentive derivative DĀTṚ together with a present indicative form of AS 'be' inflected for the appropriate person and number; compare Tables 10-12. The third-person forms, however, are not periphrastic: they are simply nominative forms of the agent noun, appropriately inflected for number. If the third-person plural form followed the more general pattern, it would be the periphrase **dātā́ santi*; but this is blocked by the actually occurring form *dātāras* (= the nominative plural form of DâTè). Some attribute such blocking to a universal principle that favors synthetic expressions over analytic expressions of the same content (cf. Andrews 1990, Sells 1998, Bresnan 2000, and others), but while such a principle could account for the override of **dātā santi*; by *dātāras*, it would also wrongly predict (for example) that *vaporize* should override *turn to vapor*.

	Singular	Dual	Plural
1st	*dātā́ asmi*	*dātā svas*	*dātā́ smas*
2nd	*dātā́ asi*	*dātā́ sthas*	*dātā stha*
3rd	*dātā́*	*dātā́ràu*	*dātāras*

Table 10 *Periphrastic future paradigm of the Sanskrit verb DĀ 'give'*

	Singular	Dual	Plural
Nominative	*dātā*	*dātā́rāu*	*dātāras*
Vocative	*dātar*	*dātārāu*	*dātāras*
Accusative	*dātāram*	*dātā́rāu*	*dātṛ́n*
Instrumental	*dātrā́*	*dātṛ́bhyām*	*dātṛ́bhis*
Dative	*dātré*	*dātṛ́bhyām*	*dātṛ́bhyas*
Ablative	*dātúr*	*dātṛ́bhyām*	*dātṛ́bhyas*
Genitive	*dātúr*	*dātrós*	*dātṛnām*
Locative	*dātári*	*dātrós*	*dātṛ́ṣu*

Table 11 *Paradigm of the Sanskrit noun DĀTṚ 'giver'*

The Pàðinian approach, by contrast, makes just the right predictions. Because the rule realizing the cell ⟨*dā*, {PER:3rd, NUM:plural, TNS:second future}⟩ as *dātāras* is narrower than the default rule realizing a cell ⟨*dā*, {PER:α, NUM:β, TNS:second plural}⟩ as the combination of *dātā́* with the realization of ⟨*as*, {PER:α, NUM:β, TNS:present, MOOD:indicative}⟩, the Pàðinian approach predicts that *dātāras* should override **dātā santi* (Stump 2001: 230ff). On the other hand, the phrase *turn to vapor* (unlike *dātā asmi*, etc.) is not a periphrase according to any of criteria in (F)-(H); that is, it isn't defined by the realizational morphology of English, but rather by its syntax. As a consequence, *turn to vapor* doesn't compete with *vaporize* to realize the paradigmatic cell ⟨*vapor*, inchoative⟩; neither expression is capable of blocking the other.

	Singular	Dual	Plural
1st	*ásmi*	*svás*	*smás*
2nd	*ási*	*sthás*	*sthá*
3rd	*ásti*	*stás*	*sánti*

Table 12 *Present indicative paradigm of the Sanskrit verb* AS *'be'*

Head marking and blocking are only two of the phenomena that have been cited as evidence of parallelism between inflection and derivation; other confirming evidence exists as well (see e.g. Bauer 1997, Booij 1997). Facts such as these seem likely to stimulate a thorough rethinking of the relation of inflection to word-formation within the coming decade. The theoretical architectures necessitated by these two types of morphology may ultimately be found to possess a much higher degree of parallelism than they are currently accorded in contemporary theoretical models.

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REFERENCES

Ackerman, Farrell and Stump, Gregory (2004). "Paradigms and periphrastic expression: A study in realization-based lexicalism." In: L. Sadler and A. Spencer (eds.), *Projecting morphology*. Stanford: CSLI Publications, 111-157.

Aitchison, Jean. 1994. *Words in the mind* [2nd edition]. Oxford UK & Cambridge USA: Blackwell.

Anderson, Stephen R. 1982. "Where's morphology?" *Linguistic Inquiry* 13, 571-612.

Anderson, Stephen R. 1985. "Inflectional morphology." In: T. Shopen (ed.), *Language typology and syntactic description*, volume III. Cambridge: Cambridge University Press, 150-201.

Anderson, Stephen R. 1992, *A-morphous morphology*. Cambridge: Cambridge University Press.

Andrews, Avery D. 1990. "Unification and morphological blocking." *Natural Language & Linguistic Theory* 8, 507-557.

Bauer, Laurie. 1997. "Derivational paradigms." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1996*. Dordrecht: Kluwer, 243-256.

Bochner, Harry. 1984. "Inflection within derivation." *The Linguistic Review* 3, 411-421.

Bochner, Harry. 1992. *Simplicity in Generative Morphology*. Berlin and New York: Mouton de Gruyter.

Booij, Geert. 1996. "Inherent versus contextual inflection and the split morphology hypothesis." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1995*. Dordrecht: Kluwer, 1-16.

Booij, Geert. 1997. "Autonomous morphology and paradigmatic relations." In: G. Booij and J. van Marle, (eds.), *Yearbook of Morphology 1996*. Dordrecht: Kluwer, 35-53.

Booij, Geert. 2000. "Inflection and derivation." In: G. Booij, Ch. Lehmann, and Joachim Mugdan (eds.), *Morphology: An international handbook on inflection and word-formation*. Berlin & New York: Walter de Gruyter, 360-369.

Börjars, Kersti; Vincent, Nigel; and Chapman, Carol. 1997. "Paradigms, periphrases and pronominal inflection: a feature-based account." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1996*. Dordrecht: Kluwer, 155-180.

Bresnan, Joan. 2000. "Optimal syntax." In: J. Dekkers, F. van der Leeuw, and J. van de Weijer (eds.), *Optimality Theory: Phonology, syntax and acquisition*. Oxford: Oxford University Press, 334-385.

Csúcs, Sándor. 1988. "Die wotjakische Sprache." In: D. Sinor (ed.), *The Uralic languages: Description, history and foreign influences*. Leiden: E. J. Brill, 131-146.

Di Sciullo, Anna Maria and Williams, Edwin. 1987. *On the definition of word*. Cambridge: MIT Press.

Dressler, Wolfgang U. 1989. "Prototypical differences between inflection and derivation." *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 42, 3-10.

Ettinger, Stefan. 1974. *Form und Funktion in der Wortbildung. Die Diminutiv- und Augmentativmodifikation im Lateinischen, Deutschen und Romanischen. Ein kritischer Forschungsbericht 1900-1970*. Tübinger Beiträge zur Linguistik 47. Tübingen: Gunter Narr.

Halpern, Aaron L. 1992. *Topics in the placement and morphology of clitics*. Doctoral dissertation. Stanford University.

Haspelmath, Martin. 1993. "The diachronic externalization of inflection." *Linguistics* 31, 279-309.

Hoeksema, Jacob. 1984. *Categorial morphology*. Doctoral dissertation, University of Groningen [New York: Garland, 1985].

Lapointe, Steven G. 1990. EDGE features in GPSG. In: M. Ziolkowski, M. Noske, and K. Deaton (eds.), *Papers from the 26th Regional Meeting of the Chicago Linguistic Society*, volume 1. Chicago: Chicago Linguistic Society, 221-235.

Lieber, Rochelle. 1980. *On the Organization of the Lexicon*. Doctoral dissertation, MIT. [Reproduced by Indiana University Linguistics Club, 1981.]

Marantz, Alec. 1988. "Clitics, morphological merger, and the mapping to phonological structure." In: M. Hammond and M. Noonan (eds.), *Theoretical morphology: Approaches in modern linguistics*. San Diego: Academic Press, 253-270.

Matthews, Peter. H. 1972. *Inflectional morphology: A theoretical study based on aspects of Latin verb conjugation*. Cambridge: Cambridge University Press.

Matthews, Peter. H. 1991. *Morphology* [2nd edn.]. Cambridge: Cambridge University Press.

Miller, Philip H. 1991. *Clitics and constituents in Phrase Structure Grammar*. Doctoral dissertation, Universiteit te Utrecht.

Mufwene, Salikoko. 1980. "Bantu class prefixes: inflectional or derivational?" In J. Kreiman and A. E. Ojeda (eds.), *Papers from the Sixteenth Regional Meeting of the Chicago Linguistic Society*. Chicago: Chicago Linguistic Society, 246-58.

Perlmutter, David. 1988. "The split morphology hypothesis: evidence from Yiddish." In: M. Hammond and M. Noonan (eds.), *Theoretical morphology: Approaches in modern linguistics*. San Diego: Academic Press, 79-100.

Pesetsky, David. 1985. "Morphology and logical form." *Linguistic Inquiry* 16, 193-246.

Sadler, Louisa and Spencer, Andrew. 2001. "Syntax as an exponent of morphological features." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 2000*. Dordrecht: Kluwer, 71-97.

Sells, Peter. 1998. "Optimality and economy of expression in Japanese and Korean." In: N. Akatsuka et al. (eds.), *Japanese/Korean Linguistics* 7. CSLI, Stanford Linguistics Association, 499-514.

Sproat, Richard. 1988. "Bracketing paradoxes, cliticization and other topics: the mapping between syntactic and phonological structure." In: M. Everaert, A. Evers, R. Huybregts, and M. Trommelen (eds.), *Morphology and modularity*. Dordrecht: Foris, 339-360.

Stump, Gregory T. 1990a. "Breton inflection and the split morphology hypothesis." In: R. Hendrick (ed.), *Syntax and semantics, volume 23: The syntax of the modern Celtic languages*. San Diego: Academic Press, 97-119.

Stump, Gregory T. 1990b. "La morphologie bretonne et la frontière entre la flexion et la derivation." *La Bretagne linguistique* 6, 185-237.

Stump, Gregory T. 1991. "A paradigm-based theory of morphosemantic mismatches." *Language* 67, 675-725.

Stump, Gregory T. 1993. "How peculiar is evaluative morphology?" *Journal of Linguistics* 29, 1-36.

Stump, Gregory T. 1995. "The uniformity of head marking in inflectional morphology." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1994*. Dordrecht: Kluwer, 245-296.

Stump, Gregory T. 1998. "Inflection." In: A. Spencer and A. M. Zwicky (eds.), *The handbook of morphology*. Oxford & Malden, MA: Blackwell, 13-43.

Stump, Gregory T. 2001. *Inflectional morphology*. Cambridge: Cambridge University Press.
Stump, Gregory T. 2002. "Morphological blocking and Pàõini's principle." Paper presented at the Periphrasis and Paradigms Workshop, University of California, San Diego.
Stump, Gregory T. 2004. "Delineating the boundary between inflection-class marking and derivational marking: The case of Sanskrit *-aya*." Paper presented at the 11th International Morphology Meeting, University of Vienna.
Zwicky, Arnold M. 1985. "How to describe inflection." In: M. Niepokuj, M. van Clay, V. Nikiforidou and D. Feder (eds.), *Proceedings of the Eleventh Annual Meeting of the Berkeley Linguistics Society*. Berkeley Linguistics Society, 372-386.

WORD-FORMATION AND SYNTAX

ANDREW SPENCER

1. INTRODUCTION

In this chapter we consider the relationship between word formation and phrase formation (syntax). Parallels and differences have been noted between the two from the earliest studies on word formation (see Štekauer 1998: 33f for detailed discussion in the context of English). The most striking parallels between word structure and phrase structure are found in compounding structures. Compounding will not be the central focus of this chapter, though I will have some remarks to make about so-called synthetic compounds. (A cross-linguistic survey of compounding can be found in Fabb 1998).

There are considerable difficulties in discussing the relationship between word formation and syntax in a theory-neutral fashion. The problem is that different theoretical models take substantially different approaches with respect to the relationship between word structure and phrase structure. Syntactic models such as *Head-Driven Phrase Structure Grammar* (HPSG, Pollard and Sag 1994) or *Lexical Functional Grammar* (LFG, Bresnan 2001) respect a principle of lexical integrity, under which syntactic rules or principles have no access to internal word structure and hence cannot create words. On the other hand there is an unbroken tradition stretching from the original *Generative Semantics* model to its contemporary incarnations in transformational grammar (minimalism) in which word structure is treated as a species of phrase or clause structure. For syntacticians such as Kayne (1994) it would seem that inflection is essentially a form of syntax, while for authors such as Hale and Keyser (1993) even word formation is syntax. Such an approach leaves no room for a dedicated morphology component and renders the relationship between word formation and syntax essentially trivial.

It is logically impossible to investigate the relationship between word formation and syntax if you do not believe in words and hence word formation. Except where otherwise stated, therefore, I shall make the assumption that there is a category of word distinct from that of morph(eme) or phrase, even if the boundary between these categories is sometimes difficult to draw. Granted the existe f words there are several respects in which we can investigate the relationship between word formation and syntax. First, we examine the extent to which syntactic principles can have access to the internal structure of words ('lexical integrity'). Next, we ask to what extent syntactic constructions can be incorporated into words. Then, we ask to what extent properties of newly formed words show up in their syntactic behaviour, especially in argument structure realization. Against this background I conclude by asking how various types of syntactic model propose to handle some of the more salient facts discussed.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 73—97.

2. LEXICAL RELATEDNESS AND SYNTAX

2.1 Morphotactics in classical US structuralism

In classical structuralist theories of the kind associated with Bloomfield (1933), Harris (1951), Hockett (1958), syntax was generally thought of as the concatenation of morphemes. Gleason (1969) was able to discuss word order patterns in languages such as English in terms of 'position classes', essentially the same notion as that used to describe the complex morphologies of American polysynthetic languages. This meant that there was no obvious difference between a word and a phrase, which some linguists took to mean that there was no principled difference between these two constructs (see Dixon and Aikhenvald 2002 for a review of these issues).

2.2 Morphology as syntax

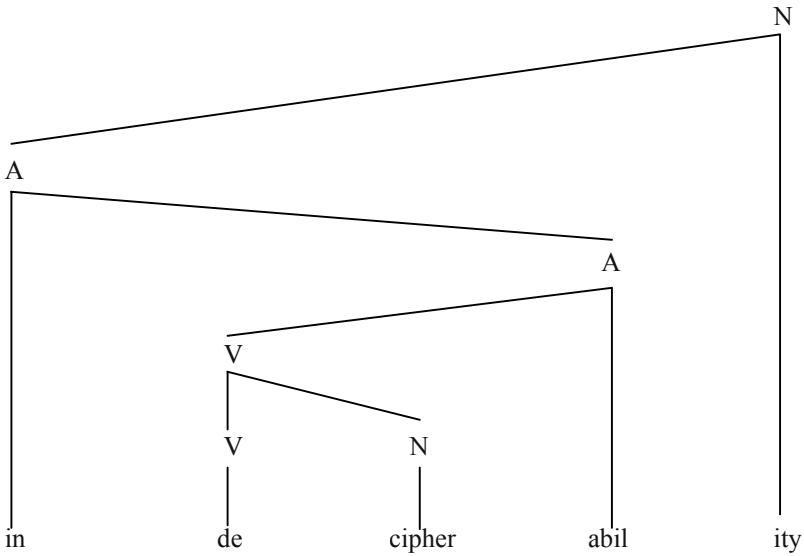
There are abundant instances of syntactic constructions occurring inside productive, or at least common, morphological constructions. In Dutch, whole phrases can be freely incorporated into noun-headed compounds (Booij 2002a: 146; see also, for example, Lieber 1989). In Romance languages we often find compounds consisting of a finite (usually 3sg present tense) verb form followed by a noun denoting the verb's object, e.g. Italian *portalettere* 'postman, mailman', literally 'carries-letters' (Scalise 1984). More generally, word formation processes in many American languages may involve rather elaborated sentence constructions (see Spencer 2000: 317 for examples of Navajo 'descriptive nouns'). Facts such as these alert us to the possibility that derived words generally might reflect the syntactic structure of a language.

In its simplest form the syntactic approach to morphology reduces to the claim that there exists a phenomenon of syntactic affixation. This essentially means that an inflectional or derivational formative can be represented as a syntactic node and hence subtend syntactic relations with structures which surface as words or parts of words. The analysis of the tense system of English provided in Chomsky (1957) is an example of this mode of reasoning. A tense suffix such as *-ed* is represented as a syntactic terminal which is then adjoined to the verb stem in the syntax. Chomsky (1970), however, argued that we can distinguish idiosyncratic types of nominalization, such as *destruction*, from regular nominalizations such as *shooting* by assuming that *destruction* is formed 'in the lexicon' while *shooting* is formed 'in the syntax'. Thus, we can think of (one interpretation of) an expression such as *the shooting of the hunters* as arising from the application of *-ing* to the VP *shoot the hunters*. This then captures the intuition that such nominalizations nominalize the entire VP or even clause rather than an individual verb. Lieber (1992) explores the idea of syntactic affixation in some detail.

Within generative grammar the claim that words have essentially the same syntactic structure as phrases was first advanced in Toman (1983) and developed by various authors including Selkirk (1982), Di Sciullo and Williams (1987) and Lieber

(1992) (see Toman, 1998 for a survey, and Scalise & Guevara, this volume). It is convenient to refer to these proposals as *word syntax*. A central feature of the word syntax approach is that words are endocentric constructions, that is, they are headed, just like phrases (note that this is a different sense of 'head' from that introduced by Stump, this volume). In the case of derivational morphology the head is identified with the affix which realizes the derivation, and it is responsible for the category change associated with derivation. This can be illustrated with the word *indecipherability* shown in (1):

(1)



The node labels are defined either by phrase structure rules (Selkirk 1982, Di Sciullo and Williams 1987) or by percolation of features from the terminals (Lieber 1983, 1992).

For inflectional morphology the notion of *headedness* is difficult to defend without resort to theory-internal justification, and different word syntax models of inflection adopt somewhat different approaches to this question of headedness. For instance, Di Sciullo and Williams (1987) adopt Selkirk's (1982) notion of a 'relativized head', under which different affixes can serve as the head of an inflected word with respect to different features, while Lieber (1992) adopts a percolation-based approach which generalizes this idea.[1] The notion of word headedness is controversial, even for derivation (see the discussion in Bauer, 1990, Hudson, 1987, Zwicky, 1985). In derivation Lieber (1983) notes that many prefixes do not seem to determine the lexical category of the derived word. For instance in *counter-analysis*,

[1] Di Sciullo and Williams (1987) also retain Williams' idea that the head of a word is always to the right of the stem, the 'Right-hand Head Rule'. I confess that I have always been mystified by this proposal, which amounts to the claim that there are no inflectional or derivational prefixes (or, for that matter, circumfixes), so I leave it without further comment.

counter-productive, *counter-attack* the prefix *counter-* combines with a noun, adjective and verb. On the other hand, the prefix *de-* in *de-ice*, *de-cipher* and so on seems to be responsible for turning a noun into a verb.

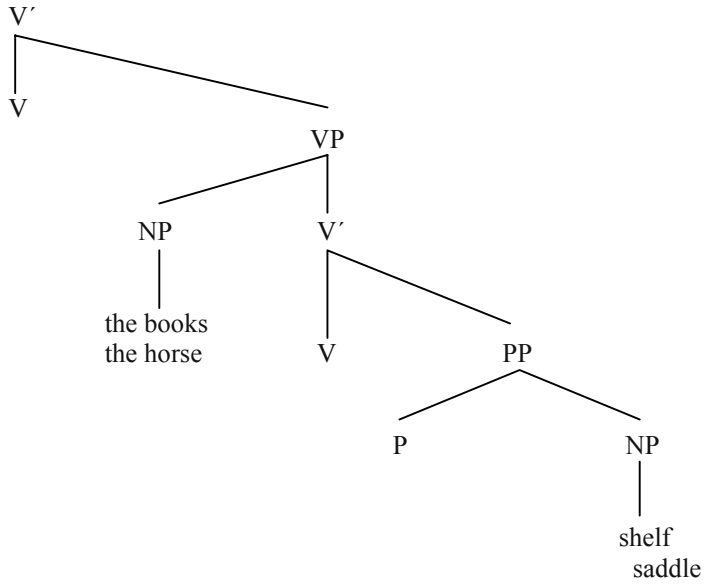
The original word syntax approach drew a distinction between individual words and phrases. Such a model is able to accommodate a principled distinction between morphological and syntactic representations and the types of principles that apply to them, while retaining the claim that morphological and syntactic principles can overlap and even be shared (see Di Sciullo and Williams 1987 for detailed discussion). However, recent approaches to inflection, inspired by the work of Baker (1988) and Pollock (1989), have argued that all morphemes, whether lexical or functional, head full phrases, and that either heads or phrases can be incorporated into word structures under certain circumstances. This marks essentially a return to the position of Harris (1951). Although proponents of such a model sometimes maintain the necessity for an independent morphology module it is unclear how such a module would operate. I shall refer to such purely syntactic approaches to word formation as 'radically syntactic' models.

The precise nature of the word syntax in radically syntactic models depends on assumptions about syntactic structure. Those who follow the model of Kayne (1994) adopt an *X-bar model* of syntax, while those who follow the minimalism of Chomsky (1995) adopt the *bare phrase structure* approach. I am not in a position to say to what extent that approach is compatible with Kayne's *anti-symmetry model*. The matter is further complicated by proposals advanced recently within the framework of *Distributed Morphology* (Halle and Marantz 1993), under which lexical items lack all lexical category specifications and acquire the features of noun, verb or adjective only in the syntax.[2]

Unfortunately, these proposals are as yet too programmatic to permit serious discussion. I shall, however, briefly mention one influential set of proposals for certain aspects of word structure, namely, the model of argument structure as *l-syntax* proposed by Hale and Keyser (1993, 2002). They consider denominal converted verbs in which the basic noun has the meaning either of a location (*shelve the books* = 'put the books on a shelf') or a locatum (*saddle the horse* = 'put a saddle on a horse'). They propose that such verbs are derived from nouns by means of a syntactic process of incorporation, akin to the kinds of incorporation structures we see in noun incorporating languages. Thus, (2) is said to be the structure underlying the *shelve*/*saddle* type verbs:

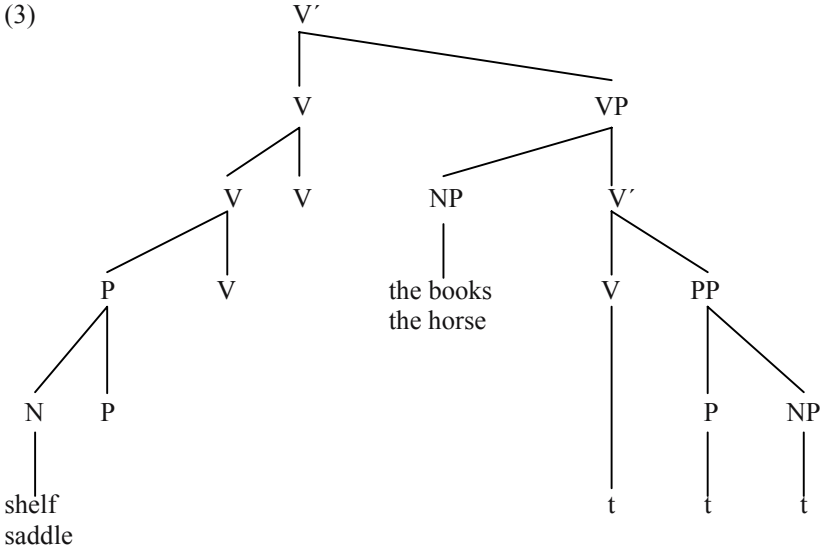
[2] I have been unable to locate a complete published exposition of these claims. See Don (2004) for a critical assessment of the claims and for references to unpublished handouts and website addresses which provide further information.

(2)



The two verbs are derived by movement processes which give the 'surface' structures in (3):

(3)



However, it has been argued in great detail and very persuasively in Kiparsky (1997) that the crucial aspects of the grammar of location and locatum verbs (and other denominal verbs, including instrumental verbs such as *to hammer*) are the result of world knowledge: saddles are (typically) put onto horses, not anywhere else

and certainly not vice versa. Kiparsky points to a number of other difficulties with the approach of Hale and Keyser (Hale and Keyser 2002, do not address these objections, and indeed Kiparsky's article is not even in their bibliography). As Culicover and Jackendoff (2005) point out there is very little empirical justification for the structures Hale and Keyser propose. Presumably, the overriding motivation is to account for as many as possible of the properties of words using exclusively syntactic principles.

2.3 Lexical integrity

The radically syntactic approaches to word formation bring with them the implicit assumption that there is nothing else of interest in word structure apart from syntax. However, the majority view amongst morphologists is that word structure is governed by principles that are in part distinct from syntactic principles (or, in the case of Anderson's (1992) *a-morphous theory* of word structure, completely distinct). One important such principle is *lexical integrity*. Essentially, this notion is characterized negatively: principles of syntax do not have access to internal word structure. In particular, syntactic rules or principles cannot be responsible for the construction of inflected or derived words. This means that if labelled tree structures such as (2) are to be admitted then we may have to give interpretations to those structures which make them rather different from syntactic constructions proper. Lexical integrity is a principle that can be adopted even on a word syntax approach, just as long as the syntactic representations which account for word structures are insulated from the operation of processes in the syntax of phrases proper.

Several properties of word structure have been proposed as diagnostics of lexical integrity, though some of them are more reliable than others. For instance, it is generally agreed that displacements which realize information structure, such as topicalization/focussing, scrambling, wh-movement and so on cannot affect parts of words. Even productively formed noun-noun compounds in English, the most phrase-like of English word types, seem to be immune from such processes, as is exemplified in (4 - 7):

(4) a. She would never give a morphology lecture.
b. A morphology lecture, she would never give _____.
c. She would never study morphology.
d. Morphology, she would never study _____.

(5) *Morphology, she would never give a _____ lecture.

(6) a. What did she give?
b. A morphology lecture

(7) a. What kind of lecture did she give?
b. A morphology lecture
c. *A morphology one

d. *A morphology ___
e. *Morphology

However, there are analytic constructions, which look like lexical items (that is, single 'words' in some sense) which clearly consist of more than one syntactic word. A familiar example from English is the verb-particle construction, as in *turn the light out*. In the most literal sense, analytic expressions such as *turn out* violate lexical integrity, in that they consist of two words which can be separated from each other in the syntax, and yet there is a clear sense in which non-compositional expressions of this kind are single lexical items. These constructions have given rise to a considerable literature, which I shall very briefly summarize here.

The range of particle constructions is lucidly summarized by Jackendoff (2002a). In the cases of interest here, the particles can appear either in pre-object position, immediately after the verb (*put down the book*) or in post-object position (*put the book down*). The post-object particle can co-occur only with NP direct objects, not with PP complements: *Jill grew up into a strong woman*, **Jill grew into a strong woman up*. In post-object position the particle can take a modifying element (specifier): *eat those sandwiches right up!* Verb-Particle-NP constructions are distinguishable from Verb-PP constructions. Thus, genuine particles cannot be conjoined the way that prepositions can: **run up a bank overdraft and up a credit card bill* as opposed to *rely on one's friends but not on one's colleagues*.

Verb-particle combinations often have idiosyncratic meanings, so that they have to be treated at the very least as listed idioms. However, these items display other properties of lexical items in that certain derivational processes seem to be applicable to verb-particle constructions. Jackendoff (2002a: 72) cites nominalizations such as *the rapid looking up of the information* and deverbal nouns (*lookup*, see also Selkirk 1982 for discussion). In other languages we get more systematic derivations. Ackerman and LeSourd (1997) illustrate this in some detail with the Hungarian preverb construction (similar to the English verb-particle construction).

Given this background we can see that there are some respects in which verb-particle constructions resemble syntactic constructions and some respects in which they resemble morphology. Although a number of authors have attempted to provide purely syntactic accounts within the minimalist program, these attempts can hardly be said to be successful. In general, they are obliged to treat the basic construction as consisting of verb followed by a 'small clause' consisting of object NP and particle. As Jackendoff points out (2002a: 90f), English does have small clause constructions but the particle constructions do not behave like them. The small clause approach is likewise criticised by Ramchand and Svenonius (2001). They argue for a syntactic approach which appeals to the Hale and Keyser (1993) notion of l-syntax, introduced in section 2.2. As far as I can tell, this essentially reproduces the constructional analysis to be described below, but putting the semantic structure into the syntax.

The most promising approach to the verb-particle construction is, perhaps, to treat it as a 'constructional idiom', as argued by Jackendoff (2002a) and for Dutch by Booij (2002b). Jackendoff (2002a: 84) provides the following analysis for a

specific type of expression, the 'time-away' construction as in *dance the night away* (Jackendoff 1997):

(8) a. Form [$_{VP}$ V NP [$_{Prt}$ *away*]]
b. Meaning '*waste* [$_{Time}$ NP] *heedlessly* V-*ing*'

More generally, we can take (9) as a template for the verb-particle construction:

(9) [$_{VP}$ V NP [$_{Prt}$ P]]

A variety of meanings will then be associated with particular instantiations of P (and/or V), whether directional, aspectual or idiomatic. The fact that a single constructional type can be associated with a variety of meaning types is a reflection of the *Separation Hypothesis* (Beard 1995, Beard & Volpe, this volume). In effect, this constructional analysis is the derivational equivalent of the analysis of auxiliary + participle constructions as periphrastic inflectional constructions (Ackerman and Webelhuth 1998).

Constructional approaches leave unclear the alternation between pre-object and post-object particle positioning (or preverb position and other positions in the case of Dutch, German, Hungarian and other languages). Each language has to be considered on its own merits. As is clear from the work of Toivonen (2002, 2003), even closely related languages such as Swedish and Danish differ considerably on these constructions. Thus, Swedish has pre-object position particles but not post-object position particles. Danish, on the other hand has no pre-object particles. Toivonen argues that pre-object particles are non-projecting words, that is, elements of a zero-level syntactic category that fail to project a phrasal constituent. In this respect they are like syntactically represented clitics. They form a tight unit with the preceding verb by virtue of being adjoined at the X^0 level. This makes particles very similar to suffixes, except that they attach to inflected words rather than to stems. In post-object position, however, the particles often do project phrases (in that they can be preceded by modifiers such as *right*, *completely* and so on). Thus, the analysis of Toivonen requires that the lexical entry for one and the same element be given a dual morphosyntactic categorization.

How can the existence of syntactically complex lexical items such as verb-particle constructions be reconciled with the notion of lexical integrity? Ackerman and LeSourd (1997) discuss this question in detail. The starting point is the observation that it is the semantico-syntactic representation of an expression which individuates it primarily as a single lexical entry. This means that a single lexical entry should have a single semantic representation, and a single argument structure (with the arguments being expressed as grammatical functions in a uniform way). Alternations in argument structure or the expression of grammatical functions (such as the passive voice) are permitted to the extent that they preserve meaning and to the extent that they enjoy a fair degree of generality. In derivations which respect (standard) lexical integrity we will typically see an affix creating a new lexeme which constitutes a single syntactic terminal, even though it is morphologically

complex. For example, the affixes of words such as *readable* or *thicken* show no signs of syntactic independence.

However, just being part of a construction type with idiosyncratic meaning is not sufficient to guarantee that we are dealing with a single word in any sense. Ackerman and LeSourd discuss the case of complex predicates which realize an argument structure type, such as the causative construction. Standard examples come from Romance languages but up to a point this can be illustrated with the English *make*-causative. In *Harriet made Tom eat the apple* we can say that we have an analytic construction *make NP VP*, in which the object NP of *make* functions as (controls) the subject of the VP. However, there is no reasonable sense in which we could say that *make NP VP* is a morphological construct: it fails to behave like a single lexical item for any of the purposes of morphology. The English *make*-causative must therefore be distinguished, for instance, from those verb-particle combinations which can serve as the base for derivation.

Ackerman and LeSourd summarize this position as follows (1997: 99):

> Lexical integrity does not hold of lexical items as such, but rather is a property of the zero-level categories specified in lexical representations. Analytically expressed lexical items and syntactically derived expressions are alike insofar as both consist of more than one zero-level category.

They modify the notion of lexical integrity by restricting it to a property of X° terminals (syntactic atoms), not of lexemes. We can state this as follows:

(10) Revised Lexical Integrity: syntactic rules cannot alter the lexical meaning of words (including argument structure); syntactic rules have no access to the internal structure of X° categories.

The typology of complex predicates proposed by Ackerman and LeSourd (1997: 100) is shown in Table 1, in slightly adapted form:

	Standard affixation	Verb-particle type	Romance causative type
Lexical information	semantic structure argument structure	semantic structure argument structure	semantic structure argument structure
Morphological form	synthetic morphological object: $[X\ Y]_V$	analytic morphological object: $[X]_{Prt}$, $[Y]_V$	non-morphological object: $[X]_V$, $[Y]_V$
Syntactic Expression	single syntactic atom: $[XY]_V$	two syntactic atoms: $[X]_{Prt}$, $[Y]_V$	two syntactic atoms: $[X]_V$, $[Y]_V$

Table 1 *Ackerman and LeSourd's typology of complex predicates*

3. SYNTACTIC PHENOMENA INSIDE WORDS

In this section I briefly survey instances of violations of (morphological) lexical integrity in English word formation. One frequent instantiation of this occurs with loosely bound prefixes and neo-classical combining forms ('prefixoids') which can be coordinated with each other (Strauss 1982), as seen in (11):

(11) a. pre- and even to some extent post-war (economies)
b. pro- as opposed to anti-war
c. hypo- but not hyper-glycaemic

By no means all prefixes or combining forms behave in this fashion, however:

(12) a. *un- and re-tie
b. *in- or ex-port
c. *erithro- and leuco-cytes

In other instances I confess to vacillating judgements, as with *they need to be poly- rather than mono-glots*.

It is difficult to think of pairs of suffixes that could be contrasted with each other semantically in such a way as to permit natural coordination. However, even where plausible putative examples can be concocted they turn out to be ungrammatical: **neither joy-ful nor -less*. Similarly we sometimes find affixes attaching to coordinated stems. Judgements are sometimes variable but the following seem to be allowable:

(13) a. write- or print-able
b. mouse- or rat-like

On the other hand, examples such as (14) seem to be completely excluded:

(14) a. *irrepair- and irreplace-able
b. *slow- and smooth-ly
c. *milk- and cream-y

Also, only limited types of coordinating conjunction are generally permitted, preferably monosyllables. Thus, in contrast to the examples in (11), we would certainly not hear examples such as (15) even from a speaker who accepted (13):

(15) a. a component which is *replace- but probably not repair-able
b. a form which was *mouse- rather than rat-like

Serious investigation of this question is hampered by two types of indeterminacy. First, it is difficult to decide whether elements such as *pre-* or *hypo-* are prefixes or compounding elements (see Strauss 1982 for discussion). Second, the syntax and

semantics of coordination is far from clear. Of relevance here is the general phenomenon of *Gruppeninflexion* or 'suspended affixation' (Lewis 1967) found in many languages. For instance in many languages of the Altaic and Uralic families inflectional suffixes realizing number, case or possession can be distributed across coordinated expressions, to give constructions of the form *pot- and pan-s* or *mother- and father-my*. However, in general this is only possible when single words are coordinated, not phrases, and only when the coordinated elements form a 'natural coordination' (in an intuitive sense) (see Wälchli 2003).

Another type of deviation from strict lexical integrity is found when an affix apparently attaches to a whole phrase, as in *a why-does-it-have-to-be-me-ish expression*. I am not aware of any serious study of such formations, and their status is unclear to me. A cursory internet search reveals large numbers of such coinings, though it also reveals that for some speakers *ish* has become a free morpheme with roughly the meaning 'approximately'. A related kind of violation of lexical integrity is found when entire phrases enter into compounds, in violation of Botha's (1978) *No Phrase Constraint* (a self-violating name), as in *a why-does-it-have-to-be-me-attitude*. In English (though not, it seems, in Dutch) such constructions sound infelicitous unless the embedded expression is very frequent and easily recognizable, and this gives rise to the intuition that phrases cannot be compounded in this way unless they are somehow seen as 'fixed' or 'lexicalized' (in some unclear sense).

4. ARGUMENT STRUCTURE REALIZATION

4.1 Deverbal morphology

In Section 2.2 I mentioned Chomsky's (1970) influential treatment of action nominals as syntactic affixation. This has been the topic of enormous speculation, both for English (see Malouf 2000b for one recent survey, and Roeper, this volume), for other languages and comparable syntactic affixation analyses have been provided for other types of derivation. I first discuss action nominals, then subject nominals ('agent nominals') such as *driver* and finally *-able* adjectives derived from transitive verbs, such as *readable*. This section is avowedly descriptive, since theoretical discussion of these phenomena is often empirically rather selective. In the following section I briefly summarize the way such constructions can be treated in different types of framework.

4.1.1 Action nominals

Action nominals are words derived from verbs which have some of the morphological and syntactic characteristics of nouns. Cross-linguistically there are two, in principle distinct, aspects to deverbal nominalization. On the one hand the derived word loses some of its verbal morphosyntactic properties, while on the other hand it gains certain nominal properties. Even in English these two aspects are separable. One feature of the base verb which is retained is closely related to the

verb's semantics, namely the *argument structure* or valency. A deverbal nominal will regularly take complements which correspond to the arguments of the base verb. A hackneyed example is shown in (16):

(16) a. The enemy destroyed the city
b. the destruction of the city by the enemy
c. the enemy's destruction of the city
d. the city's destruction by the enemy

In (16b, c, d) we see the subject and object arguments of the base verb expressed as prepositional phrases and as a preposed genitive phrase. In (16c) the genitive phrase expresses the verb's subject, while in (16d) the genitive phrases expresses the object. It should be mentioned at the outset that examples such as (16d) are somewhat rare. Corresponding examples with other nominalizations are very poor:

(17) a. *the design's improvement by the engineers
b. *the book's criticism by the reviewer
c. *the poem's translation by the student
d. *the car's repair by the mechanic

In these cases it would be perfectly possible to have a construction corresponding to (16b) or (16c): *the improvement of the design by the engineers*, *the reviewer's criticism of the book* etc.

In general the nominalization names either the event or the fact of the event happening. Thus, we can say (18) or (19):

(18) event reading
The destruction of the city by the enemy
The enemy's destruction of the city
} occurred last Monday

(19) propositional or factive reading
The destruction of the city by the enemy
The enemy's destruction of the city
} appalled us

The examples given so far have involved latinate vocabulary with specialized and idiosyncratic nominalization morphology: *destroy* ~ *destruction*, *improve* ~ *improvement*, *translate* ~ *translation*, *repair* ~ *repair*. However, there is another type of nominalization which uses native affixational resources, the *-ing* nominalization. In principle all English verbs have such a nominal, in the sense that all English verbs (without exception, save for the modal auxiliaries) have what Huddlestone and Pullum (2002: 1173f) refer to as the 'gerundive-participial form' of the verb (I shall call it the '*-ing* form'). Such forms can be used as straightforward nominalizations, as in (20):

(20) a. The Romans built the city
b. the building of the city by the Romans
c. the Roman's building of the city
d. *the city's building by the Romans

However, when a verb has its own idiosyncratic nominalization use of the *-ing* form is may well sound awkward or even be excluded:

(21) a. ??the destroying of the city
b. ??the improving of the design
c. ??the translating of the book
d. ??the repairing of the car

Nominalizations with the *-ing* form specified by just the definite article often have a rather archaic feel to them, no doubt because speakers have some awareness that they were used much more often in earlier forms of the language.[3] For discussion of the historical development of the nominal and its morphosyntactic properties see Westcoat (1994; also Malouf 2000b) and especially Hudson (2003) and the references cited there.

A frequently discussed property of *-ing* nominalizations is that they permit a somewhat puzzling syntactic construction. Consider the examples in (22):

(22) a. John's repainting of the fence (took just two hours)
b. (We were surprised at) John repainting the fence so quickly
c. (We were surprised at) John's repainting the fence so quickly

In (22a) we see a nominal form which has nearly all the properties of a noun except that it retains (semantically, at least) the arguments of the original verb. In particular, the nominal *repainting* is preferentially modified by adjectives and not by adverbs:

(23) a. John's speedy repainting of the fence
b. *John's speedily repainting of the fence

On the other hand, in (22b) we see a construction which is often regarded as essentially verbal (clausal): here the *-ing* form is modified by adverbs and not by adjectives:

(24) We were surprised at
a. John so speedily repainting the fence
b. John repainting the fence so speedily

(25) We were surprised at

[3] They abound in the King James version of the Bible, e.g. Song of Solomon ii.12 'the time of the singing of birds is come'.

a. *John so speedy repainting the fence
b. *John repainting the fence so speedy

Although not perhaps especially common, constructions such as (22b) are perfectly natural and idiomatic, especially with pronoun subjects (*We were surprised at you doing such a thing*). The puzzling case is that of (22c), a construction to which a considerable amount of discussion has been addressed. The problem is that the expression *John's repainting* seems to be lexically headed by a noun *repainting*, while the expression *repainting the fence* seems to be lexically headed by a verb *repainting*. It is common to refer to such a construction as an instance of a 'mixed category'.

We only find mixed constructions of the type (22c) with *-ing* nominals, because the latinate nominalizations in *-(at)ion*, *-ment* and so on cannot take direct objects in any case. However, in other respects we see modest categorial mixture. The eventive semantics underlying the nominalization is sufficiently strong to warrant certain types of adverbial, under certain conditions (though judgements reported in the literature tend to be contradictory). Thus, for many speakers the examples in (26) are acceptable:

(26) a. the destruction of the city, quickly and with great brutality
b. the departure of the guests, rather more suddenly than we expected
c. the removal of the mummified remains, very carefully and methodically

As can be seen, for me at least, an adverbial is only permitted to modify a nominalization of this sort when it is appositive. An example such as (27a) I find very awkward at best compared to (27b):

(27) a. *We expected the departure of the guests less suddenly
b. We expected a less sudden departure of the guests

Solutions to the descriptive dilemma posed by this construction and related constructions in other languages depend on the syntactic framework chosen. A sampling of these is found in Abney (1987), Baker (1985), Bierwisch (1989), Blevins (1994), Bresnan (1997), Fu, Roeper and Borer (2001), Grimshaw (1990), Hudson (2003), Lapointe (1993), Malouf (2000a, 2000b), Pullum (1991), Roeper (1993), Rozwadowska (1997), Spencer (1999), Yoon (1996). A useful summary of a number of these proposals is given in Malouf (2000b).

In addition to the category mixing in *–ing* nominals we observe constructions in English in which a subject role appears to be expressed by a prenominal modifier. In (28) the prenominal is itself a noun, but in (29) it would appear that the adjective *American* realizes the subject argument of the underlying verb *invade*:

(28) government proposals to reduce taxes

(29) the American invasion of Iraq

There has been brief discussion of such constructions in the literature (for instance, Radford 1997 discusses examples such as (28), while Grimshaw 1990 mentions cases like (29)) but they remain somewhat puzzling.

4.1.2 Nominals denoting grammatical functions

Another type of deverbal nominalization that has attracted attention is the subject nominalization represented by *-er* affixation as in *driver*. In this type of nominalization the referent of the derived noun is the subject argument ('external argument') of the verb (Levin and Rappaport Hovav 1988, Rappaport Hovav and Levin 1992). However, the direct object argument is still syntactically 'active', in the sense that it can be expressed by a PP complement: *the driver of the train*, *a driver of trains*. Other subject nominalization affixes do not generally permit the expression of the base verb's object or complement (30), though this is occasionally possible (31):

(30) a. claimant (*of the prize)
b. exorcist (*of the demon)
c. typist (*of the report)

(31) a. applicant for the job
b. critic of the plan

Unlike action nominals, subject nominals fail to exhibit the syntax of verbs at any level:

(32) a. *a driver expensive cars
b. *a driver of expensive cars quickly
c. *a driver of expensive cars to impress women

Handbooks on word formation generally mention the suffix *-ee* as denoting the object of a transitive verb: *employee*, *payee*. This is not quite the right characterization, since certain sorts of intransitives also permit *-ee* suffixation: *escapee*. These derived nouns show essentially no verbal properties:

(33) They employed him
a. ... intermittently
b. ... as a messenger boy
c. ... to satisfy their disabled work force quota

(34) an employee
a. *... intermittently
b. *... as a messenger boy
c. *... to satisfy the disabled work force quota

A thorough and compelling analysis of the *-ee* construction can be found in Barker (1998), who argues that the salient properties of *-ee* words are derived from their semantics rather than their syntax.

4.1.3 -able adjectives

The final set of deverbal derivates that has occasionally attracted attention (Randall 1982, Roeper 1987, this volume) is those formed by affixation of *-able* to yield an adjective with the meaning '(entity) such that one can *Verb* it'. This construction applies productively to transitive verbs, effectively creating an adjective with the meaning of passive potential (see Beard 1995: 197), though without recourse to the normal passive morphology of English. A handful of *-able* adjectives betray passive-like verbal origins in that they seem marginally to permit expression of the suppressed subject argument by a *by*-phrase or expression of other verbal arguments/satellites:

(35) a. This grammar is learnable by children
b. This expression is analysable as a kind of passive
c. The disease is treatable by non-invasive methods

However, this is not generally true of *-able* adjectives, and is pretty well universally excluded in the negative form with *un-* (my judgements):

(36) a. *This grammar is unlearnable by children
b. *This expression is unanalysable as a kind of passive
c. *The disease is untreatable by non-invasive methods

(37) a. *The game is playable by children
b. *The symphony is performable by an amateur orchestra
c. *The device is repairable only by a qualified mechanic

4.2 Synthetic compounds and noun incorporation

A number of investigators have followed Marchand (1969) and others in distinguishing two types of noun-noun compound in English: *root compounds* such as *coffee table* and *verbal nexus compounds* or *synthetic compounds*, in which the lexical head is derived from a verb. Some investigators limit such synthetic compounds to those derived from action nominals and subject nominalizations (*train driving*, *train driver*) while others (e.g. Selkirk 1982) would include examples such as *hand-made*, derived from a passive participle. Some authors also include cases such as *machine-readable* (Roeper 1987), and perhaps even *government employee*. The point about these constructions is that the non-head of the compound seems to bear a syntactic dependency to the head, realizing its direct object or some other grammatical function. Roeper and Siegel (1978) claim that the incorporated element is the nearest argument/adjunct to the verb in canonical representation, the *First*

Sister Principle. There is thus a clear prima facie case for the involvement of syntax at some level of representation and, indeed, synthetic compounds bear some resemblance to noun incorporation structures, which some take to be a classic case of syntactic word formation (e.g. Baker 1988).

True noun incorporation, in which the verb head can behave just like any other finite verb form, is not a generally observed feature of Indo-European, though Scandinavian languages are developing it and Frisian seems to have a fully-fledged system of noun incorporation (Dijk 1997). For this reason, synthetic compounding is always found with some kind of deverbal word formation. A minor exception to this is provided by the progressive aspect construction. Thus, we have the paradigm shown in (38):

(38)
a. Horse-riding is fun
b. Mary enjoys horse-riding
c. Mary went horse-riding yesterday
d. Mary was horse-riding yesterday
e. *Mary horse-rides every day
f. *Mary horse-rode yesterday
g. *Mary has horse-ridden today

In (38a, b, c) *horse-riding* is essentially a noun, which means that its head, *riding*, is a noun, not a verb. For this reason the compound is perfectly acceptable. In (38e, f), however, *rides*, *rode* are finite verb forms. English does not permit compounding with finite verb forms (i.e. true noun incorporation). Moreover, as seen in (38g) English does not permit compounding with participles when they are part of a finite construction (though I confess that (38g) sounds slightly better than (38e, f)). The surprising construction, then, is (38d), in which we have a finite construction, the progressive aspect, but a synthetic compound is possible. This seems to be an instance of not-quite-completed grammaticalization. The *-ing* form of the verb retains just sufficient of its nominal past to permit the compound (perhaps helped by the fact that in other uses the *-ing* form is clearly still a noun). Unfortunately, the paradigm in (38) is scarcely remarked upon in the literature.

5. THEORETICAL APPROACHES TO WORD FORMATION

There are essentially two ways of thinking of the constructions described in Section 4, which I shall label *lexical* and *radically syntactic* for the sake of argument. Under the lexical treatment the derived word is formed in the morphology but it can 'inherit' certain syntactic properties, such as argument structure realization. Under the radically syntactic account word formation takes place in the syntax. I shall briefly summarize the central points of theoretical treatments of synthetic compounds and action nominals, these being the most 'syntactic' of the constructions under discussion.

One of the first treatments of synthetic compounding in the generative framework was essentially a combination of the lexical and the radically syntactic.

Roeper and Siegel (1978) proposed a set of transformational (syntactic) rules operating over lexical entries which have the effect of (a) turning a verb into an adjective/noun and creating a preverbal *slot* for the non-head, (b) inserting the non-head noun in the position of the syntactic complement of the original verb, (c) moving the complement noun to the preverbal non-head position. A variant of this idea resurfaces in the account of van Hout and Roeper (1998) (see Roeper, this volume), except that for them the entire derivation is now, apparently, 'in the syntax'. They observe certain differences in interpretation between examples such as (39a, b):

(39) a. lawn mower
b. a/the mower of the lawn/of lawns

In (39b) *mower* denotes a person who at some time must have mown at least one lawn, while (39a) could denote simply a person whose duty it is to mow lawns even if he has never actually done this. More plausible examples are those such as Rappaport Hovav and Levin's (1992) *life saver* vs. *saver of lives*. In addition, *lawn mower*, unlike *mower of lawns*, is generally interpreted as an instrument (garden tool) rather than an agent. In the theoretical framework adopted by van Hout and Roeper aspectual and event-related properties are a reflection of various functional heads at clause level, above the level of VP (AspP, TP, Voice-EventP and so on). They therefore argue that synthetic compounds lack such functional projections, while they are present in the structures underlying expressions such as *the mower of the lawn* (which therefore functions essentially as a synonym of *the person who mowed the lawn*). Van Hout and Roeper account for synthetic compounds by generating the non-head noun in the syntactic position of an object and then moving it to the pre-verb stem position by means of a syntactic incorporation (head-to-head movement) process. Since Van Hout and Roeper assume that all clausal functional information is lacking from the synthetic compound, for them the incorporated noun fails to pass through any of the various functional heads which might provide it with an interpretation as a direct object (in this framework a DP is 'licensed' as an object by passing through a functional projection such as AgrOP, AspP or some such, none of which are selected by the *-er* suffix). The interpretation of *lawn* as the object of *mow* therefore comes about by virtue of some modification relationship between *lawn* and *mow*, restricting the (implicit) mowing activity to mowings of lawns.

In some lexical accounts it is typically proposed that the derived word 'inherits' certain features of the argument structure of the root verb. Thus, on the model of Di Sciullo and Williams (1987) the affix *-er* has in its argument structure grid a semantic role <R> normally found on nouns. However, this argument is a functor, which means that it can combine with another argument structure grid, for instance, that of a transitive verb, to form a more complex grid. For *driver* the complex grid would take the form (schematically) <<Ag, Th>R>, such that the agent role is identified with the <R> role and the theme role can be satisfied by a PP complement (*driver of trucks*) or compounded noun (*truck driver*). On this type of account it is possible to say that the constituent structure of the compound is [truck [driver]].

Other lexicalist accounts are closer to the radically syntactic models in that they propose that the compound is verb-headed and that this compound then serves as the input to the derivational morphology. Thus, we first form the compound [$_V$ truck drive], in which *truck* satisfies the internal argument (direct object) position of the verb *drive*. This compound then undergoes *-er* affixation, to give [$_N$ [$_V$ truck drive] er]. At the morphophonological level this representation has to correspond to a bracketing (truck (driver)).

A set of proposals for handling morphology such as *truck driver* has recently been developed by Ackema and Neeleman (2004). They reject the notion of building up sentence structures by combining 'lexical entries' or by 'lexical insertion'. Rather, they argue for a modular picture of language structure. A sentence has a semantico-syntactic representation and a morpho-phonological representation and the two levels are mapped to each other by means of correspondence principles (cf also Jackendoff 1997, 2002b and Culicover and Jackendoff 2005 for a detailed defence of a related viewpoint).

Ackema and Neeleman wish to reflect in the architecture of their model the idea that there tends to be a systematic relationship between linear ordering of affixes and their semantic scope. However, they also wish to adopt a version of 'Separationism', under which morphemes are not Saussurean signs, that is, lexically listed pairings of form and meaning. They therefore assume that there are two notions of 'affix'. One is a purely morphophonological notion, /affix/, while the other, 'AFFIX', is a semantico-syntactic notion. The way that the AFFIX and the /affix/ are attached to appropriate components of the representation is governed by sets of mapping principles. In the default case, the AFFIX-/affix/ pairing is effectively a classical morpheme and the linear ordering of the /affix/-es with respect to each other and with respect to the root corresponds to the ordering of the AFFIX-es and the head. This is guaranteed by a *Linear Correspondence principle*. Deviations from agglutination are handled by special spell-out rules, such as those in (40):

(40) [TYPE ER] ⇒ /type/ /ist/
[COOK ER] ⇒ /cook/
[STEAL ER] ⇒ /thief/

On the other hand when the base of affixation is itself complex (for instance, a compound) we will need instructions as to which element to attach the /affix/ component to. Ackema and Neeleman assume an *Input Correspondence principle*, under which the /affix/ is attached to the morphophonological exponent of the head of the host. Thus, in English synthetic compounds we see the parallel structures shown in (41):

(41) semantico-syntactic representation [[TRUCK DRIVE] ER]
morphophonological representation (/truck/ (/drive/ /er/))

There remain a number of interesting empirical and conceptual questions with this approach. For instance, why is *truck driver* more or less synonymous with

driver of trucks when there is no expression **cook of pastry* corresponding to *pastry cook*?

Action nominalizations pose a more difficult descriptive and theoretical challenge because they are much more likely to preserve a wide variety of verbal properties (see Koptjevskaja-Tamm 1993, 2003 for a detailed typological survey of the possibilities). This is clearly seen in the examples of *-ing* nominals given above. One solution to this problem is to assume that these nominals are formed in the syntax, for instance, by moving the verb root to a higher functional head, say, NOM. This effectively makes the action nominal into an instance of category-changing inflection (see Abney 1987, Baker 1985, Sproat 1985 for variants of this idea). Morphologists refer to such processes as transpositions (see Beard 1995 for detailed discussion). The nominal retains verbal properties because it remains essentially a verb. However, it acquires the distributional properties of a noun phrase because its head is categorially a noun.

A very robust finding about such nominalizations is that they may mark their arguments solely in the manner of a noun (22a), or solely as a verb (22b), or they can mark the object in the manner of a verb and the subject in the manner of a noun (22c). What seems never to be found is a construction corresponding to **John repainting of the fence*, in which *repainting* seems to be a noun with respect to its object and a verb with respect to its subject. A popular explanation for this behaviour centres around the idea that the verb is more closely associated with its object ('internal argument') than its subject ('exernal argument'). If we assume that the verb-object relation has priority in some sense over the verb-subject (or verb phrase-subject) relation we can say that the nominalization switches to being (essentially) a noun but once it has made this switch it cannot go back to being a verb. In other words, if the verb's object is marked as the object of a noun, then the subject must be so marked too. Variations on this theme couched in various theoretical models are given in Borsley and Kornfilt (2000), Bresnan (1997), Lapointe (1993), Spencer (1999).

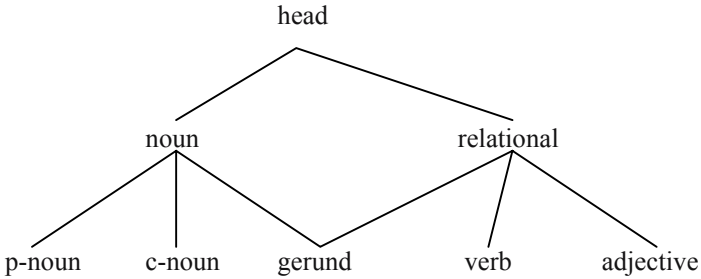
A somewhat different approach to the problem of the gerund is to treat it as in some sense a member of both the N and the V category simultaneously. Variations on this idea can be found in Lapoint (1993), Pullum (1991), Spencer (1999) and a recent variant has been proposed by Malouf (2000a, b). Malouf (2000b: 31-32) summarizes the crucial facts shown in section 4.1.1 as in (42):

(42)
a. A verbal gerund takes the same complements as the verb from which it is derived.
b. Verbal gerunds are modified by adverbs and not by adjectives
c. The entire verbal gerund phrase has the external distribution of an NP
d. The subject of the gerund is optional and, if present, can be either a genitive or an accusative NP

Malouf's analysis is presented within the framework of HPSG. In that model syntactic categories are expressed by means of a multiple inheritance hierarchy.[4] Such a hierarchy is a statement of the relationships that hold between subcategories. Malouf's (2000b: 65) hierarchy is shown in (43).

Malouf's (2000b) inheritance hierarchy:

(43)



This hierarchy distinguishes three types of noun and three types of 'relational' category. The gerund is defined as being simultaneously a noun and a relational, but distinct from a verb. For this reason the gerund phrase has the distribution of a noun phrase, but not that of a verb phrase (property (42c). Malouf claims that adjectives may only modify common nouns. Therefore, a gerund has to be modified in the manner of a relational, that is, by adverbs. This gives property (42b). To account for properties (42a, d) Malouf (2000b: 66) assumes a lexical rule which creates a lexical entry for gerund in which the verb's complements are preserved but the subject argument is expressed as the specifier (and hence subjects and specifiers cannot cooccur in the gerund.

6. SUMMARY AND AFTERWORD

There are two ways in which syntax can be said to be relevant for the study of word formation. On the one hand, theoreticians developing models of syntax have sometimes argued that most or all word formation can or should be treated as a species of syntax. Followers of the word syntax approach see words as having a constituent structure which is in some degree homologous to that of phrases. For some theorists the facts of word formation have been taken as evidence in favour of one or other specific syntactic approach, and some seem to be claiming that the only interesting aspects of word formation are to be found in syntax. I have surveyed some of these claims, concluding that the evidence for a 'syntax-all-the-way-down' approach to word formation is at best scanty. However, it remains true that there are important ways in which syntax impinges on word formation, whatever one's theoretical stance. I have surveyed the most important of these aspects, lexical

[4] Note that this is a different sense of 'inheritance' from that used in the expression 'argument structure inheritance'.

integrity, phrase-based word formation and the realization of argument structure, from this perspective.

I conclude on a methodological note. Other things being equal it would undoubtedly be simpler and hence methodologically superior to assume a single overarching model encompassing both sentence structure and word structure (though whether the central model should be syntax, as in minimalism, or morphology, as assumed by Harris, 1951, is a moot point). However, other things are rarely equal. If we assume that morphology is governed by principles which are partially distinct from syntax, and it should turn out that actually all we need is syntactic (or morphological) principles to cover both domains, then no harm will be done. We will simply discover as our understanding progresses that the syntactic and morphological principles come to converge on each other. In other words, 'splitting' is a perfectly reasonable research strategy for the field as a whole to adopt. On the other hand, suppose there really are differences between morphology and syntax and we adopt one or other version of the monolithic approach to research. If we assume a 'syntax-all-the-way-down' approach we will never hypothesize possible independent morphological principles and therefore we will never find them. The monolithic strategy, in contrast to the 'splitting' strategy, uniquely brings with it the risk that it will seriously impede progress. For this reason it would be, in a literal sense, irrational for the linguistics community as a whole to encourage the 'syntax-all-the-way-down' approach. Even those syntacticians who deep in their souls believe that syntax provides a Theory Of Everything, should, if they are to behave rationally, encourage morphologists to seek morphology-specific principles and should discourage under-motivated attempts to reduce all morphology to syntax.

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REFERENCES

Abney, Stephen. 1987. *The English Noun Phrase in its Sentential Aspect*. Unpublished PhD dissertation, Massachusetts Institute of Technology.

Ackema, Peter and Neeleman, Ad. 2004. *Beyond Morphology: Interface Conditions on Word Formation*. Oxford: Oxford University Press.

Ackerman, Farrell and LeSourd, Philip. 1997. "Toward a lexical representation of phrasal predicates." In: A. Alsina et al. (eds.), 67-106.

Ackerman, Farrell and Webelhuth, Gert. 1998. *A Theory of Predicates*. Stanford University: Center for the Study of Language and Information.

Alsina, Alex; Bresnan, Joan; and Sells, Peter (eds.). 1997. *Complex Predicates*. Stanford University: Center for the Study of Language and Information.

Anderson, Stephen R. 1992. *A-morphous Morphology*. Cambridge: Cambridge University Press.

Baker, Mark C. 1985. Syntactic affixation and English gerunds. *Proceedings of the 4th West Coast Conference on Formal Linguistics*, 1-11.
Baker, Mark C. 1988. *Incorporation. A Theory of Grammatical Function Changing.* Chicago: University of Chicago Press.
Barker, Christopher. 1998. "Episodic -ee in English: a thematic role constraint on a new word formation." *Language* 74, 695-727.
Bauer, Laurie. 1990. "Be-heading the word." *Journal of Linguistics* 26, 1-31.
Beard, Robert. 1995. *Lexeme Morpheme Base Morphology*. Stony Brook, NY: SUNY Press.
Bierwisch, Manfred. 1989. *Event nominalization: proposals and problems*. Akademie der Wissenschaften der DDR, Berlin, 1-73.
Blevins, James P. 1994. „A lexicalist analysis of gerundive nominals in English." *Australian Journal of Linguistics* 14, 1-38.
Bloomfield, Leonard. 1933. *Language*. New York: Holt.
Booij, Geert 2002a. *Dutch Morphology*. Oxford: Oxford University Press.
Booij, Geert 2002b. "Separable complex verbs in Dutch: A case of periphrastic word formation." In: Dehé et al. (eds.), 21-42.
Borsley, Robert D. and Kornfilt, Jacklin. 2000. "Mixed extended projections." In: R. D. Borsley (ed.), *The Nature and Function of Syntactic Categories. Syntax and Semantics vol. 32*. San Diego: Academic Press, 101-131.
Bresnan, Joan. 1997. "Mixed categories as head sharing constructions." In: M. Butt and T. H. King (eds.), *Proceedings of the LFG97 Conference*, CSLI publications online: http://www-csli.stanford.edu/publications/LFG2/lfg97.html.
Bresnan, Joan. 2001. *Lexical Functional Syntax*. Oxford: Blackwell Publishers.
Chomsky, Noam. 1957. *Syntactic Structures*. The Hague: Mouton.
Chomsky, Noam. 1970. "Remarks on Nominalization." In: R. Jacobs and P. Rosenbaum (eds.), *Readings in English Transformational Grammar*. Waltham, MA: Blaisdell, 184-221.
Chomsky, Noam. 1995. "Bare phrase structure." In: G. Webelhuth (ed.), *Government and Binding Theory and the Minimalist Progam*. Oxford: Blackwell Publishers, 383-439.
Culicover, Peter and Jackendoff, Ray S. 2005. *Simple(r) Syntax*. Oxford: Oxford University Press.
Dehé, Nicole; Jackendoff, Ray; Macintyre, Andrew; and Urban, Silke (eds.). 2002. *Verb particle explorations*. Berlin: Mouton de Gruyter.
Di Sciullo, Anna-Maria and Williams, Edwin. 1987. *On the Definition of Word*. Cambridge, Massachusetts: MIT Press.
Dijk, Stefan. 1997. *Noun Incorporation in Frisian*. Ljouwert: Fryske Akademy.
Dixon, Robert M. W. and Aikhenvald, Alexandra Y. 2002. Word: a typological framework. In: R. M. W. Dixon and A. Y. Aikhenvald (eds), *Word. A cross-linguistic typology*. Cambridge: Cambridge University Press, 1-41.
Don, Jan. 2004. "Categories in the lexicon." *Linguistics* 42, 931-956.
Downing, Pamela. 1977. "On the creation and use of English nominal compounds." *Language* 55, 810-842.
Fabb, Nigel. 1998. "Compounding." In: A. Spencer and A. Zwicky (eds.), 66-83.
Fu, Jingqi; Roeper, Thomas; and Borer, Hagit. 2001. "The VP within process nominals: Evidence from adverbs and the VP anaphor Do-so." *Natural Language and Linguistic Theory* 19, 549-582.
Gleason, Henry Allan Jr. 1969. *An Introduction to Descriptive Linguistics*. London : Holt, Rinehart and Winston.
Grimshaw, Jane. 1990. *Argument Structure.* Cambridge, Massachusetts: MIT Press.
Hale, Kenneth and Keyser, S. Jay (eds.). 1993. *The View From Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. Cambridge, MA: MIT Press.
Hale, Kenneth and Keyser, S. Jay. 1993. „On argument structure and the lexical expression of syntactic relations." In: K. Hale and S. J. Keyser (eds.), 53-110.
Hale, Kenneth and Keyser, S. Jay. 2002. *Prolegomenon to a Theory of Argument Structure*. Cambridge, MA: MIT Press.
Halle, Morris and Marantz, Alec. 1993. "Distributed morphology and the pieces of inflection." In: K. Hale and S. J. Keyser (eds), 111-176.
Harris, Zellig S. 1951. *Structural Linguistics*. Chicago: University of Chicago Press.
Hockett, Charles F. 1954. "Two models of grammatical description." *Word* 10, 210-231 [Reprinted in Martin Joos (ed.). 1958 (2nd edition). *Readings in Linguistics*. Chicago, Chicago University Press].

Hockett, Charles F. 1958. *A Course in Modern Linguistics*. New York: Macmillan.
Huddleston, Rodney and Pullum, Geoffrey K. 2002. *The Cambridge Grammar of the English Language*. Cambridge: Cambridge University Press.
Hudson, Richard. 1987. "Zwicky on heads." *Journal of Linguistics* 23, 109-32.
Hudson, Richard. 2003. "Gerunds without phrase structure." *Natural Language and Linguistic Theory* 21, 579-615.
Jackendoff, Ray, S. 1997. "Twistin' the night away." *Language* 73, 534-559.
Jackendoff, Ray, S. 2002a. "English particle constructions, the lexicon, and the autonomy of syntax." In: Dehé et al. (eds.), 67-94.
Jackendoff, Ray, S. 2002b. *Foundations of Language*. Oxford: Oxford University Press.
Kayne, Richard. 1994. *The Antisymmetry of Syntax*. Cambridge, MA: MIT Press.
Kiparsky, Paul. 1997. "Remarks on Denominal Verbs." In: A. Alsina et al (eds.), 473-500.
Koptjevskaja-Tamm, Maria. 1993. *Nominalizations*. London: Routledge.
Koptjevskaja-Tamm, Maria. 2003. "Action nominal constructions in the languages of Europe." In: F. Plank (ed.), *Noun Phrase Structure in the Languages of Europe*. Berlin: Mouton de Gruyter, 723-759.
Lapointe, Steven, G. 1993. "Dual lexical categories and the syntax of mixed category phrases." In: A. Kathol and M. Bernstein (eds.), *Proceedings of the East Coast States Conference on Linguistics* 1993, 199-210.
Levin, Beth and Rappaport, Malka. 1988. "Non-event *-er* nominals: a probe into argument structure." *Linguistics* 26, 1067-83.
Lewis, Geoffrey L. 1967. *Turkish Grammar*. Oxford: Clarendon Press.
Lieber, Rochelle. 1983. "Argument linking and compounds in English." *Linguistic Inquiry* 14, 251-286.
Lieber, Rochelle. 1988. "Phrasal Compounds in English and the Morphology-Syntax Interface." In: *Proceedings of the Twenty-fourth Meeting of the Chicago Linguistic Society, Parasession on Agreement in Grammatical Theory*, 202-220.
Lieber, Rochelle. 1992. *Deconstructing Morphology*. Chicago: University of Chicago Press.
Malouf, Robert. 2000a. "Verbal gerunds as mixed categories in Head-Driven Phrase Structure Grammar." In: R. D. Borsley (ed.), *The Nature and Function of Syntactic Categories*. *Syntax and Semantics vol. 32*. San Diego: Academic Press, 133-166.
Malouf, Robert. 2000b. *Mixed Categories in the Hierarchical Lexicon*. Stanford University: Center for the Study of Language and Information.
Marchand, Hans. 1969. *The Categories and Types of Present-Day English Word-Formation. A Synchronic-Diachronic Approach*. Munich: C. H. Beck.
Pollard, Carl and Sag, Ivan. 1994. *Head-Driven Phrase Structure Grammar*. Chicago: Chicago University Press.
Pollock, Jean-Yves. 1989. "Verb movement, Universal Grammar, and the structure of IP." *Linguistic Inquiry* 20, 365-424.
Pullum, Geoffrey K. 1991. "English nominal gerund phrases as noun phrases with verb-phrase heads." *Linguistics* 29, 763-799.
Radford, Andrew. 1997. *Syntactic Theory and the Structure of English*. Cambridge: Cambridge University Press.
Ramchand, Gillian and Svenonius, Peter. 2001. "The Lexical Syntax and Lexical Semantics of the Verb-Particle Construction." *Proceedings of the 21 West Coast Conference on Formal Linguistics*, L. Mikkelsen and C. Potts (eds.), Somerville, MA: Cascadilla Press, 387–400.
Randall, Janet. 1982. *Morphological structure and language acquisition*. Unpublished PhD dissertation, University of Massachusetts, Amherst. [Published by Garland Publishers, New York, 1989]
Rappaport Hovav, Malka and Levin, Beth. 1992. "-er nominals: Implications for the theory of argument structure." In: T. Stowell and E. Wehrli (eds.), *Syntax and Semantics. Vol. 26: Syntax and the Lexicon*. San Diego: Academic Press, 27-153.
Roeper, Thomas. 1987. "Implicit arguments and the head-complement relation." *Linguistic Inquiry* 18, 267-310.
Roeper, Thomas. 1993. "Explicit syntax in the lexicon: The representation of nominalizations." In: J. Pustejovsky (ed.), *Semantics and the lexicon*. Dordrecht: Kluwer Academic Publishers, 185-220.
Roeper, Thomas and Siegel, M.E.A. 1978. "A lexical transformation for verbal compounds." *Linguistic Inquiry* 9, 199-260.
Scalise, Sergio. 1984. *Morphology in Generative Grammar*. Dordrecht: Foris.

Selkirk, Elizabeth O. 1982. *The Syntax of Words*. Cambridge, MA: MIT Press.
Spencer, Andrew. 1999. "Transpositions and argument structure." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1998*. Dordrecht: Kluwer Academic Publishers, 73-102.
Spencer, Andrew. 2000. "Morphology and Syntax." (Art. 34) In: G. Booij, Ch. Lehmann and J. Mugdan (eds.), *Morphologie. Ein internationales Handbuch zur Flexion und Wortbilding. 1. Halbband. Morphology. An International Handbook on Inflection and Word-Formation. Volume 1*. Berlin: Walter de Gruyter, 312-335.
Spencer, Andrew and Zwicky, Arnold (eds.). 1998. *Handbook of Morphology*. Oxford: Blackwell Publishers.
Sproat, Richard. 1985. *On deriving the lexicon*. Unpublished PhD dissertation, Massachussetts Institute of Technology.
Štekauer, Pavol. 1998. *An Onomasiological Theory of English Word-formation*. Amsterdam: John Benjamins.
Strauss, Steven L. 1982. *Lexicalist Phonology of English and German*. Dordrecht: Foris Publications.
Toivonen, Ida. 2002. "Swedish particles and syntactic projection." In: Dehé et al. (eds), 191-210.
Toivonen, Ida. 2003. *Non-Projecting Words. A Case Study of Swedish Particles*. Dordrecht: Kluwer Academic Publishers.
Toman, Jindřich. 1983. *Wortsyntax: Eine Diskussion ausgewählter Probleme deutscher Wortbildung*. Tübingen: Niemeyer Verlag.
Toman, Jindřich. 1998. "Word syntax." In: A. Spencer and A. Zwicky (eds.), 306-321.
Van Hout, Angeliek and Roeper, Thomas. 1998. "Events and Aspectual Structure in Derivational Morphology." In: H. Harley (ed.), *Papers from the Upenn/MIT Roundtable on Argument Structure and Aspect,* vol. 32. MIT Papers in Linguistics. Cambridge, Mass, 175-200.
Wälchli, Bernhard. 2003. *Co-Compounds and Natural Coordination*. Unpublished PhD dissertation, University of Stockholm [revised version forthcoming from Oxford University Press].
Westcoat, Michael. 1994. Phrase structure, lexical sharing, partial ordering and the English gerund. *Proceedings of the Berkeley Linguistics Society* 20, 587-598.
Yoon, James. 1996. "Nominal gerund phrases in English as phrasal zero derivation." *Linguistics* 34, 329-356.
Zwicky, Arnold. 1985. "Heads." *Journal of Linguistics* 21, 1-29.

HANS MARCHAND AND THE MARCHANDEANS

DIETER KASTOVSKY

1. INTRODUCTION

Hans Marchand's contribution to the theory of word-formation in general and to the description of English word-formation in particular has unquestionably been extremely influential, and his handbook *The categories and types of Present-day English word-formation* (1st ed. 1960, 2nd. ed. 1969) is still an unsurpassed landmark in the field. A discussion of the basic assumptions underlying his approach is therefore certainly appropriate in the context of this volume. But what about the term 'Marchandean', which was suggested by the editors of this volume? What does it mean to be a 'Marchandean'? This certainly needs some kind of specification. Is it the fact that one has worked directly under Marchand's supervision as a research assistant, like Herbert Ernst Brekle, Leonhard Lipka, myself and Gabriele Stein (the names are given in chronological order of appointment)? Does it mean that someone has been very much influenced by his ideas, like Klaus Hansen, although he never met him personally? Or does it mean that someone has worked as part of a circle of linguists (nowadays sometimes called the 'Tübinger Schule'), to which Marchand also belonged, but where other influences (e.g. Mario Wandruszka, Eugenio Coseriu in Romance and general linguistics, Hans-Jürgen Heringer, Otmar Werner in German linguistics) had also been very strong, as in the case of Hans Martin Gauger, Franz Hundsnurscher, Wilfried Kürschner or Christian Rohrer? And even in the case of Marchand's assistants, these latter linguists and other influences (especially from generative-transformational grammar) are clearly visible, since none of them would take over Marchand's approach completely unchanged. Tübingen in the 1960s and 1970s was a hotbed of modern linguistics, with an active linguistic circle and a lot of cross-fertilisation also due to guests from outside. Therefore, the term 'Marchandeans' is perhaps somewhat problematic. On the other hand, there is no denying that Marchand did have a great influence on many of us working on word-formation in Tübingen in the 1960s and 1970s and also later on, and therefore the term 'Marchandean' has a certain amount of justification, especially in view of the fact that there is a certain common theoretical basis underlying the work done by us. In the present context, it is of course not possible to take into consideration the more general influence of Marchand on many colleagues in Tübingen, who had not been members of the English Department, and I can only deal with the 'inner circle', i.e. Marchand's research assistants as well as Klaus Hansen, who Marchand regarded as his oldest pupil, although Hansen knew Marchand only by reading his publications and by an intensive correspondence, and, second-hand, through his contacts with Brekle, Lipka, Stein and myself. Moreover, I will concentrate on contribution to word-formation and not to the many other fields in which they have been active.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 99—124.

Also, I will focus on those areas in which the Marchandeans have added to or modified Marchand's theory rather than sketching their overall theoretical approach, which has already been done in Štekauer (2000).

2. HANS MARCHAND

2.1 Theoretical framework

Hans Marchand's theoretical framework,[1] which he had developed in the 1940s, had its primary roots in European *structuralism*, but was also influenced by American structuralism: as a student of Leo Spitzer in the 1930s he had come into contact with European/French structuralism, but during his stay in the U.S. in the late 1940s and 1950s he had become familiar with the basic tenets of American structuralism, whose basically anti-semantic bias he objected to quite vehemently. This basically descriptive-structuralist approach to word-formation, which characterises the first edition of his handbook, was later-on modified to a certain extent by the attempt to integrate certain insights of *generative-transformational grammar*, especially in connection with a critical discussion of Lees's (1960) programmatic book *The grammar of English nominalizations* in Marchand (1965a, b; Lees 1966), which eventually found its way into the second edition of his handbook (Marchand 1969).

2.2 Synchronic approach

Marchand's word-formation theory is *synchronic* (in contradistinction to previous approaches, which had all been diachronic, cf. Jespersen 1942, Koziol 1937), although he deals with *historical* aspects in his handbook as well, cf. its subtitle *A synchronic-diachronic approach,* and it is based on the following basic assumptions:

1) Synchronic description has priority; only after a synchronic description has been provided can one look at the history of the patterns characterising a synchronic system.
2) A synchronic description of *word-formation patterns* has to be based on the notions of motivation/analysability, pattern, and productivity, which involves as additional central notion that of the *syntagma*, a combination of a *determinant* (modifier) and a *determinatum* (head).
3) A synchronic description of word-formation has to recognise the existence of systematic *morphophonemic alternations*, which have to be treated in terms of their synchronic function, not their historical origin. This might require the

[1] For a more detailed account of its genesis, cf. Kastovsky (1999). For a critical, comprehensive evaluation, cf. Štekauer (2000: 29-48).

distinction between two levels of word-formation, a native and a non-native one, though not in a purely etymological, but in a structural-functional sense.

2.3 Motivation

The most central concept in Marchand's word-formation theory is that of *motivation*, which goes back to Saussure and was further elaborated by Bally (1944). This concept, nowadays also referred to as the *compositionality principle*, assumes that simple linguistic items (signs, morphemes) are in principle arbitrary/unmotivated with regard to the relationship between form and meaning (with the exception of onomatopoeia), while complex linguistic constructions (at whichever level) are in principle *relatively motivated*, because they can be interpreted semantically on the basis of the knowledge of the meanings of their constituents and some general underlying pattern.

This assumption has the following consequences:

1) Meaning is as important as form, which is why the simple linguistic sign, the morpheme, is regarded as a combination of form *and* meaning, i.e. as a "two facet sign, which means that it must be based on the significate/significant [...] relationship posited by Saussure" (Marchand 1960: 1). This point of view differs fundamentally from the mainstream American structuralism of the 1940s and 1950s, which was basically form-oriented and treated morphemes as purely distributionally defined formal entities (cf. Kastovsky 1997b). Thus Marchand rejected the then current analysis of verbs like *receive*, *deceive*, *conceive*; *retain*, *detain*, *contain*, etc. as bi-morphemic (cf. e.g. Harris 1942: 51), because the alleged 'morphemes' did not have any identifiable meanings and therefore could not be regarded linguistic signs (cf., e.g., Marchand 1955 [1974]: 180f.).[2]
2) Only morphologically *and* semantically motivated combinations can give rise to new morphologically and semantically analysable formations, i.e. word-formation is based on formal and semantic analogy, which is equivalent to saying that there has to be an underlying *morphosemantic pattern*, which is – at least to a certain extent – also productive in so far as it allows the creation of new formations. Consequently, word-formation should only deal with *synchronically productive patterns*.

The centrality of the concept of motivation also plays an important role in Marchand's description of *onomatopoeia*. In contradistinction to Saussure, who had argued that onomatopoeia, being simple signs, were unmotivated, Marchand argues for a considerable amount of motivation in this domain. The importance which this stance had for him is documented by the fact that one of his first theory-oriented word-formation papers (Marchand 1949) deals with onomatopoeia. This is where the notion of productivity is explicitly mentioned for the first time. It should be noted

[2] Note that a similar form-based analysis was still advocated by Halle (1973: 10), who suggests segmentations such as *serendip + i + ty, vac + ant, tot + al, bro + ther, be + lieve*, and cf. Lipka's (1975a, b) justified criticism of this approach.

that from then on *sound symbolism* remained one of his major interests, cf. the respective chapters in Marchand (1960, 1969).

2.4 Morphonological alternations

The notion of productivity is also linked with the role of *morpho(pho)nological* (morphophonemic) *alternations* in word-formation, which Marchand addresses for the first time in Marchand (1951), arguing that "an opposition which does not form a morphologic pattern, is not relevant to morphonology, but to phonology only" (Marchand 1951: 88). Thus, only productive, pattern-forming alternations (whether in inflection or derivation) should be dealt with in morphonology, whereas individual instances such as *beau : belle* should be treated as straightforward allomorphy (as we would call it today). This means that instances such as *deceive : deception, resume : resumption* should be regarded as purely lexical (allomorphic) alternations, which are historically due to independent borrowings and are therefore neither part of word-formation, nor do they represent genuine synchronic morphophonemic alternations.

Marchand furthermore argues that this phenomenon reflects the fact that "most European languages [...] have two formative principles" (Marchand 1951: 92), a native and a non-native one. The crucial factor here is not etymology, i.e. whether the respective item or pattern is borrowed, but whether a given formation is synchronically formed according to productive native patterns or according to the patterns of the source language, e.g. Latin and/or Greek. Thus *cultivate : cultivatable, educate : educatable* are based on a native pattern, whereas *navigate : navigable, communicate : communicable* are based on a non-native pattern.

2.5 The concept of syntagma

The concept of motivation has an additional dimension. Marchand had adopted this concept from Bally (1944), who had linked it to the notion of *syntagma*, i.e. a sign combination based on a determinant/determinatum structure. Consequently, word-formation is also based on this principle, i.e. the results of word-forming processes are basically binary, and they always have a head (determinatum). This is also the basis for interpreting so-called conversions of the type *walk* vb → *walk* sb, *bridge* sb → *bridge* vb, *clean* adj → *clean* vb as bi-morphemic, containing a *zero-morpheme* as head, which has repeatedly been rejected, cf., e.g., Pennanen (1971), Lieber (1981: 126ff., cf. also Štekauer 2000: 246f.), or more recently Štekauer (1996), but which is generally accepted by the Marchandeans, cf., e.g., Kastovsky (1968, 1986, 1996).[3] The notion of *headedness* was much later introduced into generative word-formation by Williams (1981), but it had already been present in

[3] In the latter two papers I have tried to show that there are also historical reasons for assuming a zero morpheme/allomorph, because at an earlier stage of the language there existed overt morphological material, viz. stem formatives, expressing the respective function, which was lost due to phonological processes, but leaving behind its functional load: in other words, an overt morpheme was replaced by nothing, i.e. zero.

American structuralism, cf. the distinction between endocentric constructions consisting of a head and a modifier, and exocentric constructions, which did not contain a head. The earlier version of generative grammar with its phrase structure rules did not allow for the specification of a head of a construction, and it was only within the framework of X-bar syntax that headedness could also be characterised formally in the generative framework.

A further consequence of the headedness principle and the consideration of the typological properties of a language with regard to the sequence of modifier and head in morphological syntagmas led Marchand to postulate that in the Germanic languages word-formation syntagmas were generally characterised by the sequence of modifier/head, in contradistinction to the Romance languages, where also the sequence head/modifier occurs. This means that prefixes can only act as modifiers and not as heads, i.e. in formations such as *defrost, discourage, encage, unsaddle*, despite the change of word-class involved, the prefix cannot act as head.[4]

This phenomenon is also linked with Marchand's functional distinction between *expansion* and *derivation* (Marchand 1967), where derivation is treated as a subcategory of *transposition*, again taken over from Bally (1944), and which cuts across the purely formal distinction between compounding and affixation (prefixation and suffixation). The latter is based on the formal status of the constituents of the word-formation syntagma (compounds consist of lexemes, affixations consist of a lexeme and a bound morpheme (affix)). The former is based on the functional status of the head: in expansions, the head can stand for the whole combination according to the formula AB = B and covers both compounding and prefixation, since in both cases the determinant just modifies the determinatum: a *steamboat* is a *boat, precook* is a kind of *cook*. With derivations (= suffixations), on the other hand, this formula is not applicable, i.e. AB ≠ B, and the suffix transposes the base into a different lexical category, i.e. a *writ-er* is not an *-er*.

Bally had generalised the syntagma principle to all linguistic levels, including the level of the sentence. He assumed that the subject functions as determinatum (head), and the predicate as determinant (modifier). Moreover, he linked these functions to the organisation of the information structure in a sentence: the topic ('thème') is equivalent to the determinatum, and the comment ('propos') corresponds to the determinant, and in the unmarked case this coincides with the subject/predicate dichotomy, cf.: "la phrase est un syntagme, de même que tout groupe de signes plus grand ou plus petit, susceptible d'être ramené à la forme de la phrase" (Bally 1944: 102). This is the original source of the notion of *topicalisation*, also discussed in Marchand (1965a), although without using this term, which plays an important role in Brekle's, Lipka's and my own work later on.

This interpretation opens the way for a syntactic interpretation of complex lexical items, a central issue in generative-transformational grammar (cf., e.g., Lees

[4] For a more detailed discussion of the problems involved in this analysis, cf. Marchand (1969: 134-136), Hansen (1980), Kastovsky (1986), where the derivation is associated with a zero-determinatum, which allows the prefix to act as a determinant. The prefix as head is suggested, among others, in Lieber (1981) and Williams (1981), which goes against the general typological structure of the Germanic languages.

1960), which is already also suggested at least implicitly in Marchand (1960), cf. his remarks on the compound type *house-keeping*: "Cpds are chiefly based on a 'predicate/object' relation, but as such cbs are, on principle, nominalized sentences, other relations also occur" (Marchand 1960: 29).

This syntactic dimension is also addressed in some articles on *zero derivation*, cf. Marchand (1963a, 1963b), where he provides the following analysis of zero-derived nouns: "Other sense groups occurring are: 2) the idea of 'object', affected or effected, personal or impersonal = 'one who, that which is -ed'; 3) the idea of 'agent', personal or impersonal, material or immaterial = 'one who, that which -s'; 4) the concept 'adverbial complement' = 'place or instrument connected with the verbal process'" (Marchand 1963a: 185). And of denominal verbs he says: "Denominale Verben bezeichnen prinzipiell Handlungen, in denen das zugrunde liegende Substantiv syntaktische Funktionen hat. [...] das Substantiv fungiert als subjektbezogenes Prädikatsnomen [...], als adverbiale Ergänzung [...], als Objekt." (Marchand 1964b: 105). Marchand had thus realised that word-formation had a syntactic dimension on the basis of Bally's syntagma principle, before he was confronted with the generative-transformational approach to this domain advocated in Lees (1960).

2.6 Generative-transformational influence

In the early 1960s, Herbert E. Brekle and Christian Rohrer caught on to this new framework and got Marchand interested in it, and he began to explicitly integrate the *syntactic dimension* into his framework, cf. Marchand (1965a, b) and Lees (1966). Unfortunately, this controversy was fraught with many misunderstandings.[5] Marchand did not really adopt the then prevalent generative-transformational formalism, according to which word-formations were explicitly derived by transformations from underlying sentences, even though he used terms such as *transformation* or *underlying sentence*. This is why his terminology is somewhat ambivalent, on the one hand speaking of 'compounds reduced from sentences' (the generative-transformational perspective) and 'compounds reducible to sentences' (the Bally perspective echoing the phrase "susceptible d'être ramené à la forme de la phrase").[6]

This syntactic perspective was then integrated – at least partly – into the second, revised edition of his book, whose supervision was my first job as Marchand's assistant in 1967. It has affected the chapters on compounds and on zero derivation, but less so the prefixation and suffixation chapters. It can best be illustrated on the basis of his approach to the analysis of compounds, introducing various levels of analysis (Marchand 1969: 53) as well as the notion of *types of reference* (Marchand

[5] I must confess that at that time I also misunderstood some of the assumptions of generative-transformational grammar, taking the transformational processes to operate on actual sentences rather than on abstract underlying syntactic structures, cf. Kastovsky (1968) and below.

[6] For a detailed analysis of these misunderstandings and Marchand's equivocal use of terminology, cf. Kürschner (1977).

1969: 32), also figuring prominently in the approaches of some of the Marchandeans later on.

2.7 Analysis of compounds

Marchand assumes the following levels of analysis for compounds: morphologic shape, morphologic structure, content at the level of grammatical deep structure, type of reference, content at the morphological level.

Morphologic shape deals with the morphological status of the constituents of a compound, i.e. whether these are free (words) or bound (affixes or stems).

Morphologic structure specifies the sequence of determinant and determinatum for the combination in question. It should be added that is also describes the Immediate Constituent structure at the morphological level, i.e. it would state that *letter-writer* has the morphological structure *letter* (dt) / *writ-er* (dm) as against *back-bench* (dt) / *er* (dm).

Content at the level of grammatical deep structure and *types of reference* are interconnected and are related to "an underlying sentence whose syntactic relations they mirror. This underlying grammatical relationship will be called grammatical deep structure" (Marchand 1969: 55). This underlying structure basically corresponds to the notion of *kernel sentence* in Chomsky (1957), i.e. it represents a simple active sentence, and its syntactic structure forms the basis of the semantic interpretation of the compound. This is most obvious with the so-called *verbal nexus compounds*, which contain an overt verbal element, such as *letter-writer, cock-fighting, draw-bridge, closing-time,* where the nominal and affixal elements can easily be associated with the syntactic functions they would have in an underlying sentence. But Marchand extends this also to purely nominal (i.e. non-verbal nexus) compounds like *oil well*, *steam boat*, etc., where an underlying verb has to be reconstructed in order to assign a syntactic function to the nouns, based on the syntactic *valency* of this underlying verb.

At this stage, the notions of topicalisation and types of reference come into play: one syntactic part of the underlying sentence, the subject, object, adverbial complement or predicate can be made the topic of the sentence, which will then 'surface' as the determinatum and constitute the type of reference of the respective combination. Thus, an underlying structure *someone* (S) *eats* (P) *apples* (O) may yield the following compounds: *apple-eat-er* (= Subject Type), *eating apple* (Object Type), *apple-eating* (Predication Type)[7], *writing table* < *someone writes something at this table* (Adverbial Complement Type). Note that Marchand here refers to purely syntactic functions, i.e. to what came to be called *Argument Structure* in more

[7] The term Predication Type is somewhat problematic, since it does not really refer to a nominal syntactic function, as is the case with the other types. I had therefore already in Kastovsky (1968: 27f.) suggested to split up the predicate into a general category of state, action or activity, which would then surface as determinatum, and the remaining verbal nucleus, which would act as determinant. This was later on elaborated in Kastovsky (1976), and in Kastovsky (1982: 188f.), adopting the analysis of complement sentences by the Kiparsky's (1970), where elements such as FACT, ACT, ACTION, STATE, acting as head nouns of the respective complement sentences, would serve as the basis of the surface determinata.

recent generative grammar, but he also includes certain additional semantic differentiations such as affected and effected object, adverbials of instrument, place, time, which correspond to Fillmore's (1968) *deep-structure cases* and are now referred to as 'thematic structure', 'θ-roles' or 'thematic grid',[8] and which were adopted by some Marchandeans later on, e.g. Kastovsky (1973, 1974, 1982).

In many instances, especially with verbal nexus combinations containing an explicit verb, this reference to the syntactic underlying structure at the same time provides a sufficient *semantic analysis*: thus a *letter-writer* is 'someone who writes a letter/letters', *mincemeat* is 'meat which has been minced', *freezing point* is 'point when freezing occurs'. But in many other instances, additional semantic information is needed for an appropriate interpretation of the formation in question. This is where content at the morphological level comes in. Thus, in the case of *draw-bridge*, there is an underlying predicate-object relation, but it has to be added that this bridge also incorporates the notion of 'purpose', viz. 'bridge constructed to be drawn'; a *baker* may be someone who has just baked a cake, but may also refer to a profession, etc. Or, in the case of *call-boy,* the original interpretation was that of referring to a person calling actors onto the stage (a profession) based on a subject – predicate relation, which now – in analogy to *callgirl* – has been extended to a predicate – object relation. These semantic modifications, which can be very specific, came to be treated under the rubric of 'lexicalisation, institutionalisation, idiomatisation' by Lipka and myself, cf. below, and are necessary in order to account for the lexical properties of many of these formations which go beyond the underlying syntactic relations.

2.8 Precursor of Lexicalist Hypothesis

As has become obvious of this rather sketchy account, for Marchand the syntactic analysis of word-formation syntagmas was not equivalent to *transformational derivation*, despite the terminology used by him. Rather, this kind of analysis was regarded as a heuristic principle in order to make the relationship between the morphological and the syntactic level explicit and to provide a better basis for the semantic interpretation of composites. Looked at by hindsight today, Marchand's revised word-formation theory thus might be interpreted as a precursor of what is now called *lexicalist* word-formation, which also correlates word-formation constituents with syntactic function, but without postulating a transformational relationship between the syntactic and the lexical level.

[8] Note that in this respect there is an ongoing controversy as to whether argument structure or thematic roles should be involved in the relationship between word-formation syntagmas and corresponding syntactic structures (cf. Kastovsky 1995).

3. KLAUS HANSEN

3.1 General

Klaus Hansen (*1934), now Professor Emeritus at the Humboldt University, Berlin, was regarded by Marchand as his oldest pupil, even though they had never met, but they had an extensive correspondence, and Hansen propagated Marchand's ideas on English word-formation in numerous publications for the teaching of this and other subjects at East-German universities, where book resources were rather scarce and the production of university textbooks with corresponding didactic considerations were of paramount importance (cf. K. Hansen 1964, B. Hansen *et al.* 1985). Besides his interest in word-formation, he was also concerned with English phonetics and contrastive linguistics (which is also reflected in his papers on word-formation), as well as the development of national varieties of English, for all of which he wrote textbooks. He was strongly influenced by the Prague School and its focus on *language function* and therefore also concentrated on the relationship between formal and functional aspects of language, cf. his references to the work of Dokulil (1964, 1968) in connection with word-formation. Moreover, for his semantic analysis of word-formations, Brekle's *logical-semantic* approach as well as Fillmore's *case grammar* framework played an important role.

In the present context, three important theoretical contributions to word-formation theory will be discussed, viz. the distinction between word-formedness as the result of a morphosemantic analysis and word-formation as a synthetic process, the distinction between word-formation pattern and word-formation type, and the distinction between an onomasiological and a semasiological approach to word-formation.

3.2 Word-formedness vs. word-formation

One of Marchand's major claims had been that the productivity of a given word-formation pattern was essential for its being included in a synchronic description and that mere morphosemantic analysability was not enough (Marchand 1960: 5).[9] Hansen (1966), however, argued that, especially from the point of view of language teaching, a broader approach, called 'Worttypenlehre', should be advocated. This description "ist dabei allerdings nicht als ein System von Regeln aufzufassen, das den Lernenden zur selbständigen *Bildung* neuer Wörter befähigt oder anregt, sondern als ein Inventar von exakten Worttypbeschreibungen, das ihm die *Analyse* bereits geprägter unbekannter Wörter auf der Grundlage bekannter gestattet, also als ein Element der passiven Sprachbeherrschung" (Hansen 1966: 160, emphasis in the

[9] Marchand was not really consistent in this respect, since he also included suffixes like *-ard* (*dullard*), *-by* (*sneaksby*), *-een* (*girleen*), *-erel* (*wastrel*), *-le* (*dottle*), *-th* (*coolth*) in his book, which can hardly be said to be productive in Modern English.

original). Consequently, the distinction between productive and non-productive patterns is less relevant than the question of *analysability* and this analytic description would therefore include a wider range of patterns than a purely synthetic approach which only deals with productive patterns (cf. also Hansen 1969). Otherwise, however, Hansen follows Marchand's argumentation fairly closely, adopting the determinant / determinatum analysis of composites, rejecting a *bimorphemic analysis* of the *deceive*, *resist* cases, and giving a synchronic description priority over a diachronic one.

It is obvious that this emphasis on the *analytic aspect* was primarily motivated by didactic considerations, and Hansen in later publications modified this stance by contrasting this static approach, which corresponds to Dokulil's (1968: 205) notion of 'Wortgebildetheit', with the dynamic aspect ('Syntheseaspekt'), corresponding to Dokulil's notion of 'Wortbildung' (cf. Hansen 1977a: 43, Hansen 1985: 28f., 33ff., 38ff.), which treats word-formation as a rule-governed (generative) process. It should be added in this connection that I also used this dichotomy in Kastovsky (1982), where I distinguished between *analytic* and *generative* word-formation, which closely corresponds to Hansen's distinction.

3.3 Word-formation pattern vs. word-formation type

Another extremely useful distinction introduced by Hansen (1977a: 39-40; 1985: 28-31) is that between 'Wortbildungsmodell' (word-formation pattern) and 'Wortbildungstyp' (word-formation type), which does not really have a terminological counterpart in Marchand's approach, although it is present there at least implicitly.

A *word-formation pattern* in Hansen's sense represents a formal-morphological structure regardless of its semantics, e.g. patterns such as V + N (e.g. *cry-baby*, *drawbridge*, *bakehouse*, etc.), V + *ing* + N (*dancing girl*, *chewing gum*, *dwelling place,* etc.). A *word-formation type* is constituted by a particular semantic relationship between the constituents of a word-formation pattern, e.g.: V + N: 1) 'person characterised by performing some activity': *crybaby*, *callboy*, *playboy*, etc., 2) 'person affected by some activity': *callgirl*, *pin-up girl*, etc., 3) 'object undergoing some action': *drawbridge*, *pushcart*, *treadmill*, etc., 4) 'place where some action is carried out': *bakehouse*, *dance hall*, *runway*, etc.; V + ing + N: 1) 'person characterised by performing some activity': *dancing girl*, *working man*, *sleeping partner*, etc., 2) 'person affected by the verbal action': *whipping boy*, etc., 3) 'object undergoing some action': *chewing gum*, *cooking apple*, *drinking water*, etc., 4) 'place where some action is carried out': *dwelling place*, *gambling house*, *dining room*, etc.

One word-formation pattern thus may accommodate more than one word-formation type, and, inversely, the semantic relation represented by a given Word-Formation Type may be expressed by more than one word-formation pattern.

3.4 Onomasiological approach vs. semasiological approach

In connection with his interest in contrastive English-German word-formation, Hansen also pointed out that for the sake of comparison one needs a 'tertium comparationis', which will have to be of a cognitive-semantic nature. This results in a distinction between a semasiological and an onomasiological approach (Hansen 1977b: 293, Hansen 1985: 32-33), which to a certain extent correlate with the analytic and the synthetic aspect of word-formation respectively. The *semasiological approach* investigates which meanings (semantic relations) are associated with a given morphological structure (word-formation pattern) in a particular language, i.e. this approach is based on a form → meaning direction, which also underlies Marchand's approach. The *onomasiological approach*, on the other hand, asks "welche Wortbildungsmodelle bzw. -typen in der jeweils untersuchten Sprache zum Ausdruck bestimmter begrifflicher Tatbestände bzw. zur Bezeichnung der in ihnen abgebildeten Erscheinungen usw. der Wirklichkeit zur Verfügung stehen", i.e. is based on a concept/meaning → form direction (Hansen 1985: 32). According to Hansen (1977: 293), it is the latter approach which is preferable for a contrastive analysis, since such logical-semantic structures are more appropriate as a 'tertium comparationis' than formal-morphological structures, which are more language-specific than the former, which are potentially universal. On the other hand, for the establishment of such language-independent logical-semantic structures a systematic semasiological analysis of the languages involved in the comparison and a matching of the respective results is a prerequisite. In this connection it should be pointed out that here Hansen was again influenced by the work of Dokulil, which has also played a role in the development of Štekauer's onomasiological theory of word-formation.

4. HERBERT ERNST BREKLE

4.1 General

Herbert Ernst Brekle (*1936), now Professor Emeritus at the University of Regensburg, studied English and Romance philology, general linguistics and philosophy, the latter with an emphasis on *formal logic*, which greatly influenced his work. His major research interests were word-formation, semantics, graphemics, and the history and historiography of linguistics, which came to dominate later on. He was one of the first linguists in Germany to adopt the *generative-transformational framework*, but, even more important, he developed it in the direction of *generative semantics*, which emerged in the mid-sixties in the U.S., and which in a modified and much more refined and elaborate form characterises Brekle's earlier work on English word-formation, (cf. Brekle 1966, 1970, 1974). Subsequently, he turned to the empirical investigation of the interpretation of *ad hoc compounds* in connection with a research project in the early 1980s, which involved the integration of *pragmatic aspects* into his originally rather abstract model.

4.2 Framework

Brekle's first attempt to apply logical theory to the description of syntactic and morphological constructions dealt with a semantic description of the relations underlying syntactic groups consisting of an adjective and a noun, e.g. *black bird* and corresponding compounds, e.g. *blackbird* on the basis of *set theory* and elements of *predicate calculus* (Brekle 1966). He concluded that logically speaking these relations cannot be described intensionally but only *extensionally* on the basis of a set inclusion of (intended) referents. Moreover, he admitted that the logical framework used was still too simplistic and unrefined to cope with the more complex semantic relations underlying the syntactic and morphological constructions investigated and was in need of a substantial modification (Brekle 1966: 28).

4.3 Brekle's model

The result of the modifications he had envisaged was Brekle (1970),[10] where he proposed a much richer *predicate calculus system*, which indeed allowed a systematic description of the semantic structures underlying nominal compounds and their transformation into the appropriate surface structures. A more detailed analysis of the mechanisms of this system is not possible in this context and the reader is referred to the detailed and competent assessment in Štekauer (2000: 84-94). I fully agree with Štekauer's regret that Brekle's innovative approach did not get the attention it would have deserved because having been published in German. So I will have to restrict myself to a relative general assessment of his basic theoretical assumptions within the more general theory of word-formation.

As Brekle states in his preface, the starting-point of his approach was the syntactically oriented work of Marchand in the mid-sixties (Marchand 1965a, 1965b, 1966, 1967). This, however, he drastically modified in the direction of what came to be called *generative semantics* in the U.S. at more or less the same time, i.e. a model whose basic rules produced underlying semantic and not syntactic structures (whence the term 'generative semantics' instead of 'generative syntax'). These underlying semantic structures were represented by means of a modified predicate calculus formalism, and would then be transformed into the appropriate syntactic (or morphological) surface structures by a system of *pre-lexical* and *post-lexical transformations* including surface-structure *lexical insertion*. This direction, which evolved in the late 1960s and continued well into the 1970s until the victory of Chomsky's autonomous syntax in the guise of the *Extended Standard Theory* and *X'- syntax*, was primarily associated with the work of Fillmore, McCawley, Lakoff, Ross and Weinreich. It also influenced Lipka's and my own work in the 1970s, cf. e.g., Lipka (1972, 1976) or Kastovsky (1973, 1974, 1982). It can be assumed that

[10] The original version (Brekle's 'Habilitationsschrift') was finished in 1968.

there was some influence on Brekle's work from this emerging new framework,[11] because Brekle was in close contact with many European linguists who had access to prepublication material from the U.S. But looking at the dates of this 'grey' material, it can be safely assumed that most of Brekle's suggestions were original and just happened to conform to a beginning change in the attitude towards the relationship between syntax and semantics.

Brekle's model basically consists of the following parts: 1) a set of *arguments* and *predicates* together with some technical symbols; 2) a set of *formation rules*, which on the basis of the set of arguments and predicates generate underlying *propositional structures* ('Satzbegriffsstrukturen'), which have a cognitive-semantic status and are potentially universal;[12] 3) a primary *topicalisation rule*,[13] which selects one element of the propositional structure as determinatum (involving a λ-operator which converts the propositional structure into a predicate structure with a head/determinatum), and secondary topicalisation rules which select other elements as determinant(s) of this head; 4) *surface-structural conventions*, which regulate lexical insertion (as in generative semantics) and the surface sequence of the constituents. It should be pointed out that the propositional structures of sentences and morphological syntagmas, in this case compounds, are not considered to be isomorphic, because the latter do not contain modal elements or quantifiers, whereas the former do (cf. also Brekle 1975: 29ff.).[14] On the basis of this system, Brekle describes 25 propositional structures and more than 100 compound types that can be associated with them, noting that not all possible compound types are actually realised. The gaps can be accounted for by restrictions at the level of the norm of the language, a concept adopted from Coseriu (1962), which also played an important role in the work of Lipka, Stein and myself.

Brekle's work has demonstrated how Marchand's originally basically morphological and then morphosyntactic approach with an additional semantic interpretation can be integrated into a formalised logical description having a semantic basis. This by hindsight, might also be regarded as a precursor of the present-day lexicalist framework, which developed in the 1990s.

[11] In his bibliography there is a reference to Fillmore (1968) as a preliminary copy, but not to any other relevant publications by e.g. Lakoff, McCawley, etc. which, however, might not yet have been available.

[12] This corresponds to the semantic deep structure of generative semantics and – in more recent, syntax-based models – to the level of logical form, which to a certain extent also uses elements of predicate calculus.

[13] The notion of *topicalisation* was adopted from Marchand (1965a).

[14] This position is somewhat controversial, cf., e.g., Rohrer's (1974) argumentation that certain elements of the modality component (in Fillmore's (1968) sense) should also be included in the propositional structures underlying word-formation syntagmas, which was also argued for in Kastovsky (1982: 196) in connection with additional features such as 'habitually', 'purpose', etc.; cf. also Brekle's refutation of Rohrer's arguments in Brekle (1976: IX ff.).

4.4 Production and interpretation of compounds

A second important contribution of Brekle's to the theory of word-formation is the project on the production and interpretation of *ad-hoc-compounds* in German (cf. Brekle *et al.* 1984), where on the basis of empirical tests the conditions were investigated that have to be satisfied in order to produce and understand newly coined, non-lexicalised compounds (cf. also Brekle 1978). This involves not only the abstract structural basis investigated in Brekle (1970), but in addition the consideration of the pragmatic, con- and co-textual conditions that have to be satisfied for an existing underlying structure to be activated by a speaker and to be interpreted correctly by a listener. Moreover, it makes more explicit the reason for gaps in the actual realisations of systematic patterns that exist but apparently do not occur in performance. Brekle is certainly right when he insists that *ad-hoc*-compounds should be regarded as the most central research area in word-formation, because they indicate which processes are actually productive, whereas the compounds listed in dictionaries are very often lexicalised and therefore need not necessarily reflect active processes (cf. also Lipka below). Factors conducive to the formation of new compounds are obviously the possibility of condensing information (called the *Minimax-Principle* by Brekle), the *hypostatisation* effect, i.e. the fact that the creation of a compound (as an act of nomination) establishes the intended (real or imagined) referent as actually existing ('reified'), cf. also Lipka (1977), or the possibility of using compounds for text-linguistic purposes as pseudo-pronominal means of *co-reference*. For this project, both adult native speakers and children in the earlier stages of first-language acquisition were tested and it was investigated how much contextual influence was involved both in the production and interpretation of compounds. It turned out that one has to distinguish between instances which are interpretable without context, because the information (semantic and/or referential) associated with the constituents is sufficient to either interpret the formation in question or to disambiguate it from potentially other rather unlikely interpretations, and formations which without any contextual information are not really interpretable. Nevertheless, it turned out that all *ad-hoc*-compounds were eventually interpretable, provided enough pragmatic information (including the knowledge of referential properties) was available.

5. LEONHARD LIPKA

5.1 General

Leonhard Lipka (*1938), now Professor Emeritus at the University of Munich, is unquestionably one of the most central and important figures among the 'Marchandeans'. He studied English and Romance philology, geography and philosophy and got his Ph. D. in 1965 at the University of Tübingen with a dissertation on contrastive English-German word-formation, specifically the types *waterproof* and *grass-green* and their German counterparts (Lipka 1966). Already in

this publication he demonstrated his intense interest in a data-oriented research, which, in the last years, he has developed into a theory of *observational linguistics* (e.g. Lipka 1999, 2002b, 2003), which is an extension of what used to be called *participant observation* in anthropology and sociolinguistics. This is seen as different from corpus linguistics, because it takes into account the full linguistic, situational and cultural context and is supported by an onomasiological approach as against a semasiological one. Lipka's wide-reaching interests include, apart from word-formation, inflectional morphology (Lipka 1969),[15] semantics, text-linguistics and semiotics.

5.2 Theoretical development

While his dissertation was still firmly rooted in the Marchand tradition, Lipka in the late 1960s more and more assimilated ideas from *generative semantics*, which was probably partly due to his translation of Weinreich (1966), cf. Lipka (1970), but also to the discussions within the Tübingen linguistic circle. Moreover, he was, as all of us, influenced by Coseriu's theory of *lexematics*. The result of this is in the first place his 'Habilitationsschrift' (Lipka 1972) on the semantics of verb-particle constructions, but also a number of other papers dealing with the interaction of morphological and semantic structures in connection with generative semantics ideas (cf. Lipka 1976, 1982). This interaction of *morphosemantic* and *semantic structures* together with the *nomination function* of lexical items later on became one of his main interests. In Lipka (1972) he investigated verb-particle combinations of the type *black out, comb out, break out, eat out, dry up, heap up, break up, eat up,* etc. from a syntactic, morphological and semantic point of view, which he regarded as being on the borderline between word-formation and lexical semantics (cf. Lipka 1971). Accordingly, he combined several methods of analysis, viz. Marchandean word-formation theory, lexical decomposition as developed in generative semantics, and lexical field theory as proposed by Coseriu with the concepts of *archilexeme*, *seme* and *classeme*. The book already foreshadowed many of Lipka's later research interests, which eventually led to an excellent synthesis in his book on English lexicology (Lipka 1992c, 2002a).

The combination of word-formation structures with semantic structures was later further developed to include the domains of metaphor and metonymy as systematic phenomena related to zero derivation. Lipka regards these processes as being part of a general *dynamic lexicology*,[16] which goes beyond word-formation proper, paying attention also to the nomination function involved in the creation of new lexical items, and including an onomasiological aspect besides the traditional semasiological one (cf. Lipka 1976, 1981a, 1990, 1994b, 1996, 1998, 2002a: IX, XVIII, 138ff., 157, 177; 2002b, 2002c, 2003). In this way, lexicology has been extended to many domains that had so far been treated elsewhere, although they are

[15] This was the inspiration for Kastovsky (1971).

[16] Note that Stein (1977: 233f.) also drew attention to the similarity of syntactic conversion, metonymy and metaphorical extension with certain word-formational processes such as zero derivation.

involved in extending the lexicon in order to adapt it to the communicative needs of a speech community.

Another aspect which had already played an important role in Lipka (1972) is the process of *lexicalisation* and *idiomatisation* (to which he later on added the phenomenon of *institutionalisation*, cf. Lipka (1992a, b)), which affects the motivated/analysable status of complex linguistic structures – whether syntactic or lexical – by reducing their morphosemantic transparency (cf. Lipka 1972: 76, 143-145). He has returned to these phenomena repeatedly, refining their description in Lipka (1974, 1977, 1981, 1992a, b, 1994a, 2002a: 110ff. and passim). Simplifying somewhat, this is a three-stage process. A word-formation may start out as an *ad-hoc*-formation or neologism on the part of a single speaker. But it may gain – for whatever sociolinguistic reason – more widespread currency and become part of the established vocabulary of a speech community, and possibly also be entered into dictionaries. This is what Lipka understands by institutionalisation. Once this has happened, and once such a lexical item comes to be used frequently,[17] it may be subject to semantic change as any other established lexical item (cf., e.g. *blackboard*, *watchmaker*), because the constituents stop to fully contribute to the meaning of the combination in question. As a result of this process, the combination becomes lexicalised, e.g. by no longer admitting all possible interpretations that are attached to its morphosemantic structure, as in the case of *call girl*, *call boy*, which originally were based on the relationship V-O and V-S, but where *call boy* has now become lexicalised in the same way as *callgirl* is, i.e. as V-O. And, finally, the constituents may no longer contribute anything to the meaning of the construction, i.e. it has become idiomatised, as, e.g., in the case of *holiday, butterfly, red herring*, *black market*, *make up one's face*, *kick the bucket*, *pull one's leg.* Again, these processes contribute to the overall unity of the lexicon, where it is often difficult to set up clear demarcations, and drawing attention to this – but on the other hand also to the dynamics of the lexicon involving various linguistic levels – is one of Lipka's most important contributions to the field.

6. DIETER KASTOVSKY

6.1 General

Assessing one's own contribution in the present context is somewhat difficult, because how can one be objective in such a situation. Here, I would like to refer the reader to Štekauer's (2000: 292-310) remarks. The following will just provide some more general background information about my changing attitudes and interests, which are perhaps less obvious from both my publications and Štekauer's assessment.

[17] Note that frequency does not play a role in my own concept of lexicalisation, which otherwise is very similar to Lipka's (cf. Kastovsky 1982: 164f., 166f., 196ff.).

I (*1940) studied English, Romance and German philology and general linguistics with Marchand, Coseriu and Wandruszka, but always with a substantial background in *historical*, including Indo-European *linguistics*, having attended Hans Krahe's lectures on Indo-European phonology and morphology in 1959/60, but also doing a lot of historical studies in English, Romance and German. I had the good fortune to fall into the hands of Marchand already in my first term in 1959, when he lectured on *English morphology*, which from then on became one of my main fields of interest. But also Coseriu's lectures were immensely formative and led to my first publication, the edition of his lecture notes on *structural semantics* (Kastovsky (ed.) 1967, 1973). It is therefore not surprising that I was also influenced, like Lipka and Stein, by Coseriu's theory of *lexematics*. Other influences were *generative-transformational grammar* (cf. Kastovsky 1968, but in a somewhat misunderstood way), and generative semantics. My main research interests have always been both *synchronic* and *historical*, and, in the last years, with a rather strong *typological* slant, looking at typological changes in English and German morphology and how these can be represented in a more global historical perspective (cf., e.g., Kastovsky 1999b, 2001).

In 1962 I participated in Marchand's graduate seminar, which was devoted to word-formation and was based on his book (Marchand 1960). I had to write a paper on *zero derivation*, and this had far-reaching consequences, since from then on, zero stayed with me (cf. Kastovsky 1968, 1980, 1996a), and for a while I was referred to as the 'man who knew everything about nothing'. In this seminar paper I suggested that Marchand's treatment of formations like *hunchback, paleface, pickpocket*, etc. as exocentric compounds (Marchand 1960: 37-45) was inappropriate, and that they should be treated as zero derivatives based on syntactic groups. When I was asked to edit the second edition of Marchand's book (Marchand 1969) in 1967 – just having become Marchand's assistant – I was of course quite flattered to see that he had adopted this suggestion, even though other interpretations (like metonymy) are also possible.

6.2 Theoretical background

My dissertation (Kastovsky 1968) dealt with deverbal zero-derived nouns in Old English. It had a number of goals, viz. a) to establish *zero derivation* as a legitimate word-formation process, but at the same time to limit the use of zero to specific, clearly defined domains; b) to distinguish between *inflection* and *derivation* in Old English, because traditionally inflectional endings as *-a* in *cum-a* (Nom. Sg.) 'comer' had been treated as derivational for purely historical reasons; c) to describe the various *morphophonemic alternations* characterising the inflectional and derivational system and showing that ablaut had no derivational force; and, finally, d) to provide a more or less complete description of the nouns derived from verbs by zero derivation together with a *syntactic-semantic* description along the lines of Marchand (1965a, b). I had also included a chapter on the relationship of Coseriu's distinction between system, norm and speech and a transformational approach transforming structures located at the level of the linguistic system to concrete

derivatives at the level of speech, but, unfortunately, this was somewhat misguided: I had interpreted transformations as performance-oriented (a misunderstanding of the notion of kernel sentence, in the same way as Marchand had misunderstood it).

Subsequently, my interests turned to a more synchronic and theoretical approach, and I tried to integrate Marchand's *theory of word-formation*, Fillmore's *case grammar* and *lexical decomposition* as it was applied in generative semantics, into a coherent theory. The result were a number of papers, whose goal was to show that the semantic structure of simple and complex lexical items had similar properties, cf. Kastovsky (1973, 1974, 1976a, b, 1990a) dealing among others with causatives and denominal adjectives. The result of this work was eventually incorporated into Kastovsky (1982).

6.3 Word-Formation at the crossroads of morphology, syntax, semantics, pragmatics and the lexicon

In the mid-eighties, I began to become interested in *typological* questions, first in inflectional morphology (cf. Kastovsky 1985a), then also in word-formation (Kastovsky 1985b). This became one of my major research areas in the following years. I tried to relate individual changes at the levels of phonology and morphology to a more general tendency ('drift') showing that these tend to interact and produce a kind of feed-back mechanism. Thus changes at the phonological level necessarily have morphological consequences (loss of inflectional and derivational elements), which in turn may influence the general development of morphology in a particular direction without any additional phonological support. This, e.g., was the case with the loss of the old ablaut nouns in connection with the establishment of word-based as against stem-based base-invariant morphology. Linguistic changes thus develop their own dynamics, cf. Kastovsky (1988, 1990, 1992a, 1994a), and also Kastovsky (1992b), which contains a fairly comprehensive description of Old English word-formation including this aspect.

Another aspect, already present in Kastovsky (1968), was the role of *morphophonemic alternations*, especially in connection with the establishment of a *polystratal system* of word-formation (cf. Kastovsky 1989b, c, 1994b)

And, finally, I had also become interested in the *historical aspects* of the studies of word-formation and the various approaches which had developed in the second half of the last century. This led to a number of publications, dealing with the relationship between word-formation and syntax, word-formation and semantics, and the general development of word-formation theory, cf. Kastovsky (1992c, 1995a, c, 1996b).

7. GABRIELE STEIN (LADY QUIRK)

Gabriele Stein (*1941) studied English and Romance philology and started out as Coseriu's student assistant before she became Marchand's assistant. It is therefore not surprising that in her case Coseriu's influence is perhaps more pervasive than

with the other Marchandeans, but Marchand's theories have clearly also shaped her linguistic thinking to a great extent. Stein started out with contributions to word-formation (partly French, partly English), but then also got interested in syntax (especially the passive), and finally her main research interest became English lexicography, especially the early development of lexicographic practice, where she now is one of the leading experts.

Her first publication in word-formation (Stein 1970) dealt with the rise of new suffixes in French, English and German from a *typological* point of view. In this she applied Coseriu's distinction between *modification* (which does not involve any syntactic function, as with diminutives such as *Tischlein*, *dukelet*), *development* (which involves one basic element, changing its word-class affiliation on the basis of some syntactic function, in which it is involved, e.g. *white* → *whiteness* 'state, fact of being white'), and *composition* (which involves two basic elements and their syntactic functions: generic (prolexematic) composition, e.g. Agent + predicate; *sing-er*, and specific (lexematic) composition, e.g. *whet-stone*). On the basis of this subclassification Stein investigates the development of suffixes from independent lexical items, but also from other sources.

In her Ph. D. dissertation (Stein 1971), Stein investigates the relationship between primary, i.e. underived adjectives and derived adjectives with regard to their linguistic behaviour in French and English, again primarily based on Coseriu's theory of lexematics, but with a great deal of Marchand's theoretical considerations as well. Stein distinguishes four different types of word-formation, viz. derivation with the subcategories of *modification*, *expansion* and *prolexematic derivation* and *compounding*, represented by lexemic compounding (involving the combination of lexemes). She then subjects the bases of the adjectival derivatives to a *classematic-semantic analysis* in order to establish a principled account for existing and non-existing (or possible and impossible) derivatives in the respective languages. Thus French cannot derive an adjective from a noun denoting a human being (cf. **homme, *hommeux*) as against English (cf. *manned*). She then provides a detailed description of the semantic fields which allow the derivation of adjectives taking also into consideration whether the base is simple or complex. This leads to an interesting comparison as to what extent the two languages make use of the options available.

One of her most valuable contributions to the study of English word-formation is Stein (1973), a comprehensive *bibliography* of publications in this field between ca. 1770 and 1973. This has become an indispensable research tool especially for finding older publications, which are sometimes very difficult to trace.

Another area that Stein has tackled is so-called *combining forms* (Stein 1978), e.g. *astronaut, biology*, i.e. combinations containing Neo-Latin elements whose morphological status is unclear. Here the question arises whether these should be treated as stem-compounds or as affixal formations. Stein opts for the former solution.

In Stein (2002), she returns to word-formation again, looking into the options one has to separate constituents of complex lexical items especially in cases of co-ordination, such as *ein- und auszuschalten, Kartoffel- und grüner Salat, a spoon- or a cupful of raisins*, etc. This partial separability apparently requires a redefinition of the category of word, which is generally defined on the basis of being indivisible.

8. CONCLUSION

In this chapter I have tried to characterise the contribution to the study of (English) word-formation by those who may be regarded as having belonged to an in-group which one of the editors of this book has called 'Marchandeans'. As I have said at the beginning, it is rather difficult to really decide who should figure as a member of this set, since Marchand's influence did not only affect those working immediately with him. Restricting myself to those who did so does not mean that others might not have been included as well, but this would not have been possible in this context. I would also like to add a personal note. Having been a member of this in-group myself, I found it somewhat difficult to write this paper, because it includes my own past, and writing about one's own past one shouldn't do before one's eightieth birthday. I hope I have given all those that I have discussed a fair deal, and I also hope that at least between the lines the readers may glimpse a little bit of the wonderful atmosphere engendered by the cooperation of Coseriu, Marchand and Wandruszka on the one hand, but also by their many pupils on the other hand in the 1960s and 1970s. I think that on behalf of all the Marchandeans I can say that we are grateful for this experience.

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REFERENCES

Bacchielli, Rolando (ed.). 1994. *Historical English word-formation. Papers read at the Sixth National Conference of the History of English.* Urbino: QuattroVenti.

Bach, Emmon and Harms, Robert T. 1968. *Universals in linguistic theory.* New York: Holt, Rinehart and Winston.

Bahner, Werner; Schildt, Joachim; and Viehweger, Dieter (eds.). 1990. *Proceedings of the XIVth International Congress of Linguists, Berlin 1987.* Berlin: Akademie-Verlag.

Bally, Charles. 1944. *Linguistique générale et linguistique française.* 2e éd. Berne: Francke.

Bausch, Karl-Richard and Gauger, Hans-Martin (eds.). 1971. *Interlinguistica: Sprachvergleich und Übersetzung. Festschrift zum 60. Geburtstag von Mario Wandruszka.* Tübingen: Niemeyer.

Bierwisch, Manfred and Heidolph, Karl E. (eds.). 1970. *Progress in linguistics.* The Hague: Mouton.

Braunmüller, Kurt and Kürschner, Wilfried (eds.). 1976. *Akten des 10. Linguistischen Kolloquiums, Tübingen 1975*. Vol. 2. *Grammatik*. Tübingen: Niemeyer.

Brekle, Herbert Ernst. 1966. "Syntaktische Gruppe (Adjektiv + Substantiv) vs. Kompositum im Modernen Englisch. Versuch einer Deutung auf klassen- und relationslogischer Basis.", *Linguistics* 23, 5-29.

Brekle, Herbert Ernst. 1968. "On the syntax of adjectives determining agent-nouns in Present-day English." In: H. E. Brekle and L. Lipka (eds.), 20-31.

Brekle, Herbert Ernst. 1970. *Generative Satzsemantik und transformationelle Syntax im System der englischen Nominalkomposition.* (Internationale Bibliothek für Allgemeine Linguistik 4). München: Fink.

Brekle, Herbert Ernst. 1975. "Zur Stellung der Wortbildung in der Grammatik." In: H. Rix (ed.), *Akten der V. Fachtagung der Indogermanischen Gesellschaft. Regensburg 9.-14. September 1993.* Wiesbaden: Harrasowitz, 26-39.

Brekle, Herbert Ernst. 1976. *Generative Satzsemantik im System der englischen Nominalkomposition.* (Internationale Bibliothek für Allgemeine Linguistik 4). München: Fink. [2nd ed. of Brekle 1970].

Brekle, Herbert Ernst. 1978. "Reflections on the conditions for the coining, use and understanding of nominal compounds." In: W. U. Dressler and Werner Meid (eds.). *Proceedings of the Twelfth International Congress of Linguists. Vienna, Aug. 28 – Sept. 2*. Innsbruck: University of Innsbruck, 68-77.

Brekle, Herbert Ernst; Boase-Beier, Jean; Toman, Jindrich; Beier, Dieter; and Stöhr, Ingo. 1984. *Nominalkomposita*. Projekt-Endbericht. Regensburg: Regensburg University.

Brekle, Herbert Ernst and Kastovsky, Dieter (eds.). 1977. *Perspektiven der Wortbildungsforschung. Beiträge zum Wuppertaler Wortbildungskolloquium vom 9.-10. Juli 1975. Anlässlich des 70. Geburtstages von Hans Marchand am 1. Oktober 1977.* (Wuppertaler Schriftenreihe Linguistik 1). Bonn: Bouvier.

Brekle, Herbert Ernst and Lipka, Leonhard (eds.). 1968. *Wortbildung, Syntax und Morphologie. Festschrift zum 60. Geburtstag von Hans Marchand am 1. Oktober 1967.* (Janua Linguarum. Series Maior 36). The Hague/Paris: Mouton.

Britton, Derek (ed.). 1996. *English historical linguistics 1994.* (Current Issues in Linguistic Theory 135). Amsterdam/Philadelphia: John Benjamins.

Carls, Uwe and Lucko, Peter (eds.). 1999. *Form, function and variation in English. Studies in honour of Klaus Hansen.* Frankfurt am Main, etc.: Peter Lang.

Chomsky, Noam. 1957. *Syntactic structures.* The Hague: Mouton.

Cortés Rodriguez, Francisco J. (ed.). 1998. *Lexical studies towards the year 2000.* Special number of *Revista Canaria de Estudios Ingleses* 36.

Coseriu, Eugenio. 1962. "Sistema, norma y habla." In: E. Coseriu (ed.), *Teoría de lenguaje y lingüística general. Cinco estudios.* Madrid: Biblioteca Románica Hispánica II, 11-113.

Dietrich, Wolf and Geckeler, Horst (eds.). 1981. *Logos semantikos. Studia linguistica in honorem Eugenio Coseriu.* Vol. III. Berlin and Madrid: de Gruyter and Gredos.

Dokulil, Miloš. 1964. "Zum wechselseitigen Verhältnis zwischen Wortbildung und Syntax." *Travaux linguistiques de Prague* 1, 215-224.

Dokulil, Miloš. 1968. "Zur Theorie der Wortbildung." *Wissenschaftliche Zeitschrift der Karl-Marx-Universität Leipzig*. Gesellschafts- und sprachwissenschaftliche Reihe 17, 203-211.

Fillmore, Charles J. 1968. "The case for case." In: E. Bach and R. T. Harms (eds.), 1-88.

Fisiak, Jacek (ed.). 1985. *Historical semantics. Historical word-formation*. (Trends in Linguistics. Studies and Monographs 29). Berlin: Mouton de Gruyter.

Fries, Udo and Heusser, Martin (eds.). 1989. *Meaning and beyond. Ernst Leisi zum 70. Geburtstag.* Tübingen: Narr.

Gauger, Hans Martin. 1968. "Determinatum und Determinans im abgeleiteten Wort?" In: H. E. Brekle and L. Lipka (eds.), 93-108.

Gauger, Hans Martin. 1971a. *Durchsichtige Wörter. Zur Theorie der Wortbildung.* Heidelberg: Winter.

Grabes, Herbert (ed.). 2001. *Innovation and continuity in English studies. A critical jubilee.* Frankfurt/M., etc.: Lang.

Grosser, Wolfgang; Hubmayer, Karl; Wagner, Franz; and Wieden, Wilfried (eds.). 1989. *Phonophilia. Untersuchungen zur Phonetik und Phonologie. Festschrift für Franz Zaic.* Salzburg: Abakus.

Hansen, Barbara; Hansen, Klaus; Neubert, Albrecht; and Schentke, Manfred. 1985. *Englische Lexikologie. Einführung in die Wortbildung und lexikalische Semantik.* 2. ed. Leipzig: VEB Verlag Enzyklopädie. [1st ed. Leipzig: 1982; 3rd ed. 1990].

Hansen, Klaus. 1964. *Abriß der modernen englischen Wortbildung.* (Lehrbriefe für das Fernstudium der Lehrer / Lehrmaterial zur Ausbildung von Diplomlehrern ENGLISCH). Potsdam: PH Potsdam. [2nd ed. 1968, 3rd ed. 1971].

Hansen, Klaus. 1966. "Die Bedeutung der Worttypenlehre für das Wörterbuch." *Zeitschrift für Anglistik und Amerikanistik* 14, 160-178.

Hansen, Klaus. 1968. "Zur Analyse englischer Komposita." In: H. E. Brekle and L. Lipka (eds.), 115-126.

Hansen, Klaus. 1969. "Zur Wortbildungsanalyse im modernen Englisch." *Fremdsprachenunterricht* 13, 380-395.

Hansen, Klaus. 1977a. "Gegenstand und Beschreibungsaspekte der Wortbildungslehre (am Beispiel des Englischen)." *Linguistische Studien.* (Reihe A. Arbeitsberichte 36). Berlin, 37-68.

Hansen, Klaus. 1977b. "Probleme der Sprachkonfrontation (Deutsch – Englisch) im Bereich der Wortbildung." *Zeitschrift für Anglistik und Amerikanistik* 25, 293-306.

Hansen, Klaus. 1980. "Probleme der Konstituentenanalyse von Wortbildungen im Englischen." *Linguistische Studien*. Reihe A. Arbeitsberichte 67). Berlin: Akademie der Wissenschaften der DDR. Zentralinstitut für Sprachwissenschaft, 12-26.

Hansen, Klaus. 1985. "Wortbildung." In: B. Hansen *et al.*, 1985, 27-152.

Harris, Zellig S. 1942. "Morpheme alternants in linguistic analysis." *Language* 18, 169-180

Harris, Zellig S. 1951. *Structural linguistics.* (Phoenix Books). Chicago: Chicago University. Jespersen, Otto (1942). *A Modern English Grammar on Historical Principles*. Part 6. *Morphology.* London and Copenhagen: Munksgaard.

Hattori, Shirô and Kazuko, Inoue (eds.). 1983. *Proceedings of the XIIIth International Congress of Linguists, Tokyo, August 29 – September 4, 1982.* Tokyo: Proceedings Publishing Committee.

Hladký, Josef (ed.). 2003. *Language and function. To the memory of Jan Firbas.* Amsterdam and Philadelphia: John Benjamins.

Hogg, Richard M. (ed.). 1992. *The Cambridge history of the English language.* Vol. 1. *The beginnings to 1066.* Cambridge: Cambridge University Press.

Hoinkes, Ulrich (ed.). 1995. *Panorama der lexikalischen Semantik. Thematische Festschrift aus Anlaß des 60. Geburtstags von Horst Geckeler.* Tübingen: Narr.

Hundsnurscher, Franz. 1968. *Das System der Partikelverben mit 'AUS' in der Gegenwartssprache.* Göppingen: Kümmerle.

Jankowsky, Kurt R (ed.). 1996. *Multiple perspectives on the historical dimensions of language*. Münster: Nodus.

Jespersen, Otto. 1942. *A Modern English grammar on historical principles*. Part 6. *Morphology.* London and Copenhagen: Munksgaard.

Kastovsky, Dieter. 1968. *Old English deverbal substantives derived by means of a zero morpheme.* [Tübingen University Ph. D. dissertation 1967]. Esslingen/N.: Langer.

Kastovsky, Dieter. 1971. *Studies in morphology. Aspects of English and German verb inflection.* (Tübinger Beiträge zur Linguistik 18). Tübingen: Narr.

Kastovsky, Dieter. 1973. "Causatives", *Foundations of Language* 10: 255-315.

Kastovsky, Dieter.1974. "Word-formation, case grammar and denominal adjectives." *Anglia* 92, 1-54.

Kastovsky, Dieter. 1976a. "Zur Analyse von Nomina Actionis." In: K. Braunmüller and W. Kürschner (eds.), 77-90. [Repr. in: L. Lipka and H. Günther (eds.), 1981, 377-390].

Kastovsky, Dieter. 1976b. "Intensification and semantic analysis. Some notes on Bolinger's *Degree words*." [Review article], *Foundations of Language* 14, 377-398.

Kastovsky, Dieter. 1980. "Zero in morphology. A means of making up for phonological losses?" In: J. Fisiak (ed.), 213-250.

Kastovsky, Dieter. 1982. *Wortbildung und Semantik.* (Studienreihe Englisch 14). Tübingen/Düsseldorf: Francke/Bagel.

Kastovsky, Dieter. 1985a. "Typological changes in the nominal inflectional system of English and German." *Studia gramatyczne* 7, 97-117.

Kastovsky, Dieter. 1985b. "Deverbal nouns in Old English and Modern English: from stem-formation to word-formation." In: J. Fisiak (ed.), 221-262.

Kastovsky, Dieter. 1986. "Problems in the morphological analysis of complex lexical items." *Acta Linguistica Academiae Scientiarum Hungaricae* 36, 93-107.

Kastovsky, Dieter. 1989a. "Typological changes in the history of English morphology." In: U. Fries and M. Heusser (eds.), 159-178.

Kastovsky, Dieter. 1989b. "Morphophonemic alternations and the history of English: examples from Old English." In: M. Markus (ed.), 112-123.
Kastovsky, Dieter (1989c). "Old English morphonological processes and morphology." In: W. Grosser, K. Hubmayer, F. Wagner and W. Wieden (eds.), 83-94.
Kastovsky, Dieter (1990a). "The interaction of semantic and formal structures in the lexicon." In: J. Tomaszczyk and B. Lewandowska-Tomaszczyk (eds.), 75-91.
Kastovsky, Dieter. 1992a. "Typological reorientation as a result of level interaction: the case of English morphology." In: G. Kellermann and M. D. Morrissey (eds.), 411-428.
Kastovsky, Dieter. 1992b. "Semantics and vocabulary." In: R. M. Hogg (ed.), 290-407.
Kastovsky, Dieter. 1992c. "The formats change - the problems remain: Word-formation theory between 1960 and 1990." In: M. Pütz (ed.), 285-310.
Kastovsky, Dieter. 1994a. "Typological differences between English and German morphology and their causes." In: T. Swan, E. Mørk and O. Jansen Westvik (eds.), 135-157.
Kastovsky, Dieter. 1994b. "Historical English word-formation. From a monostratal to a polystratal system." In: R. Bacchielli (ed.), 17-31.
Kastovsky, Dieter. 1995a. "The syntactic aspects of word-formation: where are we today?" In: G. Melchers and B. Warren (eds.), 157-169.
Kastovsky, Dieter. 1995b. "Wortbildungssemantik, ein historischer Lagebericht." In: U. Hoinkes (ed.), 385-398.
Kastovsky, Dieter. 1996a. "Verbal derivation in English: A historical survey. Or: Much ado about nothing." In: D. Britton (ed.), 93-117.
Kastovsky, Dieter. 1996b. "The place of word-formation in grammar: A historical survey." In: K. R. Jankowsky (ed.), 227-243.
Kastovsky, Dieter. 1997b. "Sign-oriented vs. form-oriented linguistics and word-formation." *Studia Anglica Posnaniensia* 31, 79-90.
Kastovsky, Dieter. 1999a. "Hans Marchand's theory of word-formation: Genesis and development." In: U. Carls and P. Lucko (eds.), 19-39.
Kastovsky, Dieter. 1999b. "On writing a history of English: The 'local' and the 'global'." *The European English Messenger* 8/1, 13-15.
Kastovsky, Dieter. 2001. "Local and global typological changes in the history of English: Two complementary perspectives." In: H. Grabes (ed.), 275-287.
Kastovsky, Dieter (ed.). 1967. *Eugenio Coseriu*, *Probleme der romanischen Semantik. Vorlesung gehalten im WS 1965/1966 an der Universität Tübingen*. Autorisierte Nachschrift besorgt von Dieter Kastovsky und Wolfgang Müller. Tübingen: Selbstverlag.
Kastovsky, Dieter (ed.). 1973. *Eugenio Coseriu*, *Probleme der strukturellen Semantik*. (Tübinger Beiträge zur Linguistik 40). Tübingen: Narr. [2. Aufl. 1976].
Kellermann, Günter and Morrissey, Michael D. (eds.). 1992. *Diachrony within synchrony: Language history and cognition*. (Duisburger Arbeiten zur Sprach- und Kulturwissenschaft 14). Frankfurt/M.: Lang.
Kiparsky, Paul and Kiparsky, Carol. 1970. "Fact." In: M. Bierwisch and K. E. Heidolph (eds.), 143-173.
Koerner, Ernst F. K. (ed.). 1975. *The transformational-generative paradigm and modern linguistic theory.* Amsterdam: John Benjamins.
Koziol, Herbert. 1937. *Handbuch der englischen Wortbildungslehre*. Heidelberg: Winter.
Kürschner, Wilfried. 1974. *Zur syntaktischen Beschreibung deutscher Nominalkomposita. Auf der Grundlage generativer Transformationsgrammatiken.* (Linguistische Arbeiten 18). Tübingen: Niemeyer.
Kürschner, Wilfried. 1977. "Generative Transformationsgrammatik und die Wortbildungstheorie von Hans Marchand." In: H. E. Brekle and D. Kastovsky (eds.), 129-139.
Lees Robert B. 1960. *The grammar of English nominalisations.* Bloomington, Indiana.
Lees, Robert B. (1966). "On a transformational analysis of compounds: A reply to Hans Marchand." *Indogermanische Forschungen* 71, 1-13
Lieber, Rochelle. 1981. *On the organisation of the lexicon.* Bloomington: Indiana University Linguistics Club.
Lipka, Leonhard. 1966. *Die Wortbildungstypen WATERPROOF und GRASS-GREEN und ihre Entsprechungen im Deutschen.* Bamberg: Bamberger Fotodruck.
Lipka, Leonhard. 1969. "Assimilation and dissimilation as regulating factors in English morphology." *Zeitschrift für Anglistik und Amerikanistik* 17, 159-173.

Lipka, Leonhard. 1970. *Erkundungen zur Theorie der Semantik.* (Translation of Weinreich 1966). Tübingen: Niemeyer.
Lipka, Leonhard. 1971. "Ein Grenzgebiet zwischen Wortbildung und Wortsemantik: die Partikelverben im Englischen und Deutschen." In: K.-R. Bausch and H.-M. Gauger (eds.), 180-189.
Lipka, Leonhard. 1972. *Semantic structure and word-formation. Verb-particle constructions in contemporary English.* (International Library of General Linguistics 17). München: Fink.
Lipka, Leonhard. 1974. "Probleme der Analyse englischer Idioms aus struktureller und generativer Sicht." *Linguistik und Didaktik* 20, 274-285.
Lipka, Leonhard. 1976. "Topicalisation, case grammar, and lexical decomposition in English." *Archivum Linguisticum* 7, 118-141.
Lipka, Leonhard. 1977. "Lexikalisierung, Idiomatisierung und Hypostasierung als Probleme einer synchronischen Wortbildungslehre." In: H. E. Brekle and D. Kastovsky (eds.), 155-164.
Lipka, Leonhard. 1981a. "On the interrelation of syntagmatic modification and paradigmatic lexical structuring in English." In: W. Dietrich and H. Geckeler (eds.), 373-383.
Lipka, Leonhard. 1981b. „Zur Lexikalisierung im Deutschen und Englischen." In: L. Lipka and H. Günther (eds.), 119-132.
Lipka, Leonhard. 1982. "Causatives and inchoatives in English and their treatment in recent lexicographic practice." *Studia Anglica Posnaniensia* 14, 3-16.
Lipka, Leonhard. 1983. "A multi-level approach to word-formation: complex lexemes and word-semantics." In: S. Hattori and I. Kazuko (eds.), 926-928.
Lipka, Leonhard. 1985. "Inferential features in historical semantics." In: J. Fisiak (ed.), 339-354.
Lipka, Leonhard. 1990. "Metaphor and metonymy as productive processes on the level of the lexicon." In: W. Bahner *et al.* (eds.), 1207-1210.
Lipka, Leonhard. 1992a. "Lexikalization and institutionalization in English and German." *Linguistica Pragensia* 35, 1-13.
Lipka, Leonhard. 1992b. "Lexikalization and institutionalization in English and German. Or: *Piefke, Wendehals, smog, perestroika, AIDS* etc." *Zeitschrift für Anglistik und Amerikanistik* 40, 101-111.
Lipka, Leonhard. 1992c. *An outline of English lexicology. Lexical structure, word semantics, and word-formation.* (Forschung & Studium Anglistik 34). Tübingen: Nieymeyer. [1st ed. 1990].
Lipka, Leonhard. 1994a. "Lexicalisation and instititutionalization." In: R. E. Asher (ed.), *The encyclopaedia of language and linguistics*. Vol. 4. Oxford and New York: Pergamon, 2164-2167.
Lipka, Leonhard. 1994b. "Wortbildung, Metapher und Metonymie – Prozesse, Resultate und ihre Beschreibung." In: B. Staib (ed.), 1-15.
Lipka, Leonhard. 1996. "Words, metaphors and cognition: a bridge between domains." In: J. Svartvik (ed.), 49-69.
Lipka, Leonhard. 1998. "Word-formation, metaphor and metonymy – processes, results and their description." In: F. J. Cortés Rodriguez (ed.), 97-112.
Lipka, Leonhard. 1999. "*Blairites, teletubbies, spice girls* and *wheelie bins* – neologisms, the word of the year, and the nomination-function of 'words'." In: U. Carls and P. Lucko, 41-48.
Lipka, Leonhard. 2002a. *English lexicology. Lexical structure, word semantics, and word-formation.* Tübingen: Narr.
Lipka, Leonhard. 2002b. "English (and general) word-formation – The state of the art in 1999." In: B. Reitz and S. Rieuwerts, 5-20.
Lipka, Leonhard. 2002c. "Names, onomasiology and semantics: Functional and semiotic lexicology." In: S. Scholz *et al.* (eds.), 217-225.
Lipka, Leonhard. 2003. "Observational linguistics and semiotics." In: J. Hladký (ed.), 211-222.
Marchand, Hans. 1949. "L'étude des onomatopées: quelques points méthodiques." *Dialogues* 1, 124-134.
Marchand, Hans. 1951. "Phonology, morphonology, and word-formation." *Neuphilologische Mitteilungen* 52, 87-95.
Marchand, Hans. 1955. "Synchronic analysis and word-formation." *Cahiers Ferdinand de Saussure* 13, 7-18. [Repr. In Marchand 1974: 171-184].
Marchand, Hans. 1960. *The categories and types of Present-day English word-formation.* Wiesbaden: Harassowitz.
Marchand, Hans. 1963a. "On a question of contrary analysis with derivationally connected but morphologically uncharacterized words." *English Studies* 44, 176-187. [Repr. in Marchand 1974: 224-241].

Marchand, Hans. 1963b. „Die Ableitung desubstantivischer Verben mit Nullmorphem im Französischen und die entsprechenden Verhältnisse im Englischen und Deutschen.“ *Zeitschrift für französische Sprache und Literatur* 73, 164-179.
Marchand, Hans. 1965a. “The analysis of verbal nexus substantives.” *Indogermanische Forschungen* 70, 57-71. [Repr. in Marchand 1974: 276-291].
Marchand, Hans. 1965b. “On the analysis of substantive compounds and suffixal derivatives not containing a verbal element.” *Indogermanische Forschungen* 70, 117-145. [Repr. in Marchand 1974: 292-322].
Marchand, Hans. 1966. “On attributive and predicative derived adjectives and some problems related to the distinction.” *Anglia* 84, 131-149. [Repr. in Marchand 1974: 349-369].
Marchand, Hans. 1967. “Expansion, transposition, and derivation.” *La Linguistique* 1, 13-26. [Repr. in Marchand 1974: 322-337].
Marchand, Hans. 1969. *The categories and types of Present-day English word-formation.* 2nd rev. ed. München: Beck.
Marchand, Hans. 1974. *Studies in syntax and word-formation. Selected articles by Hans Marchand. Published in honour of his 65th birthday.* Ed. by D. Kastovsky. München: Fink.
Markus, Manfred (ed.). 1989. *Historical English. On the occasion of Karl Brunner's 100th birthday*. (Innsbrucker Beiträge zur Kulturwissenschaft. Anglistische Reihe 1). Innsbruck: University of Innsbruck.
Melchers, Gunnel and Warren, Beatrice (eds.). (1995). *Studies in Anglistics*. (Stockholm Studies in English 85). Stockholm: Almqvist and Wiksell.
Pennanen, Esko V. 1971. *Conversion and zero-derivation in English.* Tampere: Acta Universitatis Tamperensis. Ser. A vol. 40.
Pütz, Martin (ed.). 1992. *Thirty years of linguistic evolution*. Amsterdam: John Benjamins.
Reitz, Bernhard and Rieuwerts, Sigrid (eds.). 2000. *Anglistentag 1999 Mainz. Proceedings.* Trier: Wissenschaftlicher Verlag Trier.
Rix, Helmut (ed.). 1975. *Flexion und Wortbildung. Akten der V. Fachtagung der Indogermanischen Gesellschaft. Regensburg, 9.-14. September 1973.* Wiesbaden: Reichert.
Rohrer, Christian. 1967. *Die Wortzusammensetzungen im modernen Französischen*. Ph.D. dissertation. Tübingen. Tübingen: Narr [2nd ed. 1977].
Rohrer, Christian. 1974. “Some problems of word-formation.” In: Ch. Rohrer and N. Ruwet (eds.), *Actes du Colloque Franco-Allemand de grammaire transformationelle.* Tübingen: Niemeyer, 113-123.
Scholz, Sybil; Klages, Monika; Hanston, Evelyn; Römer, Ute *et al.* (eds.). 2002. *Language: Context and cognition. Papers in honour of Wolf-Dietrich Bald’s 60th birthday.* München: Langenscheidt-Longman.
Sebeok, Thomas A. 1966. *Current trends in linguistics.* Vol. 3. *Theoretical foundations.* The Hague: Mouton.
Staib, Bruno (ed.). 1994. *Wortbildungslehre.* (Münstersches Logbuch zur Linguistik 5). Münster: University of Münster.
Stein, Gabriele. 1970. “Die Typologie der Suffixentstehung. (Französisch, Englisch, Deutsch).” *Indogermanische Forschungen* 75, 131-165.
Stein, Gabriele. 1971a. *Primäre und sekundäre Adjektive im Französischen und Englischen.* Tübingen: Narr.
Stein, Gabriele. 1971b. “La dérivation française et le problème des consonnes intercalaires.” *Cahier de Lexicologie* 18, 43-64.
Stein, Gabriele. 1973. *English word-formation over two centuries. In honour of Hans Marchand on the occasion of his sixty-fifth birthday.* Tübingen: Narr.
Stein, Gabriele. 1976. “Semi-productive lexical rules: A note on *-ed*-adjectives.” *Journal of English Linguistics* 10, 30-33,
Stein, Gabriele. 1977. “The place of word-formation in linguistic description.” In: H. E. Brekle and D. Kastovsky (eds.), 219-235.
Stein, Gabriele. 1978. “English combining forms.” *Linguistica* 9, 140-147.
Stein, Gabriele. 2002. “The word and its inseparability.” In: S. Scholz *et al.* (eds), 289-299.
Štekauer, Pavol. 1996. *A theory of conversion in English*. Frankfurt am Main, etc.: Peter Lang.
Štekauer, Pavol. 2000. *English word-formation. A history of research (1960-1995)*. Tübingen: Narr.
Svartvik, Jan (ed.). 1996. *Words. Proceedings of an international symposium. Lund, 25-26 August 1995.* Stockholm: Kungl. Vitterhets och Antikvitests Akademien.

Swan, Toril; Mørk, Endre; and Westvik, Olaf Jansen (eds.). 1994. *Language change and language structure: older Germanic languages in a comparative perspective*. Berlin: Mouton de Gruyter.
Tomaszczyk, Jerzy and Lewandowska-Tomaszczyk, Barbara (eds.). 1990. *Meaning and lexicography.* (Linguistic and Literary Studies in Eastern Europe 28). Amsterdam: John Benjamins.
Weinreich, Uriel. 1966. "Explorations in semantic theory." In: T. A. Sebeok (ed.), 395-477.
Williams, Edwin. 1981. "On the notions 'Lexically related' and 'Head of a word'." *Linguistic Inquiry* 12, 245-274

CHOMSKY'S *REMARKS* AND THE TRANSFORMATIONALIST HYPOTHESIS

TOM ROEPER

1. NOMINALIZATIONS AND CORE GRAMMAR

Nominalizations have remained both in the center and at the fringe of linguistics since the first work of Robert Lees in 1960. They have been at the center since many people have the intuition that the right level of abstraction in grammar would equally capture a description of both sentences and nominalizations, but they have been at the fringe because every theory of phrase-structure fails to capture the facts in a natural way To put it more succinctly: where theories fail to extend naturally to include the effects of category-changing derivational affixes, the theories themselves fail to be natural. Numerous proposals, with increasingly subtle distinctions have been advanced (Randall 1984, Sproat 1985, Zucchi 1989) and extensions to many other languages). In each instance, the proposal veers either toward an exceptional treatment of nominalizations, or toward an abstraction that makes nominalizations seem just like sentences. The former solution seems conceptually inadequate while the latter solutions usually fail to capture many of the facts. In a sense then, nominalizations are the perfect prism through which to see modern grammar. Thus Chomsky's *Remarks on Nominalizations* threw attention on the nominalizations in opposite ways: both syntactic and lexical. The lexical emphasis led to extensive discussions of subcategorial factors that affected productivity. Nonetheless, we argue that, once the puzzling idiosyncrasies are cleared away, it is precisely nominalizations that may well point to the right level of syntactic abstraction for all constructions. We will characterize both the lexical and syntactic perspectives before we explore numerous details.

With regard to the syntactic perspective, Chomsky's proposal was that a common abstract syntactic notation, *X-bar theory*, could represent both the structure of nominalizations and of sentences. A simple addition or subtraction of an N or a V feature marked the whole structure. This view initiated other efforts to assimilate the lexicon to syntax. Vergnaud (1973) proposed that the passive could be a lexical transformation and Roeper and Siegel (1978) proposed that compounds reflected a transformation that occurred in the lexicon. Hale and Keyser (2002) extended the idea to transformational operations that were entailed in lexical causatives, with many proposals in between. For instance Lieber (1992) elaborated a mechanism that allows information to 'percolate' higher within lexical structures.

The X-bar syntactic perspective has remained as an assumption in *Government Binding theory*, without much refinement. It is a central feature of Head-driven grammars which focused on even more subtle variation in how phrase-structure nodes were represented. It has also become a core property of modern *Minimalism*

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 125—146.

where nodes are treated as the locus of *Feature Bundles* of various kinds (Collins 2001, Chomsky 1995, 2001, Halle and Marantz 1992).

From the lexical perspective, Chomsky's *Remarks* caused some researchers to examine the ways in which syntactic rules or principles either fail to capture idiosyncratic features of the lexicon, or to apply at all. Unlike syntactic operations that operate upon categorical labels, the internal content of lexical roots and their affixes sharply limit the productivity and scope of rules. For instance, these are common observations about lexical restrictions:

- Lexical rules partly resist and partly accept binding relations: *?dog$_i$-lovers cannot part with them$_i$* (See Lieber 1992 for a good discussion).
- Inside nominal compounds we find no wh-operations (dog-lover =/=> **what are you a lover/* what-lover are you*).
- Thematic roles limit incorporation where dative verbs are involved. While we find compound nominalizations like *teacher-lover* we do not find **teacher-thanker*. Both roots and affixes are surprisingly limited.
- Affected objects do not allow pre-posing **algebra's knowledge*. (Anderson 1983) nor do certain affixes: **the city's destroying* (Kayne 1984).
- Nominalizations have led to the close study of lexical semantics as well as transformational rules (Bauer 1983). It is clear that derivational affixes attach not just to a specific lexical category (N, V, A) but respond to the semantic content of roots (*help, know, push, inspire, implement* accept different affixes). We shall return to these topics.

1.1 Core Contrast

The challenge in a nutshell lies in connecting the underlying structure between a classic sentence and its corresponding nominalization:

(1) a. the enemy destroyed the city
b. the enemy's destruction of the city.

Phrase-structure rules, which form the heart of Lees account, project the category of S which rewrites as NP and VP.

(2) Sentence => NP VP
NP => Determiner N

How then can we express the notion of an NP that seems to be derivative from a VP where not only the verb itself, but its arguments are carried over, 'inherited' by the noun phrase? In order to do so, one must break the basic rule of phrase-structure: allow the categories to change labels. S becomes another kind of NP or the S is dominated by NP. In other words, either we allow the phrase structure rule NP=>S or we fit the properties of a S into the categories of the N in some other way:

(3)

Sentence:	the enemy	destroyed	the city	
Noun phrase:	Possessive	Noun	PP	[of Object]
	|	|	|	
	subject	verb	object	

Each part of the sentence must assume a different syntactic label to make this work. Each of these solutions involves a wrenching revision of higher structure.

There are two broad strategies to deal with these facts, to cope with what fails to fit neatly into sentential grammar:

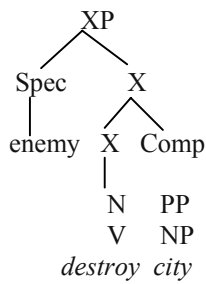
Abstract Theory: create a more abstract theory in which nominalizations and sentences look the same or in which sentential structure falls inside of NP structure.

Lexicalist Theory: attribute all of the oddities to historical residue or lexical exceptions found in a vocabulary list whose properties may reach outside of a particular language or grammar.

Lees chose the route of subordination, where a Sentence was inside the NP. Chomsky, on the other hand, chose an abstract syntax (X-bar) which left lexical restrictions to be stated elsewhere. Chomsky's approach is extended in modern minimalist theories. Lee's approach continues to be reflected in the view that there is a hidden VP in the NP; we will return to this approach below.

Under Chomsky's approach a choice of feature (N, V) determined the behavior of the label on an XP. If a phrasal node became a VP, then it assigned case (*destroy the city*); if it became an NP, then it acquired an affix or an extra bracket that blocked the assignment of case to an object, requiring insertion of a preposition to do the work (*the destruction of the city*).

(4)



This is a beautiful resolution of the core problem. But it created other problems which continue to be a challenge, as we shall see.

1.2 Transformations

Beyond phrase-structure, the anchor of transformational grammar is the concept of transformations. If common transformations apply to both sentences and nominalizations, then the argument for their common source is much stronger.

Chomsky argued that the passive transformation can occur *inside* the nominalization:

(5) the city's destruction by the enemy

The object moves into the subject position and the agent into a *by*-phrase. This is the kind of evidence for abstraction that good theories exhibit. Yet questions remain. Why is the subject apparently optional in nominalizations but obligatory in sentences?

2. THE SUBJECT ENIGMA

One explanation for the apparent optionality of the subject in nominalizations is that it really is obligatory but is carried by an invisible PRO, just as in VP structures [John wants PRO to sing]. If there is a hidden PRO, then it should be able to be controlled. Evidence for control of a subject position comes from contrasts like from (D. Charney – personal communication):

(6) a. John was in PRO control of the army => John controls
b. John was in the PRO control of the army => the army controls

The definite article has the power to block outside control, an interesting phenomenon for which a deeper theory remains elusive. One possibility is that the Determiner 'protects' the inner PRO from requiring case-assignment (Chomsky – personal communication) and blocks obligatory control as well.

Binding facts fall into place as well as a support for the hidden subject PRO:

(7) a. ? the dressing of himself thrilled the little boy.
b. the dressing of the little boy thrilled him
c. The little boy's dressing himself thrilled him

In (7b) we get the implication that someone else must have dressed the little boy, exactly as if there were a PRO_{arb} in a higher position [the PRO_{arb} dressing of the little boy] which can only be identical with an object if a reflexive is present, while in (7a) it follows that a coindexed PRO is in the higher position [the PRO_i dressing of $himself_i$], allowing the reflexive to appear in (7c) and in (7a) (with a clear meaning even for those who find the sentence marginal).

The nature of the subject role in nominalizations has, however, been the persistent target of discussion. Wasow and Roeper (1972) assumed that nominal gerunds had no subject:

(8) the singing of songs

Grimshaw (1990), Kratzer (1996), Alexiadou (1999) and others have made a similar assumption.[1] Williams (1987) proposed that the possessive relation can encompass any relation and therefore one can independently capture the notion of subject without a true verbal subject position. Evidence in behalf of this claim comes from forms like:

(9) John's idea

where no verb is present but John takes on the Agent role.What would show that sentence-like subject behavior is involved? In the best scientific tradition, it should be abstract, indirect evidence which proves the most persuasive. Modern work has provided new support for the hidden subject position.

First it has been argued by Roeper (1987) that the hidden subject can act as a controller in sentences of the form:

(10) the PRO_i destruction of the city [PRO_i to prove a point]

where it is possible to claim that the Agent that destroys the city proves a point. This argument has been criticized by Williams (1987) and Lasnik (1984), although their criticism seems to apply to the example, not the deeper claim. They observe that it is possible that the entire nominalization is the subject:

(11) the destruction of the city proved a point

Now it seems that there is no necessity for the Agent, separate from the nominalization, to be at work. However other examples point exactly at the hidden Agent:

(12) a. The use of drugs to go to sleep
b. The opening of the side door to enter the room

Here it would be impossible to argue that the whole nominalization is the subject because it would produce these readings:

(13) a. *The use of drugs went to sleep.
b. *The opening of the door entered the room.

Further evidence that the nominalization involves a true subject position comes from the argument that it can be blocked by preposing the object:

(14) ?*the drug's use to go to sleep

[1] See Alexiadou (in preparation) for a good summary.

(15) ?*the city's destruction to prove a point

These data have been further challenged from the perspective of the view that no subject is involved, by claiming that they are Results (Grimshaw 1990). If those prenominal possessives are linked to Result nominalizations, then the absence of control could have a different explanation, namely, that only action nominalizations allow purpose clauses to be controlled.[2] Thus we would no more expect **the city's destruction to prove a point* than **the city's façade to prove a point*. Is there further evidence relevant to this dispute?

2.1 Passive -ability Nominalizations

New evidence points again to the existence of the subject position in nominalizations (van Hout and Roeper (to appear)):

(16) a. the learnability of grammar by children
b. the heritability of IQ by children
c. *children's learnability of grammar
d. *children's heritability of IQ

If the subject position is free, then it ought to allow an Agent reading. Why would *-ability* nominalizations, in particular, block these possessives? What stands out is that the subject position is blocked for the adjective in sentences as well:

(17) *children are learnable [like *children are learned]

(18) *children are heritable

One possible explanation is that there is a form of passive hidden in the suffix –*able* which involves a requirement that the subject be filled by a THEME or an object, exactly as in the grammar of sentences. Therefore we have only:

(19) grammar is learnable (like: the grammar is learned)

(20) IQ is heritable.

How would this system translate into nominalizations? Here again, the most abstract features of grammar come into play. The question is this: since the object is

[2] There is some subtlety here too. We do have cases like *the man to do the job* but it is not very general. Sentences like:
a. ?*the goal to win
b. the goal of winning
shows that bare nouns do not usually take such clauses, and therefore result nouns might not either.

not in the possessive/subject position what blocks the projection of a subject in that position? In a number of instances a notion of covert movement has received support. In Germanic languages, the subject often is filled by an expletive, but features of the subject move invisibly to accomplish subject/verb agreement:

(21) there are three men
there is one man
there were pushed three men[3]

Here the object of a passive remains unmoved, but it seems to have moved covertly because number agreement is carried out.

If the same operation applies inside passive *-ability* nominalizations, then it can explain the blockage of an agent subject in those positions:

(22) Covert-Object Movement:
the [obj] learnability of grammar
<←==========
the [grammar]'s learnability of grammar
grammar <========== t

Not only do we capture the facts, but we support the claim that both a subject position exists and a movement operation has occurred inside the nominalization, much as Chomsky originally proposed, which is the obligatory heart of passive in both sentences and nominalizations. Whereas overt movement is necessary for the object in sentences, in nominalizations the movement is overt or covert.

This analysis can shed light on many of the old facts as well. It has always been mysterious that nominalizations allowed a *by*-phrase in all environments:

(23) a. the city's destruction by the enemy
b. the destruction of the city by the enemy.

If covert movement is allowed, then we can see why the by-phrase can appear; the sentence has a passive as one reading (see Borer 1998). If subjects cannot appear in the subject position, then no other element should either. We find this to be true of temporal adverbials as well for *-ability*:[4]

(24) a. the deniability of tenure to a beloved professor last year [was easier because of budget demands]
b. *last year's deniability of tenure to a beloved professor.
c. last'year's denial of tenure to a beloved professor.

[3] Such sentences are very awkward in English but common in other Germanic languages.

[4] Blocked pronominal temporal possessives are discussed in Roeper (1987), van Hout and Roeper (1998) and Snyder (1998).

Where the object has not moved forward, it appears that the temporal adverb can occupy the subject position (as it can in other Germanic languages). Since there is a non-passive form for *-tion* (*the enemy's destruction of the city*), *-tion* allows only *optional* passive, which means optional movement of the object to the subject, which in turn means that the subject position can be open for a temporal adverb when passive is not present.[5]

The covert movement analysis provides a straightforward explanation for this contrast as well:

(25) a. the appearance of John/John's appearance
b. *there's appearance of John

In (25a) the covert movement occurs and therefore the justification for *there*-insertion is eliminated. The occurrence of *there* in the sentential syntax is reduced to the need for case-assignment.

The following facts – though tenuous themselves – at first seem to contradict this account, but once again fall into line with the analysis:

(26) a. ?there's appearing to be a problem
b. "I mean, there's appearing stiff on camera. And then there's being dead"

We even find cases like (26b) from the internet in a commentary on the presidential candidate John Kerry and the war in Iraq. If these are acceptable, then why is there a distinctive decline in acceptability for (27):

(27) *there's appearing of a problem

We can explain the acceptability of (26) as derived from (28):

(28) ? the appearing of there to be a problem

(28) requires raising the lower expletive to the upper position, which is what happens overtly in (26). Therefore it is grammatical because it is a moved-expletive not an expletive inserted to capture case. A number of subtle facts fall into place under the covert movement analysis.

2.2 -ing Nominalizations

A longstanding puzzle about *-ing* is solved by this analysis, namely that the passive is not available for all nominalizing affixes. The *-ing* affix does not allow any object in subject position:

[5] Note that temporal adverbs can occupy subject position in Germanic languages in many constructions.

(29) the destroying of the city

(30) *the city's destroying

We can explain this fact too now that we have identified the familiar passive operation inside nominalizations hidden within the abstract concept of covert movement. The *-ing* is purely transitive, not passive, and therefore does not project a THEME role into the subject position that must be subject to *Feature-checking*. Therefore no movement to that position is allowed.

A new taxonomy emerges: if *-ability* carries an *obligatory* passive rule, *-tion* carries an *optional* one, it is not a surprise to find an affix which has *no* passive property, *-ing*. We will turn to structural differences that these affixes reflect shortly.

3. CASE ASSIGNMENT

Hovering in the background of this discussion is the question of how case is assigned to both the subject and the object. In each instance a variety of *possessive* marking occurs. Here is where an 'exceptionality' approach is common.

A special form of *of-insertion* has been proposed for objects and default genitive has been proposed for subjects. Neither is a straightforward reflection of any deeper principles of grammar. The direction of explanation we would advocate should be clear: a more abstract theory of case-assignment would indicate that these genitives are just as natural as Nominative and Accusative in the sentence domain. We are far from such an analysis, but the genitive and of-insertion are currently widely studied and may yield a more natural analysis (Kayne 2002).

3.1 Coping with Exceptions

There are, however, other intriguing facts which suggest that nominalizations are 'exceptional' and therefore marginal to grammar. Anderson (1976) observes that there is an *Affected Object Constraint* that is active in nominalizations:

(31) the knowledge of algebra

(32) *algebra's knowledge

(33) algebra was known

If the sentential passive allows movement of this object, why is it ruled out in nominalizations?

Lebeaux (1986) attempts to explain this observation by suggesting that there are two kinds of movement: thematically-based movement and case-based movement. These forms occur together as a rule, but nominalizations allow a finer discrimination among them.

(34) destroy => destroy [+accusative, +Affected THEME]
destruction => [+Affected Theme]
know => [Accusative]/Abstract complement
knowledge => ø

The nominalization subcategorizes only for *thematic roles*, not case. Case requires an independent subcategorizer, which is carried by *of*. Therefore we can say *the knowledge of algebra*. However since *know* does not affect an Object, it cannot project one. Rather it projects only accusative case in the verbal form and something more complex than a single thematic role in the nominal form, with no case. In the form **algebra's knowledge* the preposition is gone, therefore no case-assignment can be generated. Moreover, there is also no *theme* projection which in a case like *the city$_i$'s destruction (THEME-trace$_i$)* allows a thematic trace to occur in object position. Therefore what is needed to reconstruct the origin of the phrase is completely unavailable. From this perspective, the theory of empty categories receives a more refined interpretation: the thematic and case properties are potentially splittable, as revealed in nominalizations.

A thematic-trace is different from a case-trace. It is natural in a modular theory that the set of empty categories also reflects modular differences. It remains to be seen if this logic extends to other modules as well.

What does a verb like *know* project? Under this view of thematic roles, it projects a semantically open object that takes case, but allows propositions as well, as in *John knows the truth* or *John knows that Bill is here*. This view fits the claim that traditional Agent/Theme type thematic roles are derivative from the notion of Event. If no Event is present, the semantic structure is different.

3.2 Thematic-binding

If the thematic system is separable from the case-system, then we should see it work independently. Williams (1994) has argued that forms of thematic-binding are possible, indicating that they are a definable subsystem: one verb's thematic projection, like Agent, can bind another verb's Theme. In fact, they appear in the invisible projections of nominalizations. We find that the difference is clearly evident in:

(35) John needs Bill's support

which requires us to take *John* as the object-Theme of support. Where there is an affix that gives case, like *-ing*, then a subject blocks object binding. Clark (1985) argued that control operates only on the subject position, therefore the empty object

must move to the subject position of *supporting* (listed as PRO to indicate control in 37b = 37a). The consequence is that a filled subject position as in (36) will block object control. However this does not apply to Williams-style thematic-binding which allows the Agent role of specified verbs to seek a c-command THEME role in a lower thematic domain:

(36) *John needs Bill's supporting

(37) a. John needs supporting =
b. $John_1$ needs PRO_1 supporting t_1

In (38) the subject of *prevention* is filled, blocking control by another NP *disease*, which is possible when the subject is gone (39):

(38) *the disease calls for the city's prevention

(39) the disease calls for prevention

The object control is also blocked when higher DP structure, above NP, is invoked as these examples reveal where plural entails more than a bare noun:

(40) the president needs thought (=thinking about him)

(41) the president needs thoughts (= he thinks)

We can see that object control is sensitive to the same thematic system because where non-affected objects occur, they are excluded:

(43) the disease calls for knowledge

This does not specifically mean *knowledge of the disease* but rather knowledge in general. We find that a parasitic-gap relation can also exist among nominalizations, just where Affected Objects can occur:

(44) a. No taxation __ without representation __
b. Ideas should not undergo presentation without preparation
c. Ideas should not undergo presentation without preparations

A plural again generates an unspecified interpretation, where here the *preparations* means more than preparing the ideas.

(45) As for disease, prevention__ is better than curing__

At a very subtle level we can see our argument reflected again:

(46) *the disease's prevention is better than curing.

(46) fails because there is a lack of parallelism, since *curing* has no analogous preposed form. However in this case, where covert movement invisibly converts *the prevention of disease* into *the disease's prevention* we achieve the parallelism needed:

(47) the prevention of disease is better than its curing.

We find again that nominalization provides a sharper representation of core linguistic phenomena.

One criticism that might be made of this proposal is that it distorts thematic roles or does not honor their traditional definition. Our approach here is different, though we leave it as just a suggestion. Once again, if we take nominalizations to reflect central properties of grammar, then we need to revise the theory of thematic roles to make a sharp distinction between those entailed by Events and another set of semantic relations that are engaged in a different manner for verbs like *know*.

It is quite possible that the deepest insights into Case will come from languages with richer case systems. We have reason to believe that Case will also be appropriately abstracted by seeing nominalizations as a core phenomenon. Chomsky (lectures) once remarked that "modes of execution should be resolved into leading ideas" when we have a full understanding. What looks like a technical solution should have the germ of a principle within it. If grammar is in some sense a 'perfect' system, then all exceptionality should be resolved in nominalizations, which is too robust a phenomenon to be relegated to the periphery. The capacity of nominalizations to convert the *nominative* assigned by an auxiliary into a *genitive* should follow from a principle (like transformation) which captures other case-conversion cases, like the capacity of affixes to convert dative into accusatives (*be-* in German). Yet the insight is not yet there.

4. INTRIGUING ISSUES: ASPECTUAL DIFFERENTIATION OF NOMINALIZATION AFFIXES

What emerges from this analysis is that the process of derivational affixation carries all the properties of syntax, the natural prediction that follows from Chomsky's original claims. The fact that affixes change category should not overshadow an important question for the future: what other information is carried by affixes? Why should there be more than one nominalizing affix? We find there are transitive affixes: *-ing*, passive affixes *-ability* and ambiguous ones: *-tion*, *-ment*, *-ence*.

(48) John's enlargement of the house

the house's enlargement by John

(49) the maintanence of order
the persistence of problems

A closer look shows that affixes often captures a kind of 'aspect' of Event, although here I am just beginning to sketch out terrain that is theoretically unexplored. For instance, the affix *-ment* is used primarily for *results*, although with considerable historical drift:

(50) acknowledgement, enlargement, complement, arrangement, inducement

In addition, we find that the *-ence* affix is defined as "usually of quality, rarely of action" in the OED:

(51) dependence, existence, persistence

However it seems like the other nominalizations in:

(52) John's transference of money

Nevertheless, where action is behind the word, it is often the quality of the action that is captured:

(53) violence, subservience, prudence, pretense

The word *violence* surely refers to actions but fails to be an action nominalization, referring instead to the quality of action instead, just as the OED claims.

The suffix *-ence* is often confused with *-ance* which also carries *action* meaning:

(54) assistance, resistance, connivance

thus we find that affixes point to a kind of Nominal Aspect, but that considerable drift can occur. The affix *-th*, to which Chomsky in *Remarks* and Harley and Noyer pertain (1997,1998), has become unproductive and therefore difficult to analyze, though it seems to be inchoative:

(55) the growth of tomatoes/*Mary's growth of tomatoes

It is here we see both the strong lexical dimension of nominalizing affixes and an important, but largely mysterious question of exactly what subtle meaning each affix conveys beyond the conversion of a verb to a noun.

The notion of Aspect has emerged as both important and difficult to capture in the representation of sentence grammar. Proposals exist to project an Aspect node in the syntax which can capture *progressivity*, *telicity*, *achievement*, etc. However, as one can readily feel, it is not quite clear what kind of aspectual meaning is carried by these affixes.[6] It is also an ever-present lexical fact about nominalizations that they, being listed in the lexicon, are open to semantic drift, which further obscures the subtle meaning of affixes. Ultimately, the aspectual properties of sentences may be more deeply comprehended when a full theory of the aspectual properties of nominalizing affixes are represented. This is what we expect under the view that nominalizations both articulate the core properties of grammar and show the obscurity typical of lexical items.

Do structural properties match the claim that there are aspectual characteristics of nominalizations? If nominal aspect parallels verbal aspect, then we should seek structural correspondence as well. We need to look at the syntactic tree more carefully.

5. WHERE DO AFFIXES ATTACH?

The claim that we should have an X-bar theory where nodes are abstract has become a pillar within *Minimalist Theory*. Chomsky (1994) articulated the concept in *Bare Phrase Structure* and it has been extended in a variety of ways by Chris Collins (2001), and also by Halle and Marantz (1992) in *Distributed Morphology* (see also Marantz 1997). However within nominalizations themselves a new range of arguments points to the existence of a real VP on the inside, not simply an ambiguous abstract node, hearkening back to Lee's original position.

First we need to address the position of the affix itself. Inflectional affixation has led to a different twist on how to compose nominalizations as well. Where the affix *-tion* was once seen as a kind of *Spellout rule*, many modern versions of syntax have linked affixes to their own nodes. Such nodes involve a leftward movement to satisfy Features that are like mini-subcategorization frames. Thus we have higher Tense affixes to which a verb moves, particularly in Germanic languages with more information in the affix:

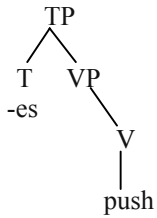
[6] See Snyder (1998) for discussion of the aspectual nature of nominalizations, refining the notions of simplex and complex Events. This leads naturally to asking how each affix captures different aspectual notions. See Harley and Noyer (1998) for pertinent data about prenominal possessives. They argue that 'encyclopedic' knowledge of Event types and not syntax determines what can occur pronominally, but we would argue that the concept of covert object-movement explains directly why there is a contrast between:

i) ??the Cold War time's separation of East and West Germany

ii) the separation of East and West Germany during the Cold War time

The verb *separate* favors the passive option for *-tion*, blocking the preposed temporal (the Cold War period) nominal.

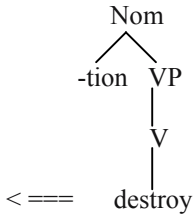
(56)



If a Nominal form is, in some ultimate grammar, a kind of [–Tense] form then it naturally alternates with Tense and may allow a projection of Tense via certain affixes of a [+V] feature which has to be satisfied by leftward movement.

In effect, this form occupies either the TenseP or the smallv proposed Chomsky (1995) following the causative analysis of Hale and Keyser (2002) widely used for a number of claims including middle, telicity, and passive.[7]

(57)



Once again, we find that at a deeper level the parallelism between noun phrases and sentences holds.

Now if we expect a node to capture a semantic difference, which has been suggested both by Chomsky (2001) and by the tradition of formal semantics, we find a natural candidate: the complex semantic entity – EVENT. We would expect this semantic property to receive articulation somewhere in the grammar of affixation (see van Hout 1996, Borer 2003, and van Hout and Roeper 1998 and references therein). We argue that *-tion* arguably refers precisely to that notion of EVENT. It is a question of profound depth to ask why this notion is not explicit in the verbal syntax. We have no answer, but we regard the question as a promising one.

We can hazard an answer in line with the philosophy articulated in this overview: the analysis of derived structures helps to illuminate core features of the grammar. If *-tion* does refer to Event, then it provides an example of where a derived construction expresses explicitly a core concept. This should be regarded as a broad speculation because, if *-tion* does have a semantic core, the notion of Event might need more refinement to capture the range of uses for *-tion*. Words like *intention* must refer to mental events. Therefore the term Event may itself be ripe for greater decomposition into a more refined array of concepts (see Brandt 2003, Snyder 1998) for suggestions in this direction, as well as work in semantics (see Kratzer (in preparation)).

[7] Widely utilized for a number of claims, including connections to Middle, Telicity, and passive.

Our theory of nominalizations matches sentential syntax if we assume that a verbal stem moves up leftward to a nominal affix (*-tion*) which seeks a [+V] stem to match a Feature which it carries. Under this analysis, we are led to argue that a real VP exists below the Nominal *-tion*, and if so, we should expect to find syntactic evidence of a VP from which a root moves to a higher node to pick up the Event marker *-tion* as illustrated above. This representation is now common in the literature, reviving Lees original idea. It was assumed in Lebeaux (1986), extensively elaborated in Fu, Roeper, and Borer (2001), and commonly assumed in most work on the topic now (see Alexiadou (in prep)). The most explicit evidence in its behalf comes from adverbs and VP-ellipsis. The pro-form *do so* regularly refers to a VP: *John sang and Bill did so too*. It is instantly evident that where there is a hidden VP in a nominal, *do so* becomes acceptable or almost acceptable:

(58) *John's version of the story and Bill's doing so too

(59) ?John's telling of the story, and Bill's doing so too

(60) John's destruction of the city and Bill's doing so too

The behavior of adverbs leads to the same conclusion:

(61) a. While the removal of evidence *purposefully* (is a crime), the removal of evidence *unintentionally* (is not).
b. ?His explanation of the problem *immediately* to the tenants (did not prevent a riot).
c. ?Protection of children *completely* from bad influence (is unrealistic).
d. His resignation so *suddenly* gave rise to wild speculation.

These judgments have sometimes received a question-mark, but it is of particular interest that they seem to occur in conversation and in newspapers, as Kehler (2002: 53) has reported: "This letter deserves a response, but before you do..." While a desire for parallelism might affect our judgments, the sentence is only comprehensible online if an underlying verb (respond) can be found, which is so sharply absent in a case like **John's version was quick and Bill did too*, even though its overall semantics is perfectly comprehensible. This should then be seen as an instance where language use provides sharper insight than intuitions.

Above the nominalized verb we find that the structure behaves just like a DP and carries adverbial meaning via adjectives:

(62) The enemy's careful destruction of the city

Sentential adverbs are excluded from the VP, but possible as adjectives in the DP:

(63) *John's destruction of the city unfortunately

(64) John's unfortunate destruction of the city.

This follows because the VP is encapsulated by the nominal affix and so no higher Speaker-linked adverbial attachment site is possible.

All of these facts accord with the split character of nominalizations. The bottom half behaves like the VP, which we argue is there, and the top half behaves like the NP which *-tion* introduces.

6. ELABORATED PHRASE STRUCTURE AND NOMINALIZATIONS

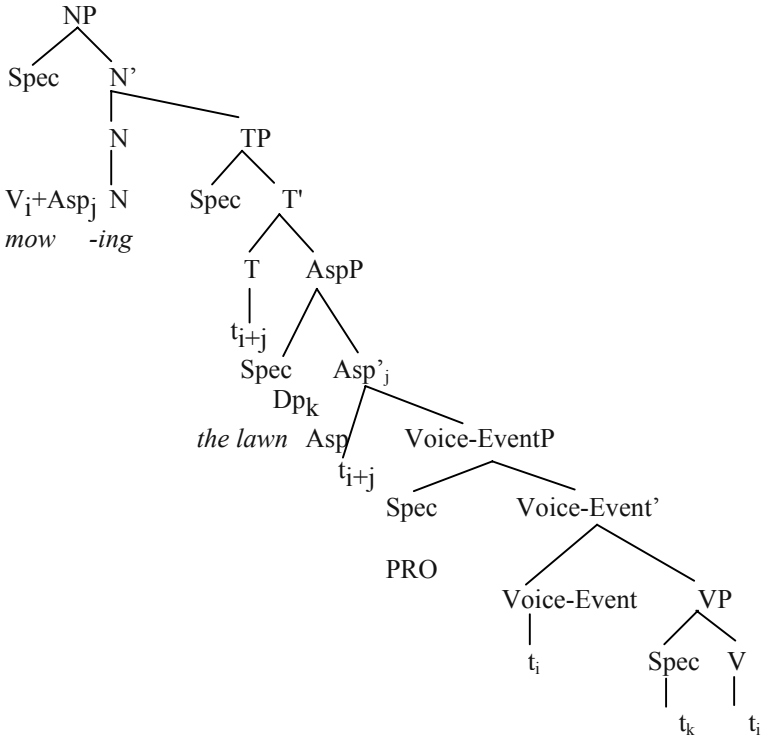
If our refined theory of nominalizations is correct, then we can argue that there are choice points for the attachment of the nominalization affix that mirror the structure of the verbal syntax. This is the position of van Hout and Roeper (1998) who argue that a node where Event and telicity information is represented must be present as has become common in many syntactic accounts.

The nominalization then picks out different amounts of sentential structure, where we use VP to cover what is often called 'small v'. In effect, one can generate a NOM node over TP, VP, vP, and V, each taking a different kind of affix, as we illustrate here, and it subcategorizes each of these nodes with a particular *Feature Bundle*:

(65) a. TP *-ing* = progressive transitive
the mowing of the lawn
b. VP *-tion*, *-ability*, *-er* = Event Agent
the mowability of the lawn
the mower of the lawn
the transformation of the lawn
c. V-bar: *-er* = non-event Agent
the lawn-mower
d. V- inchoative
the growth of the lawn
e. V-Bare Nominal => result
the view of the lawn

(66) is the representation offered by van Hout and Roeper (1998: 189) to capture this derivation for *-ing*. We will not review all of the options in depth, but point out that one can plausibly argue for each of them.

(66)



6.1 Bare Nominals: Predictable Restrictions

Although this seems never to have been noticed before, a small pocket of nominals, which might have been dismissed as drifted and idiosyncratic, nonetheless show an interesting characteristic:

(67) my help, your advice, your push, your
my kick, his shove, his kiss, my hug
your control, your view of the house

(68) *the house's view
*the car's kick (=kick the car)

In each instance we have only the Agent reading. Why is the object reading unavailable? The answer follows again from the fact that nothing licenses object-movement here. There is no passive morpheme to bring out this possibility. Therefore it is exactly like the *-ing* affix, however in this instance at the bottom of the syntactic tree, at the V-connection, not the topmost *-ing* connection.

A deeper semantic observation holds as well. Because it is at the bottom of the tree it is not eligible for any action-related aspectual interpretation. It is therefore restricted to a Result interpretation, even though the exact formulation of this claim is not straightforward. It is not clear what *love, help, advice* mean as Results. Nevertheless they are intuitively not capturing actions. It is whatever the difference between *John's help* and *John's helping* is. There is some sense, perhaps imposed by syntax, that *help* is encapsulated while *helping* is not.

6.2 High -ing

The high connection of *-ing* nominalizations allows a much wider range of argument projections. We do not find:

(69) *the being of no solution to this problem.

This stands in contrast to:

(70) the appearing of no solution to this problem

The difference is traceable once again to the covert operation of object-preposing, which applies only in the (70) case, where *no solution* can move to the subject position because of the unaccusative properties of *appear* not because of a hidden passive. Without object-preposing the nominalization fails to have a required expletive subject. The implication is that the expletive plays a slightly different role in *there appeared a problem* and *there is a problem* which is reflected in the fact that we can say *a problem appeared* but not **a problem is*. Once again a rather subtle analysis carries over to the nominalization.

6.3 Accusative and -ing Nominalizations

The *-ing* nominalizations show other characteristics of syntactic variation. There are both forms which lack an of-phrase and cases which allow the projection of Accusative case, known as Acc-*ing* constructions:

(71) a. his opening the door
b. him opening the door
c. *him opening of the door
d. him seeing her came as a surprise

Note that the *of*-phrase here is sharply excluded, as (71c) shows. The Accusative is often seen as a Default, found even among children (*me want*), but clearly it is appearing jointly with a verbal accusative. In fact (71d) is possible. We are being pushed toward a more abstract theory of case where the choice of subject/object case assignment is not independent. One has the intuition that deeper insights will come both from languages with a more elaborated case system and from keeping a steady

eye precisely on those structures which appear to be 'peripheral' and how they dictate case.

7. CONCLUSION

We have traced the history of the two primary properties of Chomsky's theory of nominalization: phrase-structure and movement. We have found that the core idea of phrase-structure has been taken over in the grammar in general, while the concept of transformation has survived at the covert level in precisely the way that Chomsky proposed. The highly elaborated phrase-structure common in most current analyses leads to the prediction that highly differentiated nominalizations should exist in a corresponding fashion. While many more facts remain to be incorporated, the project works.

Our larger goal has been to argue for a view of grammar in which there is no real distinction between core and peripheral parts of the grammar. We argue that the abstract properties of grammar are etched most clearly precisely in the non-central constructions. This claim in turn, parallels a suggestion by Ken Hale, that he found the greatest regularity in grammars by looking at the most complex properties.

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REFERENCES

Alexiadou, Artemis. 1999. *On the syntax of nominalization and possession: remarks on patterns of ergativity*. Ph.D. dissertation. University of Potsdam.
Alexiadou, Artemis (in preparation). *On the Lexicon available on the web at her website*. Manuscript.
Anderson, Mona. 1983. "Prenominal Genitive NP's." In: M. Stein (ed.), *NELS* 8. GLSA, UMass, Amherst.
Bauer, Laurie. 1983. *English Word Formation*. Cambridge: Cambridge University Press.
Borer, Hagit. 1994. "The projection of arguments." In: E. Benedicto and J. Runner (eds.), *UMOP* 17, GLSA, UMass, Amherst.
Borer, H. 1998. "Deriving passive without theta roles." In: S. Lapointe, D. Brentari and P. Farrell (eds.), *Morphology and its Relation to Phonology and Syntax*. Stanford, CA: CSLI Publications, 60-99.
Borer, Hagit. 2003. *Structuring Sense*: Oxford: Oxford University Press.
Brandt, Patrick. 2003. *Cipient Predication*. PhD. Dissertation. Utrecht.
Chomsky, Noam. 1970. "Remarks on Nominalizations." In: R. Jacobs and P. Rosenbaum (eds.), *Readings in English Transformational Grammar*. Waltham, MA: Blaisdell, 184-221.
Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.
Chomsky, Noam. 2001. *Beyond Explanatory Adequacy*. MITWPL 20, Cambridge, MA: MIT Press.
Clark, Robin. 1985. *Boundaries and the Treatment of Control*. UCLA Dissertations.
Collins, Chris. 2001. *Eliminating Labels*. MITWPL 20. Cambridge, MA: MIT Press.

Di Sciullo, Anna-Maria and Williams, Edwin. 1987. *On the Definition of Word*. Cambridge, MA: MIT Press.
Dowty, David R. 1991. "Thematic proto-roles and argument selection." *Language* 67, 547-619.
Fu, Jingqi; Roeper, Tom; and Borer, Hagit. 2001. "The VP within Nominalizations: Evidence from Adverbs and the VP anaphor do-so." *Natural Language and Linguistic Theory* 3, 549-582.
Grimshaw, Jane. 1990. *Argument Structure*. Cambridge: MIT Press.
Hale, Kenneth and Keyser, Samuel J. 1993. "On Argument Structure and the Lexical Expression of Syntactic Relations." In: K. Hale and S. J. Keyser (eds.), *The View from Building 20: Essays in Linguistics in honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, 53-110.
Hale, Kenneth and Keyser, Samuel J. 2002. *Prolegomena to a Theory of Argument Structure*. Cambridge, MA: MIT Press.
Halle, Morris and Marantz, Alec. 1993. "Distributed Morphology and the Pieces of Inflection." In: K. Hale and S. J. Keyser (eds.), *The View from Building 20*. Cambridge, MA: MIT Press, 111-176.
Harley, Heidi and Noyer, Rolf. 1997. "Mixed Nominalizations, Short Verb Movement and Object Shift in English." *NELS* 28, 143-159.
Harley, Heidi and Noyer, Rolf. 1998. "Formal vs. Encyclopedic Properties of Vocabulary: Evidence from Nominalizations." University of Pennsylvania. Manuscript.
Kayne, Richard S. 1984. *Connectedness and Binary Branching*. Dordrecth: Foris.
Kayne, Richard S. 2002. "On the syntax of quantity in English." NY University. Manuscript.
Kehler, Andrew. 2002. "Coherence, Reference, and the Theory of Grammar." In: *CSLI*. Stanford, CA, 54-55.
Kratzer, Angelika. 1996. "Severing the external argument from the verb." J. Rooryk and L. Zaring (eds.), *Phrase structure and the lexicon* [Studies in Natural Language and Linguistic Theory]. Dordrecht: Kluwer.
Kratzer, Angelika (in preparation) *The Event Argument*.
Lasnik, Howard. 1984 "Random Thoughts on Implicit Arguments." University of Connecticut. Manuscript.
Lebeaux, David. 1986. "The interpretation of derived nominals." In: A. Farley, P. Farley and K. McCullough (eds.), *Chicago Linguistic Society* 22, 231-247.
Lees, Robert B. 1960. *The Grammar of English Nominalizations*. The Hague: Mouton de Gruyter.
Lieber, Rochelle. 1992. *Deconstructing Morphology*. Chicago: University of Chicago Press.
Marantz, Alec P. 1996. *Cat as a phrasal category*. MIT. Manuscript.
Marantz, Alec P. 1997. "No escape from syntax." In: A. Dimitriadis, I. Siegel et. al. (eds.), *University of Pennsylvania Working Papers in Linguistics* 4.2, 201-225.
Marantz, Alec P. 1999. "Creating verbs above and below little *v*." Cambridge: MIT. Manuscript.
Randall, Janet. 1984. *Morphological Structure and Language Acquisition*. New York: Garland.
Roeper, Tom. 1987. "Implicit Arguments and the Head-Complement Relation." *Linguistic Inquiry* 18, 267-310.
Roeper, Tom. 2000. "Inherent Binding and the DP/NP/N distinction." In: P. Coopmans, M. Everaert and J. Grimshaw (eds.), *Lexical Specification and Lexical Insertion*. Amsterdam: John Benjamins, 305-328.
Roeper, Tom and Siegel, Muffy E. A. 1978. "A Lexical Transformation for Verbal Compounds." *Linguistic Inquiry* 9, 199-260.
Snyder, William. 1998. "On the Aspectual Properties of English Derived Nouns." In: U. Sauerland and O. Percus (eds.), *The Interpretive Tract.* MITWPL 25, 125-139.
Sproat, Richard. 1985. *On Deriving the Lexicon*. Doctoral dissertation, Massachusetts Institute of Technology.
Valois, Daniel. 1991. *The internal structure of DP*. PhD. dissertation. University of California, Los Angeles.
van Hout, A., 1996. *Event semantics of verb frame alternations*. TILDIL Dissertation Series, 1996-1.
van Hout, Angeliek and Roeper, Tom. 1998. "Events and Aspectual Structure in Derivational Morphology." In: H. Harley (ed.), *Roundtable on Argument Structure and Aspect*. MITWOL 32, 175-199.
van Hout, Angeliek. and Roeper, Tom. 1999. "The Impact of Nominalization on Passive, -able, and Middle: Burzio's Generalization and Feature-Movement in the Lexicon." *Papers from the UPenn/MIT Roundtable on the Lexicon*. MITWPL 35, 185-211.

van Hout, Angeliek and Roeper, Tom (to appear). "The Representation of Movement in -ability Nominalizations: Evidence for Covert Category Movement, Edge Phenomena, and local LF." In: A. Henry (ed.), *Motivating Movement*. Oxford: Oxford University Press.

Vergnaud, Jean-Roger. 1973. *Formal Properties of Lexical Derivations*. QRPL Electronics Lab, MIT, Cambridge, MA.

Wasow, Thomas and Roeper, Tom. 1972. "On the Subject of Gerunds." *Foundations of Language* 8.2, 44-61.

Williams, Edwin. 1987. "Implicit Arguments, Binding Theory, and Control." *NLLT* 5, 150-181.

Williams, Edwin. 1994. *Thematic Structure in Syntax*. Cambridge: MIT Press

Zucchi, Alessandro. 1989. *The language of propositions and events: issues in the syntax and semantics of nominalization*. PhD. dissertation. University of Massachusetts, Amherst.

THE LEXICALIST APPROACH TO WORD-FORMATION AND THE NOTION OF THE LEXICON[1]

SERGIO SCALISE AND EMILIANO GUEVARA

1. A DEFINITION

The term *Lexicalism* refers to the theoretical standpoint in modern generative linguistics according to which the processes that form complex words (derivation and compounding[2]) are accounted for by a set of *Lexical Rules*, *independent of and different from* the syntactic rules of the grammar (i.e. word formation is not performed by syntactic transformations). Such Lexical Rules are assumed to operate in a presyntactic component, the *Lexicon*.

The Lexicalist approach to word-formation can be said to begin in the early 1970s with two fundamental articles: Chomsky's *Remarks on Nominalizations* (1970) and Halle's *Prolegomena to a Theory of Word Formation* (1973). Since then, lexicalism developed in a linear and constant way with an impressive series of works which contributed to shape a model that – in its basic tenets – has been adopted now for more than 30 years.

Siegel (1974) designed a level-based morphological model while Jackendoff (1975) explored the relation between the formal and the semantic parts of morphological operations by means of *Redundancy Rules*. Shortly after, Aronoff (1976) established the foundations of the whole discipline with the first comprehensive monograph in generative morphology. Focusing on derivational processes, Aronoff improved the notion of rule and developed an articulated system of restrictions in order to constrain the excessive power of *Word Formation Rules* (WFRs); he also envisioned the relevance of the notion of productivity and proposed a word-based morphology.

Many specific studies were to follow, extending the Lexicalist approach to an ever-growing variety of languages and issues. Among them we can mention Booij (1977) on Dutch, Allen (1978) on English, Pesetsky (1979) on Russian, and Scalise (1980) on Italian. Still, numerous other publications introduced new fundamental concepts which contributed to build up a complete and consistent morphological

[1] We have been able to write this chapter also thanks to funding by the Italian Ministry of Research and University. We would like to thank Stephen Anderson, Geert Booij, Rochelle Lieber and Pavol Štekauer for their comments on previous drafts. We are grateful to Nigel James for looking over our English. Needless to say, the authors are solely responsible for the final version of this chapter. Even though we discussed together the whole plan of this chapter, Sergio Scalise is responsible for sections 2 through 4, and Emiliano Guevara, 5 through 8.

[2] Generally, though some versions of lexicalism explain also inflection by means of lexical rules. Cf. section 5.1 below.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 147—187.

theory: for example, Lieber (1980) proposed the mechanism of *feature percolation*, Williams (1981) formulated an important generalization on morphological *heads*, Selkirk (1982) refined the *level ordering hypothesis*, Anderson (1982), brought inflectional morphology into the picture. This list of publications is far from being comprehensive or even fair to the many scholars who took part in the developments of lexicalist morphology: the approach gradually developed into an articulate set of hypotheses, an autonomous vocabulary and specific analytic techniques.

Plan of the chapter: section 2 is devoted to overview the historical developments in morphology preceding the lexicalist approach in generative linguistics. In section 3, we describe the characteristics of the notion of Lexicon in the early days of generative linguistics. Section 4 examines in detail the two seminal works in the lexicalist framework, namely Halle (1973) and Aronoff (1976). Then (section 5), some of the most important enhancements to the lexicalist approach are briefly illustrated. In section 6, we return to the notion of Lexicon as it has been refined by the lexicalist tradition. Finally (sections 7 and 8), we discuss some major problems (specially the relation between morphology and syntax) that an up-to-date lexicalist view has to confront with.

2. A BRIEF HISTORY

In the organization of linguistic theory, morphology is an intermediate discipline between phonology and syntax. Over the years, the relationship of morphology with these two fields of research has changed substantially a good number of times.

In 19th century European comparative linguistics, morphology lay at the heart of the reconstruction of the Indo-European languages (cf. Bopp 1816, to name but one, who compared Sanskrit, Latin, Persian and the Germanic languages by looking almost exclusively at morphological phenomena).

Morphology was also central in American structuralist linguistics, although the main focus of research was on phonology. The major 'discovery' of the time, the *Phonemic Principle*, could be easily extended to morphology giving rise to the well-known parallelism *phone* : *phoneme* = *morph* : *morpheme*, extensively used to study allophonic and allomorphic variation. Morphology was always present in the American tradition either viewed as grammatical process (Sapir 1921), or as arrangement of morphemes (Bloomfield 1933).[3]

With the advent of early Generative Grammar (Chomsky 1957), morphology lost relevance in the general organization of theoretical linguistics. Within that framework, the lexicon contained only simple words (idiosyncratic, arbitrary signs); neither compounds nor derived words had a place there. The only location where they could be constructed was the transformational component, which at the time was the only theoretical device capable of expressing grammatical relations. Phrase structure rules and transformations were allowed to manipulate words and morphemes, thus making superfluous every additional specification to account for

[3] Cf. the discussion of the different models existing at the time in Hockett (1954). Cf. also the relevance of morphological matters in classical anthologies, e.g. Joos (1957).

the structure of words. At the same time, all the possible variations in *form* that words and morphemes might show (allomorphy) were assigned to the phonological component.

For instance, in *Aspects* (1965: 184) Chomsky proposed to use 'nominalization transformations' to account for the relation between word-pairs such as *destroy*/*destruction* claiming that "phonological rules will determine that *nom*+*destroy* becomes *destruction*." Hence, the purely morphological relation between *destroy* and *destruction* was at the time accounted for by a combination of syntactic and phonological operations. In addition, inflectional morphology was handled in a similar way: Chomsky & Halle (1968) analyzed both irregular and regular inflected verb-forms like *sang* and *mended*, as *sing*+past and *mend*+past, "where past is a formative with an abstract feature structure introduced by syntactic rules" (1968: 11).

At that time,[4] generative linguistics simply did not have adequate formal mechanisms for these phenomena: the theory assumed no morphological rules at all.[5] However, transformations were not suited to explain morphological facts: they had been introduced to handle syntactic phenomena, i.e. totally productive, transparent and regular phenomena. Words, on the contrary, tend to be less regular (cf. *destroy* → **destroy-ation*), and, sometimes, they undergo idiosyncratic lexicalization (cf. *transmission* 'the action of transmitting' vs. *transmission* 'gearbox of a car'); furthermore, most lexical processes are not fully productive (cf. *read* → **read-ation*).

A few years later, Chomsky's *Remarks on Nominalizations* (cf. Roeper, this volume) suggested that these facts could be better explained by lexical rules: "Fairly idiosyncratic morphological rules will determine the phonological form of *refuse*, *destroy*, etc., when these items appear in the noun position" (Chomsky 1970: 271).

[4] A summary of the situation of morphological theory in the beginnings of Generative Grammar is given in Anderson (1988: 147):
"In American structuralist terms, the enterprise of morphology can be divided into the study of morphotactics (the arrangement of morphological elements into larger structures) and allomorphy (variations in the shape of the 'same' unit). Early generative views, typified by Chomsky (1957) or Lees (1960) assigned the arrangement of all items into larger constructions to the syntax, whether the structures involved were above or below the level of the word – which effectively eliminated the independent study of morphotactics. The program of classical generative phonology, on the other hand, as summed up in Chomsky & Halle (1968), was to reduce all variation in shape of unitary linguistic elements to a common base form as this might be affected by a set of phonological rules – which effectively reduced the study of allomorphy to the listing of arbitrary suppletions. With nothing of substance left to do in morphology, generative linguists had to be either phonologists or syntacticians."

[5] In the major 'readings' that made the history of Generative Grammar (e.g. Fodor & Katz 1964, Bierwish & Heidolph 1970, Jacobs & Rosenbaum 1970, Reibel & Shane 1969, Gross, Halle & Schuetzenberger 1973) there are no more than three to four articles on morphology and, crucially, they all treat purely morphological phenomena transformationally (exceptions exist, e.g. Kiefer (1973)). Another famous reader (Peters 1972) had the significant title *Goals of Linguistic Theory* (with contributions by linguists such as Fillmore, Chomsky, Postal, Kiparsky, etc.): the volume contains only papers on syntax and phonology, thus showing that at the time morphology was not even considered among the 'goals' of linguistic theory.

Linguists gradually became convinced that rules different from transformations should operate in the lexicon to form complex words.[6]

2.1 Lees (1960)

Before going into the details of the lexicalist approach to morphology, let us briefly consider the kind of problems that early generative theory had to face. The most exhaustive treatment of morphological phenomena (specifically of nominal compounds) within a transformational framework is that of Lees (1960).

Lees accounts for the formation of compound words by applying transformations to sentences. The arguments in support of this proposal are essentially of a semantic and syntactic nature, and can be summarized in the following three points:

(a) Nominal compounds are generated by transformations from underlying sentence structures in which the grammatical relations (subject, object, cf. p. 119) that hold implicitly between the two formatives of the compound are expressed explicitly.
(b) If the meaning of a compound is ambiguous, it is possible to show that this ambiguity results from different underlying sentences corresponding to the different meanings. For instance, the ambiguity of a compound such as *snake poison* can be explained in "grammatical" terms by deriving the different meanings from (at least) three different sentences (a. *X extracts poison from the snake*, b. *The snake has the poison*, c. *The poison is for the snake*).
(c) Transformations can account for the intuition that compounds such as *windmill* and *flour mill* express different grammatical relations despite their superficial similarity (both compounds are of the N+N type): they are derived from different deep structures (a. *Wind powers the mill*, b. *The mill grinds the flour*).

The major problem arising from Lees's proposal is that it requires a good deal of deletion transformations which are too powerful.[7] For example, to form *windmill* from the underlying sentence *wind powers the mill* it is necessary to delete the verb *power*, while to derive the compound *car thief*, it is necessary to delete the verb *steal* (assuming that the deep structure of the compound is the sentence *the thief steals the car*). In other words, Lees's transformations require the deletion of linguistic material that cannot be independently said to have been there in the first place. Subsequent developments in generative linguistics made an effort to exclude unconstrained rules such as these from the grammar. It was already clear, by the mid 1960's – with the influence of Chomsky's (1965) principle of *Recoverability of Transformations* – that this type of unrestricted operations could not bring us closer to an adequate characterization of the notion 'natural language'. Even if it were possible to formulate the transformations required in the derivation of compounds in such a way as to satisfy the recoverability principle, it would nevertheless be necessary to postulate at least as many transformations as the number of verbs that

[6] Cf. Wasow (1977) and the comments thereof in Anderson (1977).
[7] A detailed discussion of this topic can be found in Allen (1978) and Scalise (1984), among others.

could be deleted, thus assuming rules of '*power* deletion', '*steal* deletion', etc. These transformations are clearly *ad hoc* (each of them is constructed to account for one example) and their number cannot be constrained; in this respect, Lees's proposal fails to achieve a satisfactory level of descriptive adequacy.

3. THE LEXICON

The notion of *Lexicon* in Generative Grammar has gone through a complex process of development, from a Bloomfieldian conception (the lexicon is "a list of irregularities", idiosyncratic sound-meaning pairings) to a more articulated vision, where besides irregularities, the Lexicon contains also regular processes.[8]

In *Syntactic Structures* (Chomsky 1957), the Lexicon was not regarded as an autonomous component of the grammar: the rules introducing lexical items were the last rules of the categorial component. Thus, the categorial component had only one type of rule both for expanding categorial symbols (e.g. 1.i, 1.ii) and for introducing lexical items (e.g. 1.v-vii):

(1)
i. S → NP + Aux + VP
ii. NP → Det + N
iii. VP → V + NP
iv. Aux → pres., past
v. Det. → the …
vi. N → girl, book ...
vii. V → take, read, walk …

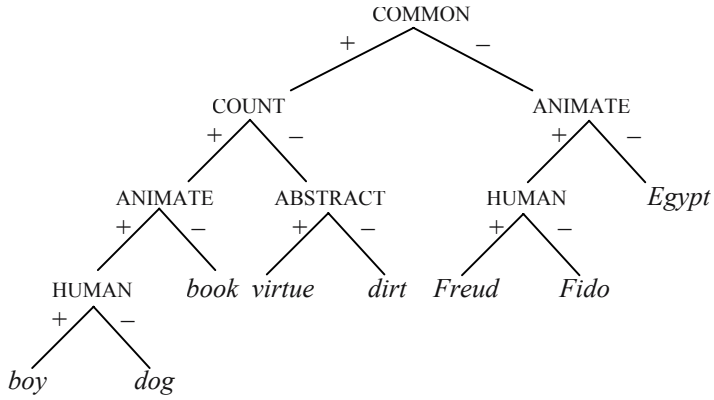
Furthermore, only simple words (or, better, morphemes) could be inserted by such rules.

The most important modification of the framework (as far as morphology is concerned, and in particular for the lexicalist approach) was the separation of the Lexicon from the rewriting rules proposed in *Aspects*. This move permitted a significant simplification of the grammar since many of the properties of lexical formatives are, in fact, irrelevant to the functioning of the base rules and, furthermore, are often idiosyncratic. For example, the fact that there are two classes of transitive verbs, those that allow deletion of the object (e.g. *to read*) and those that do not (e.g. *to buy*), no longer had to be handled by rewriting rules. Instead, the properties of verbs such as *read* and *buy* could be specified in their lexical entries. The organization of the lexicon presented in *Aspects* can be considered a major step into the direction of what we call today Lexicalism: in order to simplify the system of base rules, the Lexicon was given a greater importance (and weight) in the theory.

In Chomsky's *Aspects*, atomic category symbols were subcategorized by feature matrices (sets of attribute-value pairs) in which various kinds of information were encoded. Two types of feature matrices were used. The first was a system of inherent features describing lexical entries (cf. (2)):

[8] For a clear differentiation between these two conceptions of the lexicon, cf. Aronoff (1989).

(2)



boy = [+common, +count, +animate, +human]
Egypt = [–common, –animate], etc.

The second type of subcategorization consisted in a system of contextual features that specified the syntactic environment in which a given lexical entry can appear (so-called strict subcategorization frames). Consider the contextual features that characterize the following verbs:

(3)

eat	[+__NP]		
	John eats food.		
seem	[+__Adjective,	+__*like*-Predicate-Nominal]	
	John seems sad.	*John seems like a nice fellow.*	
grow	[+__NP,	+__#,	+__Adjective]
	John grew a beard.	*John grew.*	*John grew sad.*

The information associated with a lexical item (lexical category and subcategorization frames) is crucial for the explanation of the morphological phenomena in any language: morphological rules use this information to select the bases to which they may apply. For a brief illustration, consider the following nouns, with each one being able to appear only with certain derivational suffixes, but not with all of them:

(4)

	-ian	-hood	-(i)fy	
Chomsky	+	–	–	= Chomskyan
boy	–	+	–	= boyhood
beauty	–	–	+	= beautify

The suffix *-ian* can only attach to [–common] nouns (cf. *Egyptian*, **table-ian*, **horse-ian*), whereas *-(i)fy* attaches to nouns subcategorized as [+common, ±abstract, –animate] (cf. *countrify*, **England-ify*, **secretar-ify*, **hors-ify*). Finally, *-hood* selects [+common, –abstract, +animate] nouns (cf. *neighborhood*, *priesthood*, **democracy-hood*, **correction-hood*, **George-hood*).

Moreover, strict subcategorization frames are also relevant for derivation, as it is often the case with deverbal derivation. For instance, the suffix *-able* attaches by rule to verbs characterized as [+__NP] (i.e. transitive verbs): *eatable*, *believable* but **seemable*.

The notion of lexicon presented in *Aspects* was yet a static one: it served the sole function of providing the syntax with words. Chomsky informally suggested that "it may be necessary to extend the theory of lexicon to permit some 'internal computation'" (Chomsky 1965: 187). As we will see, in later work, (e.g. Chomsky 1970, Halle 1973, Jackendoff 1975, Aronoff 1976) the Lexicon is much more than a simple list of words: besides a list of underived lexical entries and idiosyncratic complex units, it also contains an explicit internal computation, the word formation component.

4. LEXICALISM

As it has been pointed out above, Chomsky's *Remarks on Nominalization* initiated a totally different perspective on morphological phenomena, suggesting that at least some complex words are better explained as lexical formations than as transformations: derived complex words are built in the Lexicon, inflected complex words are generated by syntactic transformations (cf. Roeper, this volume). This idea laid the foundations for a more dynamic view of the Lexicon.

Remarks on Nominalization represented a definitive turning point in the study of morphology; its consequences greatly exceeded what could be imagined at the time. Chomsky treated only deverbal nominalizations but, quite clearly, the lexicalist explanation could be argued for many other derivational processes: deverbal adjectives (*readable*, *attractive*), deadjectival nouns (*readability*, *attractiveness*) etc. (cf. Carstairs-McCarthy 1992: 17–19). In the following sections we will provide an overview of some of the most influential developments in the lexicalist approach. In particular, those which had the most profound impact on the architecture of the grammar.

4.1 Halle (1973)

The linguist who was first able to draw the logical conclusions from the criticisms that were being raised against the transformational treatment of word formation was Morris Halle. In his article *Prolegomena to a Theory of Word Formation*, Halle advanced the first proposal of an autonomous morphological component within the framework of the Lexicalist theory. This work, although

relatively short and programmatic, has served as the foundation and inspiration for much work in lexicalism.

Halle's starting point is the idea that if a grammar is a formal representation of a native speaker's knowledge of language, then there must be a component that accounts for the speaker's lexical knowledge: a speaker of English 'knows', for example, a) that *read* is a word of his/her language, but *lezen* is not, b) that certain words have internal structure (e.g. *un-drink-able*) and c) that the internal structure respects a specific order of concatenation of morphemes (*un-drink-able* is a possible word but **un-able-drink* or **drink-un-able* are not). Such knowledge can be represented in a formal model:

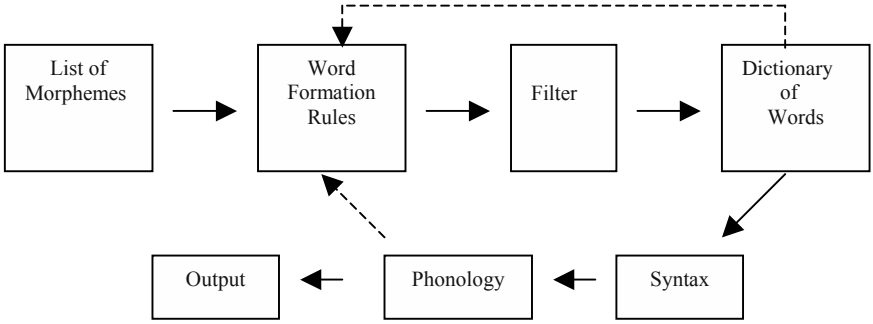


Figure 1

Let us briefly examine how this model works. In Halle's view, the basic units of the lexicon are morphemes. Each morpheme is represented as a sequence of phonological segments provided with a syntactic label (N, V, etc.), except affixes, which are labeled Af (without syntactic category):

(5) $[\text{home}]_{N}$ $[\text{arrive}]_{V}$ $[\text{-al}]_{Af}$

These forms constitute the input of *Word Formation Rules*, which are responsible for the sequential arrangement of the morphemes of a language into actual words. WFRs can freely apply to the list of morphemes, forming *potential* words (i.e. words that are not listed in the Dictionary). WFRs are of two types, those that apply to stems and those that apply to words:

(6) a. $[\text{STEM} + \text{Af}]_{A}$ tot+*al*
b. $[\text{VERB} + \text{Af}]_{N}$ arriv+*al*

WFRs can change not only the lexical category of the input lexical item, but also the syntactic features associated with it. For example, the suffix *-hood* can attach to [–abstract] Nouns resulting in [+abstract] Nouns (*boy* → *boyhood*, *priest* → *priesthood*).

Halle's model of morphology entails a more radical version of the *Lexicalist Hypothesis* than was originally proposed in Chomsky (1970): Halle's WFRs operate in the same way for derivation and inflection[9] (compounding was not yet in the picture at the time), both derivational and inflectional affixes are equally listed in the Lexicon. The motivation for this choice is that the set of morphophonological operations and the idiosyncratic behavior typical of derivational processes has parallels in inflection.

The third subcomponent in Halle's model is the *Filter*. The Filter has basically two functions: a) it adds idiosyncratic features when necessary (e.g. a word such as *recital* is formed regularly as is *arrival*, but the Filter gives it its idiosyncratic meaning "performance of a soloist") and b) it prevents possible but non-existing words (e.g. **ignoration*) from appearing in sentences by assigning the feature [– lexical insertion] to them.

The final subcomponent in Halle's model is the *Dictionary*, which is entirely determined by the interaction of the List of Morphemes, WFRs and the Filter: it contains all existing words, including all the inflected forms of every word. The whole mechanism can be summarized with the following schema:

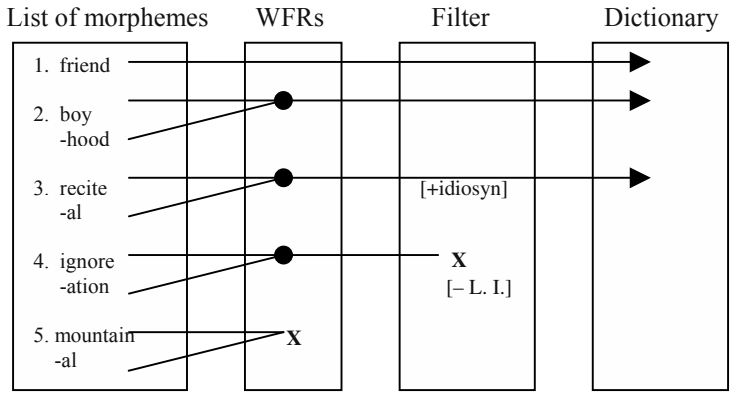


Figure 2

Halle's proposal represented a fundamental step in the development of the theory of morphology: for the first time it was proposed to handle all morphological phenomena in a single place (i.e. the Lexicon) and by means of specific rules (WFRs). This suggestion served not only to lighten the burden of the transformational component by removing those operations that involved numerous lexically governed exceptions: it also provided a way to account for a fundamental difference between syntax and morphology. The notion "possible but non-existent

[9] Halle's position is today called *Strong Lexicalist Hypothesis* as opposed to the so-called *Weak Lexicalist Hypothesis* (where derivational and inflectional morphology are handled by different sets of rules). Cf. section 5.1 below.

word" became crucial for morphology; a parallel concept is totally absent in syntax, where in fact, it makes no sense to say that a sentence is 'possible but non-existent'.

With respect to earlier models of morphology, such as the *Item and Arrangement* model[10] that joined morphemes by the simple operation of concatenation, Halle's proposal represented a significant innovation in that it contains a special mechanism for creating complex words (i.e. WFRs), a mechanism that makes use of more linguistic information and carries out more abstract operations than simple concatenation.

To see why concatenation is not an adequate way to explain word formation, consider the French word *restructuration* 'restructuring': this word cannot simply be built up by concatenation of the three morphemes *re+structur+ation*; it must have internal structure since it is not possible to attach just any prefix or suffix to any base. That is, the prefix *re-* must be attached to verbs, not to nouns (cf. **re-verité* 're-truth') or adjectives (cf. **re-grand* 're-great'), and the suffix *-ation* must also be attached to verbs, not to nouns (cf. **verity-ation* 'truth-ation') or adjectives (cf. **grand-ation* 'great-ation'). Thus the base of the derived word *restructuration* must be a verb (*structur(er)* 'to structure') and the derivation must be carried out in two steps: i. *structur(er)* → *re-structur(er)*, ii. *restructur(er)* → *restructur-ation*. Thus the word in question has the following internal structure:

(7) $[[\text{re+}[\text{structur}]_V]_V \text{ +ation}]_N$

It should be remembered that Halle's main purpose was to stimulate discussion in a still neglected field. We can see today that this goal has, in fact, been completely achieved although later research on morphology has raised questions on every subpart of the model seen above.

Placing morphemes at the base of the system is a problematic choice because, while in English simple words and morphemes coincide most of the time, this is not always the case with other languages. Moreover, considering derivational and inflectional affixes as included in the List of Morphemes obscures the difference between the formation of new words (or 'lexemes', e.g. *writ+er* from *write*) and the formation of word-forms (e.g. *write+s*, *writ+ing*).

Halle's WFRs are quite unrestricted; not only do they have access to information contained in later stages in a derivation (the Dictionary), but they also generate a large number of ungrammatical forms.

Finally, also the Filter has been criticized, mainly because it is not a finite mechanism. The set of possible but non-existent words is not finite in the sense that there are no grammatical principles restricting the degree of complexity of derived and compound words, with the likely exception of performance considerations such as memory (cf. Booij 1977).

[10] Cf. Hocket (1954).

4.2 Aronoff (1976)

Aronoff (1976) was the first comprehensive monograph on morphology in the framework of generative grammar. Its main contributions consisted in refining the notion of rule in morphology, providing it with a system of restrictions on WFRs and in proposing a morphological model that is based on 'words' (not on morphemes). The topics developed in Aronoff's work are at the basis of the Lexicalist approach; although most morphologists never agreed completely with Aronoff's proposals, this monograph can still be considered the foundational work in lexicalism. We will briefly describe some of its salient contributions, most of which have provoked a great deal of debate in morphological theory.

4.2.1 The Word-based Hypothesis

Aronoff argues against morpheme-based theories of morphology: morphemes cannot serve as the basis of word-formation processes because the very notion of morpheme is problematic.[11] If words are to be analyzed exhaustively in morphemes, one is often left with isolated strings that cannot be interpreted as 'meaningful elements'. Consider the so-called *cranberry-morphs* in (8a):

(8) a. cranberry huckleberry
b. strawberry blackberry

All these words refer to types of 'berries', but, isolating the morpheme *berry* in (8a) we are left with *cran* and *huckle*, which do not exist independently (cf. the examples in (8b), where the analysis yields the English words *straw* and *black*). An even more extreme case is shown in (9):

(9) X+*fer* : refer defer prefer transfer
X+*mit* : remit demit … transmit

A theory based on morphemes would have to recognize the stems *fer* and *mit* and the prefixes *re-*, *de-*, *pre-*, *trans-*. However, it is clear that in these examples "neither the prefix nor the stem has any fixed meaning" (Aronoff 1976: 12). These units without meaning cannot be considered minimal linguistic signs (i.e. they are not Saussurean signs, arbitrary constant unions of sound and meaning). Aronoff's proposal is that morphology must be explained on the basis of words, which are indeed true minimal signs:

(10) All regular word-formation processes are word-based. A new word is formed by applying a regular rule to a single already existing word. Both the new word and the existing one are members of major lexical categories (Aronoff 1976: 21).

[11] Cf. Anderson (1992: 51 ff.).

The word-based hypothesis entails that English words such as *cranberry*, *huckleberry*, *refer*, *prefer*, *transmit*, etc. are not formed by regular morphological processes. They are listed in the Lexicon as such. In Aronoff's view, all word-formation takes place in the Lexicon (which lists only words and no morphemes in the traditional sense).

4.2.2 Word-Formation Rules

> [WFRs] specify a set of words on which [they] can operate. This set [...] we will term the *base* of that rule. Every WFR specifies a unique phonological operation which is performed on the base. Every WFR also specifies a syntactic label and subcategorization for the resulting word, as well as a semantic reading for it, which is a function of the reading of the base (Aronoff 1976: 22).

WFRs, therefore, can have the following form:

(11) a. Suffixation: $[WORD]_X \rightarrow [[WORD]_X + Suf]_Y$
e.g. happy → happiness

b. Prefixation: $[WORD]_X \rightarrow [Pre+ [WORD]_X]_X$
e.g. happy → unhappy

c. Compounding: $[WORD]_X, [WORD]_Y \rightarrow [[WORD]_X + [WORD]_Y]_Z$[12]
e.g. apron, string → apron string

These rules can be seen as an input/output mechanism, where the input is the simple word and the output the complex one. Note that in the formulation given in (11) suffixation is supposed to change the lexical category of the base (X → Y), while prefixation is not supposed to do so (X → X) (as for compounds, see section 4 below).

WFRs have a semantic counterpart: the meaning of the whole word is 'composed' by the partial meaning of the constituents and it is usually given as a paraphrase:

(12)
happy+ness	→	'the state of being happy'
un+happy	→	'not happy'
apron, string	→	'string of the apron'

In contrast to Halle (1973), in Aronoff's model words and affixes are represented in different levels: words are in the lexicon while affixes are parts of rules, that is to say, affixes are not lexical items. A WFR is a sort of 'instruction' to change the category of the base into another category (e.g. A → N) and it is at the same time a phonological and a semantic operation on the base (the former typically adding an affix to the base, the latter changing its meaning).

[12] This general rule for compounding was actually proposed by Allen (1978).

4.2.3 Productivity

In Aronoff's view, only productive processes build the possible complex words of a language: they may not still exist, but nevertheless conform to the morphological rules of that language. Morphological processes can be classified according to their productivity: while some WFRs are totally productive, e.g. the formation of adverbs with *-ly* ($[[\ ]_A$ + *-ly*$]_{Adv}$, which can be said to apply to most English adjectives), others exhibit a lower productivity (e.g. *-dom*, which only occasionally forms new words – *dollardom*, *gangsterdom*, *girldom*).

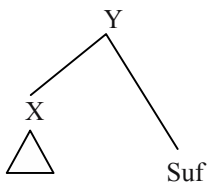
Aronoff gives two different views on the issue of productivity: First, he proposes (and quickly dismisses) a method to calculate the productivity of a given WFR as the ratio of possible input entries and attested output entries. Second, he points out that productivity "goes hand in hand" with semantic compositionality: any complex word whose properties are completely predictable from the interaction of the Lexicon and the set of WFRs is a possible word that does not need to be listed (whether it has been attested or not) and the related WFR is a productive one. Instead, if a word has some idiosyncratic feature (formal, semantic, syntactic), it must be stipulated and not constructed by rule. (For a detailed account of these and many other issues related to morphological productivity, cf. Bauer 2001 and this volume).

4.2.4 Restrictions on WFRs

One of the goals of syntactic theory is the definition of the class of possible sentences of a language. Similarly, one of the goals of morphological theory is the definition of the class of possible words of a language. To achieve this goal, Aronoff provides WFRs with a series of restrictions in order to determine correctly (a) the kind of information that is available to them, and (b) the kind of operations that they can carry out (cf. Rainer, this volume, for a thorough and critical assessment of the theoretical status of restrictions on WFRs).

Consider the following schema:

(13)



The *base* of a WFR (in this case a rule adding a suffix) is the set of all words that can substitute the Δ symbol dominated by X. X's lexical category might not by itself be sufficient to establish appropriately the base of a suffix. In order to exclude all the words yielding ungrammatical X+Suf combinations from the base, restrictions must be formulated regarding different types of information: there exist syntactic, semantic, phonological and morphological restrictions on the base of a WFR.

Syntactic restrictions

WFRs have access to the syntactic properties of the base: generally, the base is a member of the major syntactic categories N, A and V (e.g. the suffix *-able* attaches to V, not to N, A or P, cf. *readable*, **dog-able*, **nice-able*, **over-able*); WFRs do not usually apply, for example, to articles, pronouns, etc. Furthermore, WFRs are sensitive to the subcategorization frame of the base (*-able* attaches to Vs which are subcategorized as [+transitive] and not [–transitive], cf. *drinkable* vs. **dieable*).

Semantic restrictions

Generally, we may say that derivational affixes 'select' the base to which they attach also with respect to its meaning.

Consider, for instance, the Italian verb *tenta(re)*, which may be used (at least) with the following two meanings (a) 'to attempt', (b) 'to tempt'. The WFR that adds *-tivo* (yielding *tentativo* 'tentative') selects meaning (a), while the WFR adding *-tore* (forming *tentatore* 'tempter') selects meaning (b):

(14)

	tenta(re)	tentativo	tentatore
Meaning (a)		+	–
Meaning (b)		–	+

The semantics of the base is relevant in various ways to the functioning of morphological rules: they do not apply indistinctly to all the possible meanings of the base but, instead, typically select one of them.

Phonological restrictions

WFRs are subject to phonological restrictions when the ungrammaticality of their outputs depends exclusively on the phonological shape of the base. E.g. the English noun-forming suffix *-al* attaches only to verbs with main stress on the last syllable:

(15)

a.	try	[ˈtrai]	→	trial
	propose	[prəʊˈpəʊz]	→	proposal
	arrive	[əˈraiv]	→	arrival
b.	deposit	[diˈpɒzit]	→	*deposital
	recover	[riˈkʌvə(r)]	→	*recoveral
	promise	[ˈprɒmis]	→	*promisal

Morphological restrictions

Some WFRs are sensitive to the morphological makeup of the base, blocking the derivation if the base has a particular internal structure.

For instance, the Italian adverb-forming suffix *-mente* is as productive as its English counterpart *-ly* with simple and derived adjectival bases, but it does not attach to compound bases, as can be seen from (16) and (17):

(16)	[dolce][amaro] + *mente	'sweet-sour'
	[terzo][ultimo] + *mente	'lit. third last'
(17)	[storico][critico] +*mente	'lit. historical-critical'
	[economico] [sociale] + *mente	'lit. economic-social'

Note that *-mente* can be freely attached to the individual constituents of these compounded adjectives, whether they are simple (as in (16)) or derived (as in (17)).

(18)	dolcemente	'lit. sweet+ly'
	amaramente	'lit. sour+ly'
	?terzamente	'thirdly'
	ultimamente	'lastly'
	storicamente	'historically'
	criticamente	'critically'
	economicamente	'economically'
	socialmente	'socially'

The non-application of *-mente* to the examples in (16) and (17) depends on the internal structure of the base.

4.2.5 Stratal features

The Lexicon of a language may have various lexical strata (often due to contact with other languages, borrowings, diachrony etc.). In order to express this information, a system of stratal features has been developed (e.g. [±native] [±latinate], [±greek], etc., cf. Saciuk 1969).

English is characterized by having two well-defined strata, a [+native] body of Germanic origin and a [–native] stratum mainly of Romance origin. This kind of distinction is relevant to the functioning of many WFRs: different affixes "select" bases from different lexical strata.

Consider e.g. the suffix *-ity*, which can attach to [+latinate] words – as in (19a) – but not to [–latinate] words (19b):

(19)	a. profane	→	profanity
	vivid	→	vividity
	b. wide	→	*widity
	strong	→	*strongity

In this respect, *-ity* differs from the suffix *-ness*, which does not discriminate between [+latinate] (20a) and [–latinate] (20b):

(20) a. common+ness
strange+ness

b. happy+ness
white+ness

4.2.6 Restrictions on the output of WFRs

The output of WFRs is also subject to restrictions. In Aronoff's view, these are either syntactic or semantic.

All the words that are created by WFRs must be members of a major lexical category (i.e. N, A, V or P). The category of the output is specified by the WFR itself. The output of a WFR is a labeled bracketing where the lexical categories of the input and the output are explicitly signaled, together with a boundary between the constituents of the complex word. An output such as *happiness* has the following representation:

(21) $[[happy]_A + ness\ ]_N$

The semantic restriction on the output requires that its meaning be compositionally derived from the meaning of the base. The meaning of the output is represented as compositional paraphrase containing a variable:

(22) a. $[[X]_V$ +er $]_A$ 'one who Xs habitually, professionally'
drinker 'one who drinks habitually'

b. $[un+ [X]_A]_A$ 'not X'
unhappy 'not happy'

The meaning of a complex word is always compositional when it has been created by a (synchronically) productive WFR. With time, a complex word may acquire unexpected or idiosyncratic meanings, i.e. meanings that cannot be derived from its constituents, as, for example, in the already seen word *transmission*.

4.2.7 Conditions

Alongside the system of restrictions, which define the possible words of a language applying differently on each individual WFR, Aronoff put forward a set of Conditions devised to constrain morphological rules at a system-wide level.

Unitary Base Hypothesis (UBH)

An affix cannot attach to *any* lexical category, it selects words of one and only one category. So, when we find an affix that apparently selects more than one category, we are forced to conclude that there are (at least) two homophonous affixes. For example, *-able* usually attaches to Vs (*acceptable*), but it is also found

attached to Ns (*charitable*). According to the UBH, therefore, there are two *-able* suffixes and this is supported by two facts. First, denominal *-able* adjectives may be further derived with *-ness* but not with *-ity* (*charitableness*, **charitability*), while deverbal *-able* adjectives do not show such preference (*acceptability*, *acceptableness*). Second, the semantics of these formations is different (i.e. deverbal *-able* adjectives can be paraphrased 'capable of being X-*ed'*, while denominal *-able* adjectives mean 'characterized by X').

Since the UBH proved to be too strong, various refinements of Aronoff's original formulation have been proposed. For example, Scalise (1984) proposed that the UBH might be held true only if, instead of plain categories, we take into consideration syntactic features such as [±N] and [±V]; Scalise's Modified UBH would therefore read as follows: an affix selects as its base only items marked either as [+N] or [+V]. Consider two Italian examples as the following:

(23)

-anza

tolleranza 'tolerance'	(V→N)	from *tollerare* 'to tolerate'
lontananza 'distance'	(A→N)	from *lontano* 'distant'

-esimo

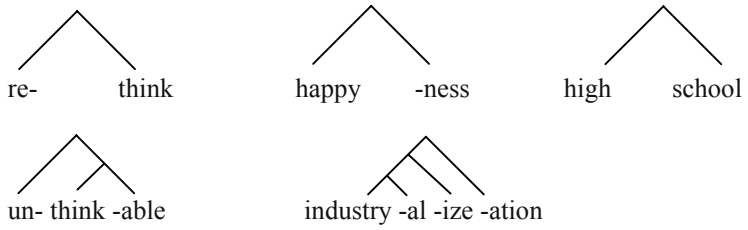
incantesimo 'enchantment'	(N→N)	from *incanto* 'spell'
umanesimo 'humanism'	(A→N)	from *umano* 'human'

The first suffix can be described as having a [+V] base and the second one as having a [+N] base. The hypothesis reformulated in these terms seems able to account for a great number of cases Actually, adopting the MUBH, one can describe correctly the behaviour of all Italian suffixes but one (cf. Scalise 1984: 143), although it is uncertain if this condition holds equally well for every language.[13]

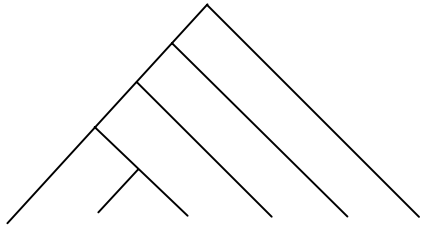
Binary Branching Hypothesis (BBH)

The Binary Branching Hypothesis states that morphological structures are basically binary, regardless of their complexity:

(24)



[13] See Iacobini & Scalise (to appear).



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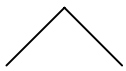
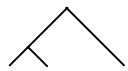
Thus, the trees in (25a) are possible morphological structures while those in (25b) are not:

(25) a.





b. *

*

*

This hypothesis corresponds to Aronoff's idea that affixes attach to their base one at the time ('one affix, one rule') and, therefore, that there are no genuine morphological rules that attach two (or more) affixes simultaneously. Some linguists do not accept the validity of BBH: Rainer (1989), for example, argues that there is a class of coordinate compounds (cf. *anglo-italo-american*) where there is no reason to postulate a binary-branching structure. In fact, the BBH has some limits of application:[14] it seems generally true for derivation and for subordinate compounds, not clearly so for multiple coordinate compounds.

No Phrase Constraint (NPC)

The No Phrase Constraint[15] states that the base of a WFR is always a lexical category (i.e. a word) and never a syntactic phrase. This restriction is decisive in order to separate morphology and syntax. Again, there are counterexamples, but they are typically found in compounds[16] (Aronoff's concern, we must remember, was entirely within derivation). As for derivation, some exceptions to the NPC can be found (cf. the following cases from Allen 1978: 236):

(26) [black and blue]ness
[at home]ish
[open-air]y

[14] In some theoretical approaches, this hypothesis is even dispensed with: cf. for example Štekauer (1998, this volume).
[15] The label 'No Phrase Constraint' was introduced by Botha (1981).
[16] Cf. Lieber (1992).

These examples can nevertheless be described as involving lexicalized phrases. If we systematically apply the same processes to similar constructions, ungrammatical complex words are obtained:

(27) *[intelligent and attractive]ness
*[at school]ish
*[open wood]y

Blocking

Blocking expresses the general tendency of the Lexicon to avoid the formation of synonyms. It may be stated as "the nonoccurrence of one form due to the simple existence of another" (Aronoff 1976: 43).

There are two types of blocking: one that we can call syntagmatic and one paradigmatic (or, following Rainer 1988, token blocking and type blocking, respectively, cf. also Rainer this volume). The first type is illustrated by cases such as the following:

(28)	X	X+ous	X+ity
	glory	glorious	*gloriosity
	grace	gracious	*graciosity
	fury	furious	*furiosity

The simple nouns *glory*, *grace* and *fury* 'block' the formation of the semantically related abstract nouns **gloriosity, *graciosity, *furiosity*.

Consider now the following set of data:

(29)	X	X+ous	X+ity
	*	curious	curiosity
	*	precious	preciosity
	*	specious	speciosity

The abstract nominal in *-ity* can be formed because there is no blocking element X. Blocking is strictly linked with productivity: the suffix *-ness* can in fact be added to all the X-*ous* adjectives in (28, 29) due to its high productivity.

In the second type of blocking, an affix will prevent the attachment of rival affixes to the same base: so we do not have **occuration* or **occurrement* because of the existence of *occurrence*.

The two different types of blocking do not seem to operate across the board, however. They can be said to express only a general tendency of the lexicon and not a strong constraint on the functioning of morphological rules.[17]

[17] Cf. Scalise et al. (1983), Rainer (1988)

4.2.8 Summary on Word-Formation Rules

A list of the properties of WFRs as it has been elaborated in the main core of the lexicalism, can be summarized as follows:

WFRs

- take as their input only lexical items (they are thus 'lexical' rules)
- have access to all the information associated with a given lexical item
- they have, therefore, access to phonological, morphological and categorial properties of words, but also to all kinds of semantic information
- they consist of a formal part (attachment of an affix) and of a semantic part
- they form new words but can be used also to analyze existing words
- they are structure-building rules (the structure they build is binary)
- they can operate on possible but not existent words
- they can be more or less productive
- apply to one another's outputs

WFRs are different from other rules of grammar, because they

- can change all the information associated with their base (they can thus change lexical categories, subcategorization features, argument structure, etc.)
- are local[18]
- are optional

WFRs are subject to restrictions

- on their base (categorial, phonological, morphological, stratal, semantic)
- their output belongs to a major lexical category and has compositional meaning
- they take as their base only words (that is, neither morphemes nor phrases, although this point is not accepted by all lexicalist morphologists)
- they select a single category they can attach to (Unitary Base Hypothesis)
- they tendentially do not form synonyms of the base (blocking)

5. SOME MAJOR ISSUES

The theoretical agenda resulting from Halle (1973) and Aronoff (1976) was soon expanded with new proposals that had as a consequence the enhancement of Lexicalism (which became a well-defined framework) besides inspiring a good deal of research on both the theoretical and the empirical aspect. In this section we will have a quick look at some of the most interesting and thought-provoking issues arising from research in the lexicalist tradition.

[18] 'Local' intended in the sense of Wasow (1977: 330): "Whereas transformations are mappings between entire phrase markers, lexical redundancy rules (i.e. WFRs) are mappings only between lexical items."

An insightful method to treat the inherently compositional nature of word-formation processes was proposed by Allen (1978) applying the 'IS A' Condition to English compounds like the following:[19]

(30) $[[high]_A\ [school]_N\ ]_N$

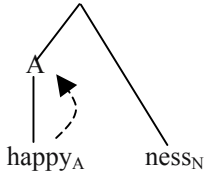
The 'IS A' Condition allows the identification of the compound's head in semantic and categorial terms:

- IS *high school* A type of *high* or IS it A type of *school*?
- Given that *high* is an adjective and *school* is a noun: IS *high school* AN adjective or IS it A noun?

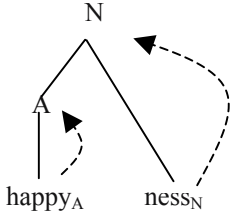
A *high school* 'IS A' (type of) *school* and it 'IS A' noun, hence *school* is the head of the compound *high school*. Looking back at the compounding rule in (11c), we can generalize that in an English compound [X+Y]Z, Z 'IS A' Y, both from a categorial and a semantic point of view.

Although 'IS A' may correctly tell us which of the constituents is predominant in a complex word, it says nothing about the mechanisms that bring about this asymmetry. Lieber (1980) presents a system of rewriting rules that generate binary-branching tree structures whose terminal nodes are filled by stems and affixes, depending on their subcategorization frames. In this system the 'IS A' Condition is explained on strictly formal terms: the essential property of a morphological head is that all its features (whether semantic or categorial) are copied to the upper node of the structure. Lieber reformulates the 'IS A' Condition as the *Feature-Percolation Convention*. We illustrate this in simplified form with the word *happiness*:

(31) a. The features of a stem are passed to the first dominating non-



b. The features of an affix are passed to the first dominating node which branches

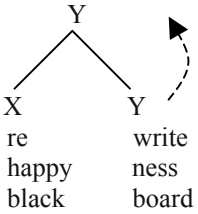


[19] This notion had been previously explored, though in different terms, for example by Marchand (1969).

Both the 'IS A' Condition and the Feature-Percolation Convention were designed to account in formal terms for one of the most crucial notions in morphology: the notion of *head*. Aronoff (1976) extended the use of 'head' to include both words and bound forms (affixes). Williams (1981) further elaborated it, proposing the *Right-Hand Head Rule* (RHR) for English: all morphologically complex words are headed, and the head in a complex structure is the rightmost element. The validity of his rule can be tested with prefixed, suffixed and compound words (32a) and can be expressed with a general schema (32b):

(32) a. $[re+ [write]_V]_V$ $[[happy]_A ness]_N$ $[[black]_A [board]_N]_N$

b.



In all these cases, the rightmost element heads the construction: *rewrite* is a verb because *write* is a verb, *happiness* is a noun because *-ness* forms nouns and, finally, *blackboard* is a noun because *board* is a noun.

A logical generalization stemming from the RHR is that prefixes are never heads, while suffixes always are. This generalization, although correct for a great number of cases, is too strong and needs to be weakened: for instance, some prefixes do indeed seem to be heads (cf. *rich* → *en+rich*) while evaluative suffixes and inflectional affixes in general do not qualify as heads (cf. *book+let*, *want+ed*). As for compounds, subsequent research has shown that the RHR is not a universal principle but that it depends on the typological affiliation of the languages considered: for instance, compounds in the Romance languages are systematically left-headed (cf. It. ***uomo*** *rana* 'lit. man-frog, frogman').[20]

The very concept of 'head' has been strongly criticized. An extreme position, defended by Bauer (1990), suggests that the possibility that the notion of head has no place in morphology should be also taken into account.[21]

Nevertheless, the notion of head is still a fundamental one in morphology for it grants important insights into the functioning of many regular phenomena: the head in a complex word is usually the locus of inflection (cf. *high school* → *high schools*

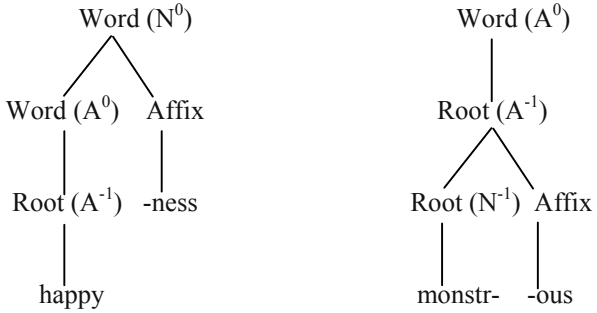
[20] Note that while derived words are always endocentric and by and large right-headed, compounds exhibit a variety of possibilities: (a) head in the 'canonic' location (e.g. right for Germanic languages, left for Romance languages), (b) no heads (cf. the 'exocentric compounds', also called *bahuvrihi*, such as *pale face*), (c) two heads (*dvandva* compounds, cf. Sp. *poeta-pintor* 'poet-painter'), (d) head in the 'wrong' place (cf. It. *terremoto* 'earthquake' a right-headed word due its Latin diachronic origin).

[21] Even the position taken by Bauer has been criticized. Cf. Štekauer (2001).

and It. *capostazione* 'station master' → *capistazione*), it is the constituent from which relevant information percolates to the upper node, its position in compounds is strongly related to the word-order type of the language (SVO languages tend to have left-headed compounds, while SOV languages tend to have right-headed ones[22]).

Morphological theory has often benefited from progress in syntactic theory. For example, Selkirk (1982)[23] extended the hierarchical projections of the so-called X-bar schema to apply in morphology:[24] the maximal morphological projection is identical to the X^0 level projection in syntax (i.e. words) while, below X^0, two purely morphological projections exist: Root (X^{-1}) and Af. The internal structure of *happiness* and *monstrous* would, therefore, be represented as in (33):

(33)



The similarity between morphology and syntax, however, is not complete. For instance, affixes do not have X-bar level: they are a peculiarity of W-syntax (the syntax of words, morphology), having no parallel in S-syntax (syntax proper).

In addition, while in S-syntax it is common that non-maximal projections dominate other maximal projections,[25] Selkirk argues that the same is not true of morphology: she proposes a universal principle that, only in the domain of W-syntax, no constituent can dominate a constituent of higher X-bar level. This means that Words may contain Roots, but not vice versa; at the same time, both Words and Roots may freely contain Affixes, for they do not have X-bar level.

[22] English, being an SVO language with right-headed compounds, is a counterexample to this statement. However, this can be explained in diachronic terms: English right-headed compounding is a remnant of an earlier dominant SOV word order. It is widely accepted that there was a shift in word order between Old and Middle English: Old English was SOV (like Proto-Indo-European) while Middle English was mainly SVO (cf. Kemenade 1987, Lightfoot 1991).

[23] Selkirk, while remaining committed to the Lexicalist hypothesis, presents a new point of view: rather than highlighting the differences between morphology and syntax, she explores the degree to which they resemble each other. The extent of this similarity in Selkirk's framework concerns the formal apparatus of both components. W-syntax and S-syntax make use of the same context-free rewriting rules and of the lexical categories N, A and V.

[24] Cf. section 7 below for other issues concerning the application of X-bar theory to morphological phenomena.

[25] Cf. [the [[train]$_N{}^0$ [[[to]$_P{}^0$]$_P{}^1$ [[[London]$_N{}^0$]$_N{}^1$]$_{NP}$]$_{PP}$]$_N{}^1$]$_{NP}$, where, for example, the projection N^1 headed by *train* contains a maximal projection of the preposition *to* (PP).

5.1 Strong and Weak Lexicalism

Stemming from Chomsky's (1970) proposal that semantically irregular derivation should not be accounted for by the syntax (the beginning of Lexicalism), there developed two opposed theoretical positions.

The *Strong Lexicalist Hypothesis* takes Chomsky's suggestion to its extreme consequences, excluding all morphological phenomena from the syntax: the processes of word formation and the rules of inflection are applied presyntactically, in the Lexicon. This position was originally proposed in Halle's (1973) seminal paper on generative morphology and it has been widely assumed as part of the most influential theories of syntax (e.g. *Lexical Functional Grammar*, *Generalized Phrase Structure Grammar*, *Head-Driven Phrase Structure Grammar*, and to some extent – at least regarding inflectional morphology and checking theory – also by the Minimalist Program).

The Strong Lexicalist Hypothesis is usually supplemented by the assumption that syntactic rules cannot modify, move or delete parts of words: this is the so-called *Principle of Lexical Integrity*, which has been endorsed by a great number of morphologists (cf. Lapointe 1980, Di Sciullo & Williams 1987, among others) and constitutes one of the key ideas of *Strong Lexicalism*. This principle can be defined as (34), in its most radical formulation:

(34) Generalized Lexicalist Hypothesis (Lapointe 1980: 8)
No syntactic rule can refer to elements of morphological structure

The Strong Lexicalist Hypothesis demands a sharp division between syntax and morphology and, as such, it cannot account for a variety of phenomena that require some degree of interaction of these two components of the grammar.

The distinction between derivational morphology (realized in the Lexicon) and inflectional morphology (accomplished by the syntax) achieves a greater degree of descriptive accuracy. This position is known as the *Weak Lexicalist Hypothesis* and (in general) it has had more success among morphologists than among syntacticians. Aronoff (1976) acknowledged a Weak Lexicalist framework, as did many others thereafter. The standpoint received a detailed account for the first time in Anderson's classic paper *Where's Morphology?* (1982).

All in all, over a ten-year period, the Lexicalist approach in morphology developed a very rich body of hypotheses and principles, of which only a few have been discussed in the preceding sections. We have not mentioned many others such as the *Adjacency Condition* (Siegel 1978),[26] which developed into the *Atom Condition* of Williams (1981), inheritance of Argument Structure (Sproat 1985, Booij 1988), etc.

Lexicalism has been applied to an ever growing number of languages and topics such as the nature of the so-called evaluative suffixes and clitics (Zwicky 1985),

[26] Which inspired a great number of proposals, such as Pesetsky's (1979) *Bracket Erasure Convention*, William's (1981) *Atom Condition*, Lapointe's (1981) for his *Lexical Integrity Hypothesis*, Kiparsky's (1982) *Bracketing Erasure Principle*, Botha's (1981) *Morphological Island Constraint*, among others.

allomorphy (Carstairs McCarthy 1987), bracketing paradoxes (Spencer 1988), the organization of so-called non-linear morphologies (McCarthy 1982), the interface between different components of the grammar (for example, between morphology and syntax, see to name but one Zwicky 1986; or between morphology and phonology, cf. Booij & Rubach 1987).

Certainly, such an empirical ferment over a short period of time also brought into the picture data that could not be accommodated in the original theory, and therefore, different branches of lexicalism developed. To be sure, Lexicalism was not the only theory of morphology: at the same time other theories developed such as Natural Morphology (cf. Dressler et al. 1987), to mention but one, giving rise to a rich theoretical debate, which is still today very intense (cf. for example, Fradin & Kerleroux 2003).

6. MORE ON THE NOTION OF LEXICON

Research in theoretical linguistics has remarkably enriched the notion 'Lexicon': by moving away from the early generative viewpoint (cf. section 3), much more elaborated hypotheses of lexical representations have been proposed. These developments often involve the inclusion of information depicting the *Predicate Argument Structure* (PAS) and/or some kind of complex semantic description of lexical items (usually termed *Lexical Conceptual Structure*, LCS). Typical minimal entries in such a Lexicon could be represented as follows (cf. Lieber 1992: 22):

(35) a. *enter* [V ___]
['ɛntɛ(r)]
LCS: [$_{Event}$ GO ([$_{Thing}$], [$_{Path}$ TO] ([$_{Place}$ IN ([$_{Thing}$])]))]
PAS: x <y>

b. *cat* [N ___]
['kæt]
LCS: [$_{Thing}$]

For instance, in (35a) *enter* reads as a verb pronounced [ɛntr] whose LCS describes an action involving two entities, one of which goes into the other; *enter*'s PAS says that it has two arguments, x (external) and y (internal and, in this case, non-obligatory).

Given such a conception of lexical representations and of the operations that can be applied to them, the domain of morphology (traditionally understood as the study of the internal structure of words) has been extended to include also the study of the external valency of words (the effects of morphology on PAS[27]).

[27] Whether there is an independent PAS slot in lexical entries is open to question; some linguists assume that PAS is derived from LCS, as a sort of "summary" of its contents as far as it visible to syntactic processes.

While it is generally agreed that words are represented in the Lexicon (i.e. they have a full lexical entry of the kind seen above), whether affixes are lexically represented is much more controversial. These issues demand a principled formal distinction between 'word' and 'affix', and this is not a simple distinction to draw. There are two basic viewpoints:

(36) a. words and affixes are lexical items (both have full lexical entries)
b. words and affixes are different (only words have entries in the Lexicon)

Among others, Halle (1973), Lieber (1980) and Selkirk (1982) ascribe to the hypothesis (36a), which has been supported by numerous arguments, for example:

- Words and affixes often exhibit the same relations among them (synonymy, antinomy, hyponymy, polysemy, cf. Lehrer 1996)
- Sometimes, a unit clearly identifiable as an affix on formal grounds seems to carry the kind of meanings expressed by roots in other languages (cf. Mithun 1996)
- Both words and affixes have lexical category and subcategorization frames (cf. Lieber 1980, 1992, Williams 1981, Selkirk 1982).
- Both words and affixes take part in X-bar structures (Selkirk 1982), suffixes, in particular, seem to share the basic properties of syntactic heads in complement-head structures (Di Sciullo 1995).

Hypothesis (36b) was first proposed in a Lexicalist framework by Aronoff (1976) and has become the hallmark of word-based theories of morphology: only 'words' are represented in the Lexicon, 'affixes' are assimilated to rules and operate in a different submodule of the grammar. The arguments for this position are also numerous; its main appeal lies in the representation of non-concatenative phenomena such as umlaut, allomorphy, suppletion, all of which cannot be easily explained by hypothesis (36a) as combinations of words and affixes. Furthermore, as D. Corbin (1987) pointed out, if affixes and words have the same representation, there would be no possible distinction to be drawn between compounding and derivation: crucially, though, in some languages compounds and derived words are systematically different (e.g. compounds in the Romance languages are left-headed, while derived words are right-headed, cf. It. ***uomo*** *rana* 'lit. man-frog, frogman' vs. *bar**ista*** 'bar man'). If words and affixes are not differentiated, interesting generalizations such as this one will be lost.

It has often been observed that the Lexicon may contain a wide range of different entities, produced not only by morphological processes but also by syntactic operations. Di Sciullo & Williams (1987: 14) propose a "hierarchy of listedness" for the contents of the Lexicon, which they consider to be "like a prison – it contains only the lawless, and the only thing that its inmates have in common is lawlessness":

(37) – All the morphemes are listed.
– 'Most' of the words are listed.

– Many of the compounds are listed.
– Some of the phrases are listed.
– Four or five of the sentences are listed.

This does not mean that we cannot distinguish between morphological and syntactic objects; Di Sciullo & Williams emphasize the Lexicon's role as storage for whatever linguistic object needs to be memorized by speakers. The elements of the Lexicon for Di Sciullo & Williams are all called *listemes* (whether they are words, affixes or phrases).

7. LEXICALISM TODAY

The Lexicalist Hypothesis in its strong version is rather difficult to maintain with respect to a series of counterexamples that have been highlighted by empirical research. These countexamples lead some linguists to conceive the morphological component as having *some* obligatory interaction with the syntax. The extent of this interaction, as conceived in various studies, ranges from the so-called Weak Lexicalist Hypothesis (which assigns inflectional morphology to the syntactic component), to the opening of some systematic areas where morphology and syntax "talk" to each other, to the complete account of all morphological phenomena by means of syntactic operations (which amounts to the exact opposite of lexicalism).

Below we will discuss some problems of the lexicalist approach and evaluate to what extent it can still be considered a productive theoretical framework.

Strong Lexicalist models are essentially linear:[28] the morphological component (Lexicon + Word Formation Rules) provides simplex and complex words, feeding the structures created by syntax. The only point of contact between the two components in these models is lexical insertion, the mechanism by which the terminal nodes in a syntactic tree are 'filled' with words. The following is a simplified schema of this relation:

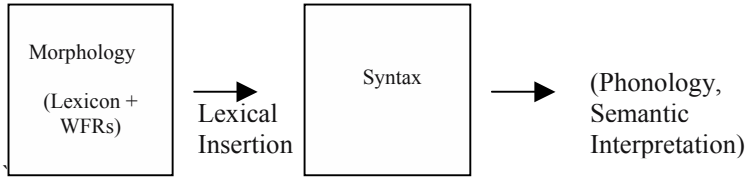


Figure 3

In a picture such as this one, communication between morphology and syntax is kept to a bare minimum. The Lexicon feeds the initial point of syntactic derivations,

[28] There are also other types of models. Cf. for example the so-called 'parallel morphology' (Borer 1991, Sadock 1991).

leaving phonological and semantic interpretation to take place after the syntactic computation is done.

7.1 Inflectional morphology

Most morphologists working within the lexicalist framework assumed that derivation and inflection are different morphological processes.[29]

In particular, Anderson (1982) defined inflection as the morphology that "*is relevant to the syntax*": inflectional morphology *realizes* all the morphosyntactic features of a word (Plural, Indicative, Active, etc., each specifying a morphosyntactic category such as Number, Mood, Voice) depending on the syntactic context in which the word is inserted. Inflection plays, therefore, the role of "adjusting" the words provided by the Lexicon to the morphosyntactic requirements of the syntax. Anderson proposed a Weak version of Lexicalism, claiming that the rules of inflectional morphology apply after syntax, intermixed with phonological rules; consider the architecture of Anderson's proposal (details omitted):[30]

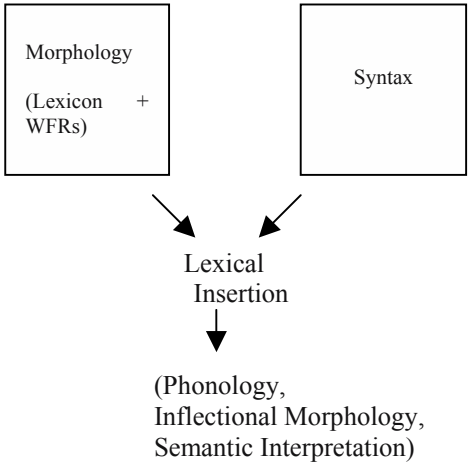


Figure 4

Other linguists assume that inflection and derivation are instances of the same operation, i.e. affixation, but that the differences between them can be explained as a matter of 'ordering'. This approach is defended in Kiparsky's (1982, 1983) model of

[29] Cf., among others, Aronoff (1976), Scalise (1988) and Anderson (1982, 1992). The opposite view has been also maintained however, cf. among others Halle (1973), Lieber (1980).

[30] Realization-based models of morphology (e.g. Anderson 1992, Stump 2001) continue in some way the dissociation of the inflectional and derivational rule types (defining respectively inflected word forms vs. lexemes).

Lexical Morphology:[31] he assumes that both word-formation rules and phonological rules apply in the Lexicon in an orderly progression of cycles. Without attempting to illustrate the details of the theory, Kiparsky's model can be represented as in Figure 5.

Morphological rules are assigned to ordered levels. Inflectional rules are assigned to a later level than derivational and compounding rules (thus explaining why inflection usually appears outside derivation). Each morphological level is paired with a class of specific phonological rules: the output of a word-formation rule is sent to the phonological rules of that level.[32]

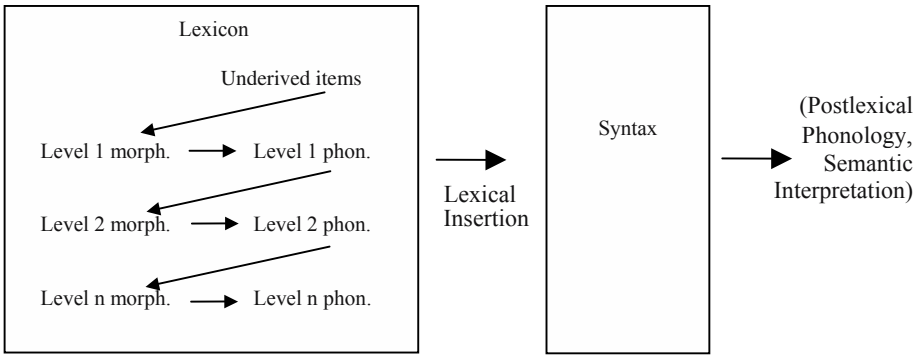


Figure 5

As it can be seen, both Anderson's and Kiparsky's proposals highlight that inflection is a problem for the strong lexicalist model in Figure 3. An alternative point of view has been proposed by Booij (1996, 2002: 19-20) who claims that there are two types of inflection: *inherent inflection* (which "adds morphosyntactic properties with an independent semantic value to the stem of the word") and *contextual inflection* ("required by the syntactic context, but [which] does not add information"). A functional continuum ranging from strictly word-forming processes (lexical) to strictly contextual inflection (syntactic) can be imagined, placing inherent inflection somewhere closer to derivation. This distinction can account for the fact that, sometimes, inherent inflection (but never contextual inflection) may feed WFRs: comparatives and superlatives are found as parts of compounds and derived words.

[31] Developing from Siegel's (1974) *Level Ordering Hypothesis*, the theory of *Cyclic Phonology* developed in Mascaró (1976) and Pesetsky (1979). A number of different versions of *Lexical Morphology/Phonology* have been proposed, somewhat differing with respect to the characterization of rules (morphological or phonological) or proposing a different level-ordering organization (cf. Mohanan (1986), Kiparsky (1985), Halle & Mohanan (1985), Booij & Rubach (1987)). All these approaches embrace Strong Lexicalism, but at the cost of enhancing the Lexicon (which now, besides WFRs, must contain phonological rules).

[32] The rules of lexical phonology are cyclic because they apply at each level of word-formation, before the next level can take place. On the other hand, the rules of postlexical phonology apply after all word-formation and syntactic processes have taken place (they are not cyclic).

7.2 Syntactic Morphology

One of the key arguments against the Lexicalist Hypothesis has been Occam's razor: if it can be demonstrated that a satisfactory explanation of morphological phenomena is achievable without any additional theoretical apparatus (i.e. only with the instruments of syntax and, more rarely, phonology), then dispensing with the morphological component of the grammar is a desirable effect for linguistic theory. This idea has, in one way or another, dominated the theoretical debate since the 1990's: developments in recent theories of syntax seem (more) capable of dealing with processes of word-formation than they were in the 1970's.

Syntactic models of morphology argue that word-formation phenomena follow syntactic constraints, interacting with syntactic operations, and that they should be subsumed within the syntactic component.

7.3 The Syntactic Incorporation Hypothesis

Incorporation[33] has been at the center of many theoretical discussions because it consists of a "formally morphological process with syntactic implications" (Mithun 2000: 923-24). The central issue of this debate is whether incorporation is a lexical or a syntactic process. Consider the example (38a), a prototypical case of incorporation from Classical Nahuatl and the synonymous syntactic construction (38b) (Iturrioz Leza 2001: 715):

(38) a. *ni-* *naca-qua*
1SG.SUBJ meat-eat
'I meat-eat'

b. *ni-c-qua* *in* *naca-tl*
1SG.SUBJ-3SG.OBJ-eat DET meat-ABS
'I eat (the) meat'

The complex verb *naca-qua* in (38a) is formed by incorporating the noun *naca* into the verb. In true incorporating languages, both the incorporated NV sequence (38a) and the full sentence in (38b) are semantically equivalent and grammatical.

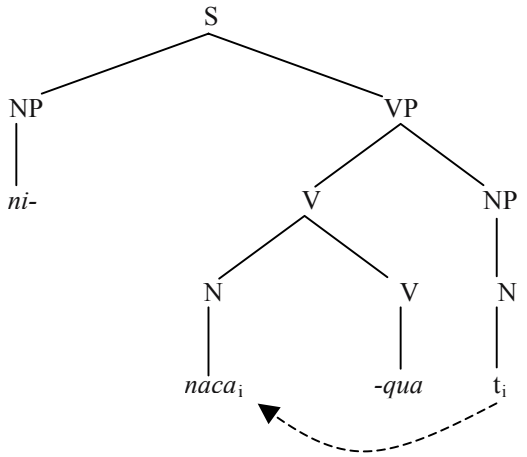
Baker (1988) analyzed such constructions as involving "the syntactic movement of a word-level category from its base position to combine with another word-level category" (Baker 1988: 424). Baker's *syntactic incorporation hypothesis* is developed within the framework of *Government-Binding* (Chomsky 1981): it is described as an instance of head-to-head movement that leaves a trace (a properly governed empty category) with which the moved element must be co-indexed. Constraints on the process are explained by the *Empty Category Principle*: the crucial point is that a trace of the incorporated element must be an argument of V,

[33] The best-known type of incorporation involves adding the internal argument (i.e. direct object) into the verb but many other patterns are attested (e.g. verb incorporation, particle incorporation, passive incorporation, pronoun incorporation, cf. Mithun 2000, Iturrioz Leza 2001).

otherwise it would not be theta-marked by V and, therefore, not governed. The tree structure (39) represents the head-to-head movement needed to derive the Nahuatl example (38a) according to Baker's proposal.

If the syntactic incorporation hypothesis is correct, its consequences for the theory of morphology are far-reaching. Allowing head-to-head movement in the creation of words can have various effects: in a minimal setting, at least some word-formation is accomplished by syntactic processes, while applying it fully amounts to reducing all morphology to syntax.[34] Baker proposed the process of incorporation to unify the treatment of various *grammatical function changing operations* (e.g. passive, causative, reflexive, etc.) and complex inflected forms.

(39)



Deep Structure (DS) Surface Structure (SS)
$[\,[\ldots]_{NP}\,[V\,[Det\ N]_{NP}\,]_{VP}\,]_S$ => $[\,[\ldots]_{NP}\,[\,N_iV\ \ [Det\ t_i\,]_{NP}\,]_{VP}\,]_S$

Furthermore, Baker (1985, 1988) proposes that the grammar is subject to the Mirror Principle:

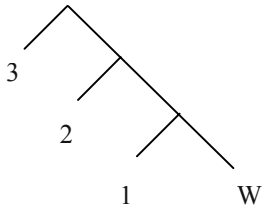
(40) *The Mirror Principle* (Baker 1985: 375)
Morphological derivations must directly reflect syntactic derivations (and vice versa)

What this principle implies is that, given a word with multiple affixes W+1+2+3, the order of the morphological affixes 'mirrors' the order of the relevant syntactic heads: W is required to incorporate first into 1, then the resulting W+1 incorporates

[34] Syntactic incorporation has been used to explain many different phenomena since Baker's initial proposal. One application that has become extremely influential in morphological theory is found in Hale & Keyser (1993), who explain denominal verb formation in English (i.e. derivational morphology) as an instance of incorporation/head-movement.

into 2, and so forth. The last affix is located higher in the syntactic tree than the previous ones:

(41)



The *Mirror Principle* predicts that syntax can explain morpheme order in a substantial range of cases. If this is true, it follows that Morphology is not a separate component of the grammar but, instead, a subset of rules contained in the syntactic component.

Baker's proposals are not uncontroversial. Other morphologists have successfully argued that all types of incorporation have to be regarded as lexical phenomena (e.g. Mithun 1984, Di Sciullo & Williams 1987, Rosen 1989, Anderson 1992: 267–270, Spencer 1995, Anderson 2000). In particular, Baker's analyses of applicatives, reflexives and causatives, have been challenged in numerous ways (cf. Di Sciullo & Williams 1987: 56–58). Furthermore, the Mirror Principle is not able to deal with non-concatenative morphological phenomena (umlaut, reduplication, infixation, etc.), which simply cannot be described linearly in order to 'mirror' the syntax.

7.4 Word-formation as syntax

One of the most complete syntactic models of morphology is presented by Rochelle Lieber (1992). Lieber examines a series of phenomena that a (Strong) Lexicalist theory is not able to explain; among them we find the following cases (cf. Lieber 1992: 11–23):

(42) a. Phrasal compounds

Eng.	a [[floor of a birdcage] taste]	
	an [[ate too much] headache]	
Afrik.	[[God is dood] theologie]	'god is dead theology'
Du.	[[lach of ik schiet] humor]	'laugh or I shoot humor'
Ger.	die [[Wer war das] Frage]	'the who was that question'

b. English possessive *'s*

Mary's eyes

[a friend of mine]'s book

Phrasal compounds are formed by joining a phrase (NP, VP, etc.) and a noun; they are productively created in English and other Germanic languages. The fact that the constituents of phrasal compounds cannot be separated or modified (cf. **a floor of a birdcage salty taste*) suggests that they are to be considered words (obeying the Lexical Integrity Hypothesis). However, they clearly undermine the validity of the Strong Lexicalist Hypothesis, for some interaction between morphology and syntax must be allowed to explain their productivity.

The possessive *'s* marking in English can attach not only to words, but also to NPs. This fact, too, poses a serious case against Strong Lexicalism: if syntax and morphology cannot interact, then it is impossible to formulate a morphological rule that adds affixes to a phrasal category.

Lieber draws the following conclusions which illustrate her research program in very clear terms:

> The Lexicalist Hypothesis is clearly too strong. Some measure of interaction between morphology and syntax must be allowed […] (p. 18).

> In order for phrasal categories to be the input to processes of derivation and compounding, at least some construction of words must be done in the syntax. The conceptually simplest possible theory would then be one in which all morphology is done as a part of a theory of syntax […] one in which nothing at all needed to be added to the theory of syntax in order to account for the construction of words (p. 21).

Furthermore, Lieber notes that formal devices such as head, subcategorization and projection that are used to explain morphological processes parallel the formal methods developed in syntax. She claims that only the syntactic computational component is responsible for the creation of well-formed sentences and words. The Lexicon is thus emptied of all its contents, except idiosyncratic morphemes, bound and free (i.e. listemes as in Di Sciullo & Williams 1987). The theoretical apparatus used in syntax is applied also to word-formation, although with some modifications.[35] The architecture of Lieber's model is as follows (details omitted):

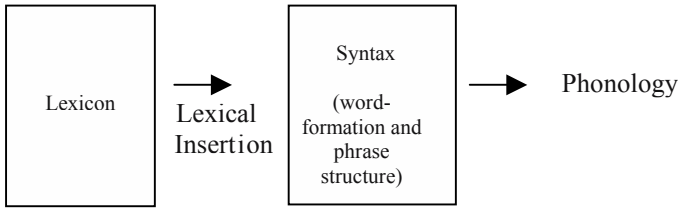


Figure 6

[35] Lieber's approach makes use of a variant of X-bar theory that has not gone without criticism. Cf. Ackema (1995: 5-8) and Borer (1998: 162-164) who point out that Lieber's modification of the X-bar schema is not motivated by facts independent of word-formation and this would undermine Lieber's attempt to reduce all morphology to syntax.

A similar approach to Lieber's is presented by Ackema (1995) who claims that the same set of principles govern syntactic and morphological phenomena, though the separation of a syntactic and a morphological component can still be maintained: "morphology is syntax below zero, not […] a byproduct of syntax above zero" (1995: 87). *Below zero* and *above zero* refer to the X-bar status of words which constitute the interface between the two components: X^0 is simultaneously the basis of syntax (whose maximal projection is X^2) and the maximal projection of morphology (whose basis is X^{-2}). For example, *happy* as a phrasal head is A^0, as head of a morphological structure it is A^{-2}.

Such syntactic accounts of morphology, however, have failed to follow rigorously the research guidelines that gave rise to them: in both the cases under consideration here, some modification of the X-bar schema is stipulated in order to account for strictly morphological phenomena. It is not clear, however, whether the theory of syntax has anything to gain from these stipulations.[36]

7.5 Distributed Morphology

Halle & Marantz (1993) introduced the theory of *Distributed Morphology* (DM), which proposes a radical departure from previous morphological models: all the operations attributed to morphology are distributed among several different components and do not belong to a single module. According to this theory, all word- and phrase-formation occur within a unified computational model as a result of the syntactic combination of heads: the internal structure of words is visible to syntactic operations. In DM, the Lexicon does not exist as such: it is split into three lists that enter the computation at different points of the derivation:

(a) A pre-syntactic list of roots and bundles of functional features (e.g. Det, [plural], [past], etc.)
(b) A post-syntactic Vocabulary supplying phonological representations to the terminal nodes in the derived structure.
(c) An Encyclopedia, which lists idiosyncratic meanings associated with Vocabulary items or idioms. Its content is 'non-linguistic knowledge' (cf. Harley & Noyer 1999).

DM is designed to reflect directly the fact that words are often non-isomorphic with respect to their phonological and semantic realizations (cf. Marantz 1997): rejecting Lexicalism and somewhat isolating morphosyntax, morphophonology and morphosemantics allows various mismatches to fall within the expectations of the theory.

It is beyond the objectives of this chapter to present a reasonable description of DM, which has rather the characteristics of a research-program than those of a definitive theory (much like the case with the Minimalist Program in syntax). We will only draw attention to the DM treatment of idioms, which seems to pose a strong case against Lexicalism.

[36] On the distinction of syntactic and morphological phenomena, cf. Zwicky (1990).

Crucially for DM, words have no special status with respect to the idiomatization process: linguistic expressions of any size may be part of the Encyclopedia, morphemes smaller than word-size and phrases can be equally idiomatized. However, the process of idiomatization in DM departs from what is traditionally assumed: the term idiom is used for any expression whose meaning is not wholly predictable from its structural description (cf. Marantz 1997); this claim entails, on one hand, that atomic elements are always idioms (i.e. arbitrary) and, on the other, that complex structures are never fully idiomatic. Only structural meaning, but not idiosyncratic meaning, is composed in the syntax; tendentially, all structural combinations of morphemes are interpreted regularly. For instance, *kick the bucket* or *depart* cannot exactly mean 'die' (which is demonstrated by aspectual differences, cf. *he was dying/*kicking the bucket/*departing for three weeks*). Within this framework, the idea of Lexicalism that the meaning of syntactic and morphological structures is composed differently (in the syntax and in the Lexicon) is seriously undermined.

8. CONCLUSION

The development of the Lexicalist approach to morphology outlined in this chapter can be summarized in the following phases:

1. Lexicalism originated by subtracting computational space in the grammar to both phonology and syntax:

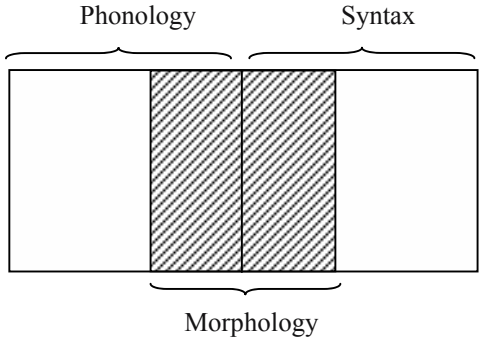


Figure 7

2. The lexicalist approach developed into a theory of morphology as a separate component with its own set of principles (crucially, different from the principles of syntax).

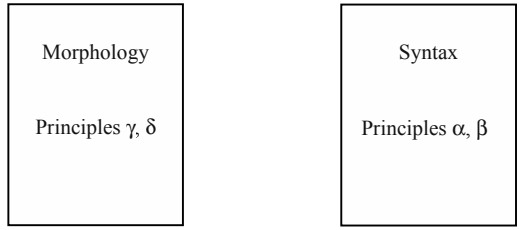


Figure 8

3. The discovery of new data, deeper analyses, research on boundary phenomena and the study of unrelated languages brought to light facts that could not be answered in a strictly separationist setting, putting under scrutiny the autonomy of morphology in the architecture of the grammar (specially with respect to syntax).
4. Under this light, various reactions emerged: among them, the intermediate reformulation of the Lexicalist Hypothesis known as Weak Lexicalism,

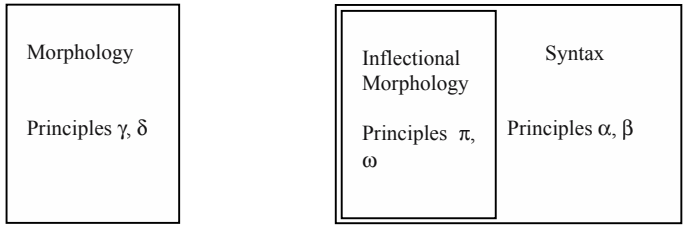


Figure 9

and the extreme opposite of Lexicalism, that is, the reabsorption of all morphological phenomena in the domain of syntactic theory.

We believe that a step back to the stage of 'all-syntax-no-morphology' is not a viable possibility, for there exist phenomena that resist being accounted for by the instruments of syntactic theory. This does not imply an uncritical approval of the main assumptions of the Lexicalist trend in the 1970s and 1980s, which could be summarized as in (43):

(43) a. the computational space in the grammar for morphological operations constitutes a separate component
b. the division between syntax and morphology is absolute
c. predominance of strictly formal over semantic analysis

These assumptions were not equally made explicit in the theory, yet they were the driving force behind most research in the Lexicalist framework. Nowadays, we know for certain that they are all open to question but, in the beginnings of

Lexicalism, they certainly played an important role in defining a homogeneous approach to a wide range of phenomena.

Consider for instance (43b). In order to maintain a clear distinction between morphology and syntax, two principles were devised: the *No Phrase Constraint* (NPC) and the *Lexical Integrity Hypothesis* (LIH). These principles had the effect of blocking every possible interaction: NPC denies morphological processes access to syntactic constructs (cf. (44)), while LIH makes sure that syntactic operations do not apply within morphological structures (cf. (45)):

(44) *[[ ]$_{XP}$ + Suf] , *[Pref + [ ]$_{XP}$]

(45) a. Maria taglia carte → Cosa taglia Maria t?[37]
'Maria cuts papers' 'lit. what cuts Maria?'

b. Maria ha un tagliacarte → *Cosa ha Maria un taglia t?
'lit. Maria has a cut-papers' 'lit. what has Maria a cut?'

c. *M. ha un taglia *grandi carte
'lit. Maria has a cut big papers'

As it clearly emerges from our preceding discussion, there is today a general agreement that morphology and syntax must be allowed to interact with, rather than ignore, each other. Current theories are much more flexible with respect to this interaction than the Lexicalist proposals of the past.

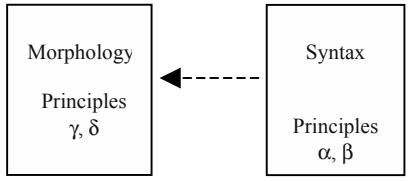


Figure 10

The degree of 'communication' between morphology and syntax that must absolutely be accounted for, however, is not total. There are some clear areas of interaction, in particular, morphological phenomena that can take syntactic objects as base[38] (thus demanding revision of the NPC), but not vice versa. This is a sign of some degree of independence of morphology and syntax as separate modules of the grammar.

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[37] Example adapted from Di Sciullo (1992).
[38] Though restrictedly, as pointed out by Lieber 1992.

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REFERENCES

Ackema, Peter. 1995. *Syntax below zero*. Utrecht: OTS/Led.

Allen, Margaret R. 1978. *Morphological investigations.* Ph.D. dissertation. University of Connecticut: Storrs.

Anderson, Stephen R. 1977. "Comments on the paper by Wasow." In: P.H. Culicover, T. Wasow and A. Akmajian (eds.), *Formal syntax*. New York: Academic Press, 361–377.

Anderson Stephen R. 1982. "Where's Morphology." *Linguistic Inquiry* 13, 571–612.

Anderson, Stephen R. 1988. "Morphological theory." In: F. J. Newmeyer (ed.), *Linguistics*. *The Cambridge Survey*. Cambridge: Cambridge University Press, 146–191.

Anderson, Stephen R. 1992. *A-Morphous Morphology*. Cambridge: Cambridge University Press.

Anderson, Stephen R. 2000. "Some Lexicalist Remarks on Incorporation Phenomena." In: B. Stiebels and D. Wunderlich (eds.), *Lexicon in Focus* (Studia Grammatica 45), 123–142.

Aronoff, Mark. 1976. Word Formation in Generative Grammar. Cambridge (Mass.): MIT Press.

Aronoff, Mark. 1989. "Two Senses of Lexical." In: *Proceedings of ESCOL '88*. Ohio State University, CLC Publications, 1-11.

Baker, Mark. 1985. "The Mirror Principle and Morphosyntactic Explanation." *Linguistic Inquiry* 16/3, 373–415.

Baker, Mark. 1988. *Incorporation: A Theory of Grammatical Function Changing*. Chicago: University of Chicago Press.

Bauer, Laurie. 1990. "Be-heading the Word." *Journal of Linguistics* 26, 1-31.

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.

Bierwisch, Manfred and Heidolph, Karl Erich (eds.) 1970. *Progress in Linguistics*. The Hague - Paris: Mouton de Gruyter.

Bloomfield, Leonard. 1933. *Language*. New York: Holt,

Booij, Geert E. 1977. *Dutch Morphology: A Study of Word Formation in Generative Grammar*. Dordrecht: Foris.

Booij, Geert E. 1988. "The Relation between inheritance and argument linking: Deverbal nouns in Dutch." In: M. Evaraert, A. Evers, R. Huybregts, and M. Trommelen (eds.), *Morphology and modularity: to Honour Henk Schultink*. Dordrecht: Foris, 57–73.

Booij, Geert E. 1996. "Inherent versus contextual inflection and the split morphology hypothesis." In: G. E. Booij and J. van Marle (eds.), *Yearbook of Morphology* 1995. Dordrecht: Kluwer, 1-16.

Booij, Geert E. 2002. *The Morphology of Dutch*. Oxford: Oxford University Press.

Booij, Geert E. and Rubach, Jerzy. 1984. "Morphological and prosodic domains in lexical phonology." In: *Phonology Yearbook* 1, 1–27.

Booij, Geert E. and Rubach, Jerzy. 1987. "Postcyclic versus postlexical rules in lexical phonology." *Linguistic Inquiry* 18, 1–44.

Bopp, Franz. 1816. *Über das Konjugationssystem der Sanskritsprache in Vergleichung mit jenem der griechischen, lateinischen persischen und germanischen Sprache. Nebst Episoden des Ramayan und Mahabharat in genauen metrischen Übersetzungen aus dem Originaltext und einigen Abschnitten aus den Vedas.* Herausgegeben und mit einer Vorerinnerung begleitet von K. J. Windischmann, Frankfurt.

Borer, Hagit. 1991. "The causative-inchoative alternation: A case study in parallel morphology." In: *The Linguistic Review* 8, 119–158.

Borer, Hagit.1998. “Morphology and Syntax.” In: A. Spencer and M. Zwicky (eds.), *The Handbook of Morphology*. Oxford: Blackwell, 151–190.
Botha, Rudolph P. 1981. “A base rule theory of Africaans synthetic compounding.” In: M. Mortgaat, H.van der Hulst and T. Hoekstra (eds.), *The scope of lexical rules*. Dordrecht: Foris, 1–77.
Carstairs McCarthy, Andrew. 1987. *Allomorphy in inflection*. London: Croom Helm.
Carstairs McCarthy, Andrew. 1992. *Current Morphology*. New York: Routledge.
Chomsky, Noam. 1957. *Syntactic Structures*. Den Haag: Mouton.
Chomsky, Noam. 1965. *Aspects of the Theory of Syntax*. Cambridge, Mass.: MIT Press.
Chomsky, Noam. 1970. “Remarks on nominalization.” In: R. Jacobs and P. Rosenbaum (eds.), *Readings in English transformational grammar*. Ginn, Waltham (MA): Ginn, 184–221.
Chomsky, Noam. 1981. *Lectures on Government and Binding*. Berlin: Mouton.
Chomsky, Noam and Halle, Morris. 1968. *The sound pattern of English*. New York: Harper and Row.
Corbin, Danielle. 1987. *Morphologie dérivationnelle et structuration du lexique*. Thèse de Doctorat d'État présentée à ParisVIII. 2 vols. Tübingen : Max Niemeyer Verlag.
De Saussure, Ferdinand. 1916. *Cours de linguistique générale*. Paris: Payot.
Di Sciullo, Anna-Maria. 1992. “Deverbal Compounds and the External Argument.” In: I. Roca (ed.), *Thematic Structure: its role in Grammar*. Dordrecht: Foris, 65–78.
Di Sciullo, Anna-Maria. 1995. “X-bar selection.” In: J. Rooryck and L. Zaring (eds.), *Phrase structure and the lexicon*. Dordrecht: Kluwer, 77–107.
Di Sciullo, Anna-Maria and Williams, Edwin. 1987. *On the definition of word*. Cambridge, Mass.: MIT Press.
Dressler, Wolfgang U.; Mayerthaler, Willi; Panagl, Oskar; and Wurzel, Wolfgang U. (eds.). 1987. *Leitmotifs in Natural Morphology*. Amsterdam: John Benjamins.
Fodor Jerry R. and Katz, Jerrold J. (eds.) 1964. *The structure of language: Reading in the philosophy of language*. Englewood Cliffs: Prentice Hall.
Fradin Bernard and Kerleroux, Françoise. “Introduction a Quoi de neuf en morphologie?” *Langages* 152, 3–11.
Gross Maurice; Halle, Morris; and Schuetzenberger, Marcel-Paul (eds.). 1973. *The formal analysis of natural languages*. Den Haag: Mouton.
Hale, Kenneth and Keyser, Samuel J. 1993. “On Argument Structure and the Lexical Expression of Syntactic Relations.” In: K. Hale and S. J. Keyser (eds.), *The View from Building 20: Essays in Linguistics in honor of Sylvain Bromberger*. Cambridge, MA: MIT Press, 53-110.
Halle, Morris. 1973. “Prolegomena to a Theory of Word Formation.” *Linguistic Inquiry* 4, 3–16.
Halle, Morris. and Marantz, Alec P. 1993. “Distributed Morphology and the Pieces of Inflection.” In: K. Hale and S. J. Keyser (eds.), *The View from Building 20: Essays in Linguistics in honor of Sylvain Bromberger*. Cambridge, MA: MIT Press.
Halle, Morris. and Mohanan, K. P. 1985. “Segmental phonology of Modern English.” In: *Linguistic Inquiry* 16, 57–116.
Harley, Heidi and Noyer, Rolf. 1999. “State-of-the Article: Distributed Morphology.” *GLOT International* 4/4, 3-9.
Hockett , Charles F. 1954. “Two models of grammatical description.” *Word* 10, 210–31.
Iacobini, Claudio and Scalise, Sergio (to appear). *Contraintes sur la catégorie de la base et de l'output dans la dérivation, Hommage à Danielle Corbin*.
Iturrioz Leza, José Luis. 2001. “Inkorporation.” In: M. Haspelmath et al. (eds.), *Language Typology and Language Universals: an International Handbook*, Vol.1. *Berlin – New York*: Walter De Gruyter.
Jackendoff, Ray S. 1972. *Semantic Interpretation in Generative Grammar*. Cambridge, Mass: MIT Press.
Jackendoff, Ray S. 1975. “Morphological and Semantic Regularieties in the Lexicon.” *Language* 51, 639–71.
Jackendoff, Ray S. 1990. *Semantic Structures*. Current Studies in Linguistics 18. Cambridge, MA: MIT Press.
Jackendoff, Ray S. 1997. *The Architecture of the language faculty*. Cambridge: MIT Press.
Jacobs, Roderick A. and Rosenbaum, Peter S. (eds.). 1970. *Readings in English Transformational Grammar*. Waltham, MA: Ginn.
Joos, Martin (ed.). 1957. *Readings in linguistics*. Chicago University of Chicago Press.
Kiefer, Ferenc.1973. „Morphology in generative grammar.“ In M. Gross, M. Halle, and M. P. Schuetzenberger (eds.), 265–280.

Kiparsky, Paul. 1982. “From Cyclic Phonology to Lexical Phonology.” In: H. van der Hulst and N. Smith (eds.), *The Structure of Phonological Representations* I, 131–175.
Kiparsky, Paul. 1983. “Word formation and the lexicon.” In: F. Ingemann (ed.), *Proceedings of the 1982 MidAmerica Linguistics Conference*. University of Kansas, 3–32.
Lapointe, Steven. 1980. *The Theory of Grammatical Agreement*. PhD. diss. Univ. of Mass.: Amherst.
Lapointe, Steven. 1981. “The representation of inflectional morphology within the lexicon.” *North East Linguistic Conference* 11, 190–204.
Lees, Robert B. 1960. *The grammar of English nominalizations*. Bloomington: Indiana University Press.
Lehrer, Adrienne. 1996. *How lexeme-like are affixes?* University of Arizona, manusript.
Lieber, Rochelle. 1980. *On the Organization of the Lexicon*. PhD Diss. MIT (distributed by IULC, 1981).
Lieber, Rochelle. 1992. *Deconstructing Morphology*. Chicago: University of Chicago Press.
Lightfoot, David W. 1991. *How to set Parameters: Arguments from Language Change*. Cambridge, MA: MIT Press.
Marantz, Alec. 1997. “No Escape from Syntax.” In A. Dimitriadis et al., (eds.), *University of Pennsylvania Working Papers in Linguistics* 4/2, 201–225.
Marchand, Hans. 1969. *The Categories and Types of Present-Day English Word-Formation: A Synchronic-Diachronic Approach*, 2nd. ed. München: Beck.
Mascaró, Joan. 1976. *Catalan Phonology and the Phonological Cycle*. PhD dissertation MIT, Cambridge, Mass. (Distr. by IULC, Bloomington Indiana,1978).
McCarthy, John J. 1982. *Formal problems in Semitic phonology and morphology*. Bloomington (IN): Indiana University Linguistics Club.
Mithun, Marianne. 1984. “The Evolution of Noun Incorporation.” *Language* 60, 847–894.
Mithun, Marianne. 1996. *The meaning of roots and affixes*. Department of Linguistics, University of California, Santa Barbara, manuscript.
Mithun, Marianne. 2000. “Incorporation.” In: G. Booij, Ch. Lehmann, and J. Mugdan (eds.), Morphologie / Morphology: an international handbook on inflection and word-formation, vol. 1. Berlin – New York, Walter De Gruyter, 916-928.
Mohanan, K.P. 1986. *The theory of lexical phonology*. Dordrecht: Reidel.
Perlmutter, David M. 1988. “The split morphology hypothesis: evidence from Yiddish.” In: M. Hammond and M. Noonan (eds.), *Theoretical Morphology: Approaches in Modern Linguistics*. Academic Press, 79-100.
Pesetsky, David. 1979. *Russian morphology and lexical theory*. Unpublished manuscript.
Peters, Stanley (ed.). 1972. *Goals of linguistic theory*. Prentice Hall: Englewood Cliffs N.J.
Rainer, Franz. 1988. “Towards a Theory of Blocking: the case of Italian and German quality nouns.” In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology* 1988. Dordrecht: Foris, 155-185.
Rainer, Franz. 1989. *I nomi di qualità nell'italiano contemporaneo*. Wiener romanistische Arbeiten 16. Wien: Braumüller.
Reibel, David A. and Sanford, Shane (eds.). 1969. *Modern Studies in English*. Prentice Hall: Englewood Cliffs N.J.
Rosen, Sara T. 1989. “Two Types of Noun Incorporation: A Lexical Analysis.” *Language* 65, 294-317.
Saciuk, Bohdan. 1969. “The Stratal Division of the Lexicon.” *Papers in Linguistics* 1, 464-532
Sadock, Jerrold M. 1991. *Autolexical syntax: A theory of parallel grammatical representations*. Chicago: University of Chicago Press.
Scalise, Sergio. 1980. “Towards an ‘Extended’ Italian Morphology.” In: *Journal of Italian Linguistics* 1/2, 197–244.
Scalise, Sergio. 1984. *Generative Morphology*. Foris: Dordrecht.
Scalise, Sergio. 1988. “Inflection and Derivation.” *Linguistics* 26, 561–581.
Scalise, Sergio; Ceresa, Marco; Drigo, Marina; Gottardo, Maria; and Zannier, Irene. 1983. “Sulla nozione di “blocking” in morfologia derivazionale.” *Lingua e Stile* 2, 243-269.
Selkirk, Elizabeth O. 1982. *The syntax of words*. Cambridge (Mass.): MIT Press.
Siegel, Dorothy. 1974. *Topics in English Morphology*. New York: Garland.
Siegel, Dorothy. 1978. “The Adjacency Condition and the Theory of Morphology.” In: M. J. Stein (ed.), *Proceedings of the 8th Annual Meeting of the North-Eastern Linguistic Society*, University of Massachusetts, Amherst, 189-197.
Spencer, Andrew. 1988. “Bracketing paradoxes and the English lexicon.” *Language* 64, 663–682.
Spencer, Andrew. 1991. *Morphological Theory*. Oxford: Blackwell.
Spencer, Andrew. 1995. “Incorporation in Chukchi.” *Language* 71, 439–489.

Spencer, Andrew. 2000. "Morphology and Syntax." In: G. Booij, Ch. Lehmann, and J. Mugdan (eds.), Morphologie / Morphology: an international handbook on inflection and word-formation, vol. 1. Berlin – New York: Walter De Gruyter, 312-334.

Sproat, Richard W. 1985. *On deriving the lexicon*. Ph.D. dissertation. Cambridge (Mass.), MIT.

Štekauer, Pavol. 2001. "Beheading the Word? Please, Stop the Execution." *Folia Linguistica* 34/3-4, 333-355.

Stump, Gregory T. 2001. *Inflectional morphology*. Cambridge: Cambridge University Press.

Van Kemenade, Ans. 1987. *Syntactic case and morphological case in the history of English*. Dordrecht: Foris.

Wasow, Thomas. 1977. "Transformations and the Lexicon." In: P. Culicover, Th. Wasow and A. Akmajian (eds), *Formal Syntax*. Academic Press 327-360.

Williams, Edwin. 1981. "On the notions 'Lexically Related' and 'Head of a Word'." *Linguistic Inquiry* 12, 245–74.

Zwicky, Arnold M. 1985. "Clitics and particles." *Language* 61, 283–305.

Zwicky, Arnold M. 1986. "The general case: Basic form vs. default form." In: *Berkeley Linguistic Society* 12, 305–14.

Zwicky, Arnold M. 1990. "Some Choices in the Theory of Morphology." In: *Formal Grammar: Theory and Implementation.* Vancouver Studies in Cognitive Science. Vancouver: University of British Columbia.

LEXEME-MORPHEME BASE MORPHOLOGY

ROBERT BEARD AND MARK VOLPE

1. INTRODUCTION

LEXEME-MORPHEME BASE MORPHOLOGY (LMBM) is a theory of morphology which claims that lexical morphemes, called *Lexemes*, and grammatical morphemes, *Morphemes*, are radically different linguistic phenomena. This hypothesis is based on the properties distinguishing Lexemes and Morphemes listed in Table 1:

Lexemes	**Morphemes**
Belong to an open class	Belong to a closed class
Have real world references	Refer only to grammatical categories
Must be phonemically expressed	May be phonemically expressed

Table 1 *Lexemes and Morphemes*

The definitions of the two categories are simple: Lexemes are noun, verb, and adjective stems. These items in all languages are manifested without exception as sound-meaning pairings that refer to something in the real world. Any other meaningful linguistic phenomenon is a Morpheme and hence must refer to a grammatical category; it cannot be used in reference to anything in the extra-linguistic world. Morphemes refer exclusively to universally available closed-class grammatical categories like Tense, Aspect, and Number and may consist of independent phonemic strings (usually unaccented), affixes, infixes, changes in accent or tone, or even predicta [1]

2. THE THREE BASIC HYPOTHESES OF LMBM

LMBM comprises three basic hypotheses:

The Separation Hypothesis claims that lexical and inflectional derivation are processes distinct from phonological realization (affixation, etc.);

The Unitary Grammatical Function Hypothesis claims that there are 44 universally available grammatical functions used for both inflectional and lexical derivations;

[1] Since morphemes are often the result of reducing a lexeme, lexemes in transition, serving both as lexemes and morphemes, are not uncommon. In US English, for example, *have* is a lexeme since it does not behave like a morphemic auxiliary. In Britain, however, this verb behaves more like an auxiliary, which LMBM treats as a *I've a new book* raised in questions (*Have you a new book*).

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 189—205.

The Base Rule Hypothesis claims that the universal categories of word and clause structure must originate in a base component in order to explain both lexical and syntactic (= inflectional) derivation most economically;

Let us examine each of these hypotheses one by one.

2.1 The Separation Hypothesis

For centuries linguists struggled with a set of morphological enigmas: (1) zero morphemes, i.e., morphemes without phonological realization, as in the noun *a cook* derived from the verb *to cook*, (2) empty morphemes, morphemes with no semantic realization, e.g., *-al* in *syntact-ic-al*, and (3) morphological asymmetry, the fact that a single morpheme could have several functions, as the *-ing* in the two instances of *annoy-ing* in *The annoy-ing* [Adj] *boy is annoy-ing* [V] *everyone*, while a single function could have several phonological realizations, as the agentive nominalization variously realized as *-er*, *-ee*, and *-ent* in *runner* 'one who runs', *standee* 'one who stands', and *correspondent* 'one who corresponds'. The question then is: are we dealing with three different phenomena or is there a common thread that unites them all?

Within the framework of LMBM, the problem pertains only to Morphemes; all Lexemes have a more or less immutable one-to-one or one-to-many relationship with their meanings which precludes zero or empty morphemes. Lexical asymmetry is only possible in cases of (1) synonymy and (2) polysemy, both of which are inconsistent with the facts of asymmetry. Synonyms are so imprecise that most semanticians argue that perfect synonyms do not exist. *Sofa* and *couch* may seem to have identical meanings, but close examination demonstrate that they vary dialectically. Morphological modifications, e.g., affixes, share identical meanings that are unrelated to isoglosses.

Polysemy is also imperfect, usually a matter of metaphoric variation as *cut* can mean 'sever' or 'insult'. The meanings of polysemantic lexemes are unpredictable across words, their meanings referring to the real world. Morphological modifications with multiple meanings select from a single pool of meaning, always grammatical functions. So *morphological* asymmetry is the proper term to use in referring to the traditional problem of asymmetry.

Roman Jakobson (1939) noted that in a set of morphological relations like the agentive nominalizations *read-er*, *stand-ee*, *correspond-ent*, and *record-ist*, where speakers know an affix is common, the occasional omission of a suffix can be taken as a morphological marker itself, and forms like *(a) cook*, *guide*, *(fast) study* therefore become permissible. The basic fact is that many words across various languages have a grammatical function without a phonological realization, strongly suggesting that (1) variation of function (derivation) and (2) realization (the addition of affixes, prosodic modifications, etc. to the phonemic description of a lexical item) are separate processes.

If derivation, the variation of grammatical functions like Tense, Person, and Number, is a process separate from phonological realization, we would also expect the obverse phenomenon: realization without any functional variation. In fact, this

phenomenon is not only common, but one of the age-old conundrums of morphology: empty morphemes. Several empty morphemes are found in English, e.g. the extension *-at* in Greek borrowings whose stem ends on *-m*: *dram-at-ic* (compare *cub-ic*, *metr-ic*, and *bas-ic*) or the extra *-al* added to adjectives with this same suffix, e.g. *dram-at-ic-al, metr-ic-al*, *syntact-ic-al*. All these words mean the same with or without the final *-al*, so *-al* has no meaning or function.

This is crucial evidence supporting the *Separation Hypothesis*, that the rules which change or adjust the functions in derived words, like *bak-er* from *bake*, operate independent of the rules that assign the affix marking it. If the derivation of *baker* from *bake* involved only one operation, adding a meaningful suffix *-er*, agentive derivations such as *cook* would have only the meaning of the underlying verb and any sentence in which it occurs would be ungrammatical since no suffix which bears a meaning appears on it.

Morphological asymmetry follows from the Separation Hypothesis, too. If derivation and phonological realization were independent processes, we would expect some functional variation to be realized by one realization rule (*annoying*, the verb, noun, and adjective) and one function, or functional change, to be realized by several phonological rules – exactly what we find: *reader*, *correspondent*, *standee*, *typist*. The phenomena of morphology contain exactly what is predicted by LMBM – no more, no less.

2.2 The Unitary Grammatical Function Hypothesis

The nature of the categories of derivational morphology (classic 'word formation') was long ignored as morphologists focused on inflection. Belić (1958) and Kuryłowicz (1964) first noticed striking parallels between the categories of inflection and derivation in Slavic languages. Bybee (1985), however, rejected the parallel between the two sets of categories, arguing instead for a continuum between the two sets, with no clear line distinguishing them. In his classic monograph on the subject of derivational categories, Szymanek (1988) argues that derivational categories are, in fact, definable but claims that there are too many of them with meanings too diverse to be associated with inflection.

Beard (1995), however, goes through the inflectional categories one by one and associates most of them with a derivational category. The categories themselves are listed in the Appendix. The *Unitary Grammatical Function Hypothesis* (UGF) claims that the functions that derivational rules operate on are the same for lexical derivation as for inflectional derivation, e.g. Subject, Object, Possession and Location. Consider the following example:

(1) The baker bakes cookies.

Baker is the subject of this sentence but it is also the subject of the verb contained within itself. That is, *baker*, as a word, refers to 'someone who bakes' in the sense of the subject of the *bake* to which the Subjective (Agentive) *-er* is attached. Notice that one might be tempted to say that *-er* is the subject of *bake* in

the verb, however this explanation of the relationship of the meaning of *baker* to *bake* is limited to agentive derivations with phonologically overt affixes. It cannot apply to all words with analogous relations, e.g., *cook*, *guide*, and *drop-out*, since no phonological piece in these nominalizations could bear the subject role. It is best to simply say that the concept of Subject is incorporated into the derivation by a derivation rule which is sometimes marked by a phonological modification of the lexical phonology, sometimes not. We do not have to offer an alternative source of the Subject function in *baker* and *cook*.

2.3 The Base Rule Hypothesis[2]

To show how syntactic inflectional and lexical derivational functions can be the same, we must go back to the first modification of Chomsky's syntactic theory, sometimes referred to as the *Extended Standard Theory* (Chomsky, 1965). This framework posited two syntactic components: (1) a base (categorical) component and (2) a transformational component. The *Base Component* provides syntactic categories such as Agent, Patient, Location, Means, Origin, and Source. LMBM assumes that all grammatical categories (including Tense, Case, Number, Comparison) and their functions (such as Tense: Present, Future, Past; Case: Subject, Object, Possession, Location, Means, Origin, etc., Comparison: Positive, Comparative, Superlative) are located in the Base Component.[3]

Let us assume that the subject of the sentence in example (1), above, begins its rise to surface structure as shown in (2).

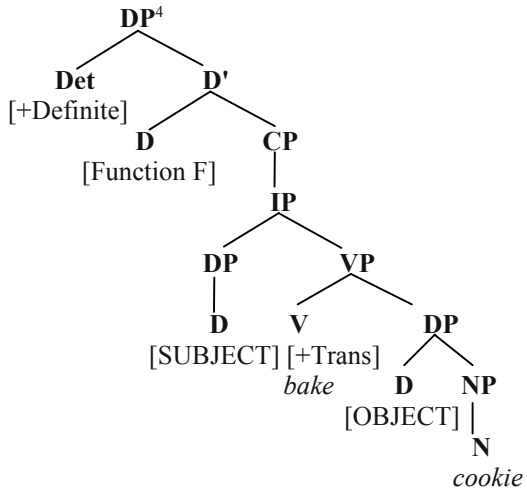
In (2) we see that a typical DP structure with the function SUBJECT could emerge at the surface as *the one who bakes cookies* if *the*, *one*, and *who*, i.e., independent Morphemes in LMBM, fill out the empty nodes. Notice how remarkably close the meanings of *one who bakes cookies* and *cookie-baker* are.

Assume that the morphological categories in the empty nodes in example (2) above are not recognized by the Lexicon. In this case they would pass unfilled to the upper levels of grammar. Since they are morphological categories (assuming Morpheme as defined above), the morphological component would recognize and realize them in a syntactic structure as phonological Morphemes, which include free-standing pronouns, affixes, and other modifications of the stem, as determined by the morphological systems of particular languages.

[2] See Botha (1980), Halle and Marantz (1993), Szymanek (1985) for other arguments for the Base Rule Hypothesis.

[3] LMBM assumes Matthews' (1972) interpretation of grammatical categories. According to Matthews, grammatical categories like Case, Number, Tense, Aspect, Number, Gender each comprise a set of functions, e.g. Nominative, Accusative, Genitive Cases, Singular and Plural Number, Past, Present, and Future Tenses, etc. The functions, in turn, comprise sets of features, as the Genitive Case – marked by the preposition *of* in English – comprise the Genitive of Possession (*the property of the city*), the Partitive Genitive (*the house of 7 gables*), Subject and Object Genitives (*the arrival of the boys*, *the destruction of the city*), among others. To simplify matters, we will combine grammatical functions and features and refer to both as "functions." This step has no effect on the theory and does not conceal any crucial issue of morphological theory.

(2)



Additionally however, LMBM claims that the Lexicon contains rules of its own. The Lexicon recognizes the morphological categories in (2) but contains no rules for inflectional morphology. It *does*, however, contain lexical rules operating over the same categories and their functions.

The Lexicon is the logical place for lexical rules. Lexical rules will vary from language to language but will be constrained to rules operating over the categorical functions of universal syntax, such as Subject, Object, Goal, and Location. (See Appendix) The only potential output of the Lexicon is words so lexical rules would have to reduce (2) to a single word without ignoring any of the functional relations in (2).

The only option for the Lexicon would be to incorporate the functions of (2) into an output comprising a single word, *cookie-baker*. It doesn't matter how the Subject and Object functions are ordered in the lexical description of the output, for the semantic component will know how to sort them out. It is only important that the semantic component know that the relationship is Subject-Object rather than, say, Subject-Locative, as in *field-worker* or Manner-Object as in *fire-brewed*. All the information the semantic component needs can be derived from structures like (2).

Notice that this approach explains the similarity in meaning of *cookie-baker* and *the one who bakes cookies* without claiming that one is derived from the other. Rather, LMBM claims that both are derived from the same underlying syntactic structure.

The Unitary Grammatical Function Hypothesis, in conclusion, claims that the functions of derivational (lexical) morphology are identical with those of inflectional morphology (morpho-syntax). The functions are inherent in the base structure of the grammar, which is not necessarily syntactic since both higher syntactic rules and

[4] Bare phrase structure (Chomsky, 1995) argues for the elimination of the intermediary node X' in favor of the labels X^{max} (XP) and X^{min} (X^0) on minimalist grounds. Where intermedediary nodes arise in this chapter, we employ the traditional label X' (Jackendoff, 1976).

lexical rules operate over it. Languages like Yupik and Algonquian with richer morphological systems will use more of these functions in their lexical morphology than languages with impoverished morphologies like English and Chinese, which will realize them mostly in syntax. However, all languages are constrained to the same universal set of grammatical category functions.

3. TYPES OF LEXICAL (L-) DERIVATION

LMBM is currently the only morphological theory comprising distinct competence and performance theories. It assumes that language contains means of creating new words based on unconscious and productive rules similar to those of syntax. These rules are restricted to lexical items in the Lexicon, e.g. if a new verb, say, *smike* entered the language, a panoply of derivations are immediately and automatically available: *smiker*, *smikers*, *smikable*, *unsmikability*, etc. These are forms made available by the unconscious creative L-derivation rules of English.

However, the Lexicon also expands its stock of Lexemes by the addition of new stems, e.g. *AIDS*, *rep*, and *jihad*. These words are typically consciously added in a process unlike other grammatical processes (syntax, morphology, phonology), which are always unconscious. *AIDS*, *laser*, and *sonar* are the result of conscious efforts to create phrases whose initials letters phonotactically conform to English. *Smog* is the result of an assumption on the part of a speaker that, if a reference contains two constituents, it should be given a name comprised of half the name of one constituent and half the name of the other. These are all conscious, logical processes and not the result of the unconscious rules of a grammar. It follows that they are rules having to do with how we perform morphology rather than morphology itself.

Another property distinguishing this type of derivational rule is that their output is not a variation of a pre-existing Lexeme, as *baker*, *bakery* and *baking* are a variation of *bake*, but a new Lexeme, an expansion of the lexical stock itself. Processes like these take place outside grammar and are thus treated in the performance theory of LMBM. In this brief section, we will not discuss the LMBM performance theory, known as *Lexical Stock Expansion*, however, details of it may be found in Beard (1981, 1995, and especially 1987).

3.1 Competence: Grammatical L-Derivation

LMBM allows four and only four types of L-derivation: (1) *Feature Value Switches*, (2) *Functional L-Derivation*, (3) *Transposition*, and (4) *Expressive L-Derivation*. All but (4) are determined by the nature of the derivational and grammatical function systems themselves; (4) remains a mystery for all morphological theories. Let's examine each in detail.

3.1.1 Feature Value Switches

Like most contemporary theories of linguistics, LMBM assumes a Lexicon comprising a catalog of entries made up of lexical features. Some features of lexical

items are morphological, some are semantic. Evidence across thousands of languages suggests that these features operate as though they are negatively or positively marked. For example, the category of Number seems to be two functions, singular and plural, either of which may be positively or negatively involved in syntactic agreement. For this reason, number is represented in the lexical entries of nouns as: [±Singular], [±Plural]. The noun *table* would be represented as [+Singular, –Plural] while the Number representation for *tables* would be [–Singular, +Plural]. A curious aspect of this form of representation of Number is that it predicts two other combinations: [+Singular, +Plural] and [–Singular, –Plural]. What could these representations possibly describe?

In fact, exactly two more Number phenomena are found in languages which other theories do not predict and only with difficulty explain: mass nouns (which have no logical or morphological plural, e.g. *contemplation, envy,* and *sleep*) and collective nouns which are both singular and plural.[5] It makes no sense to speak of number in connection with mass nouns like *envy*, so the feature value setting [–Singular, –Plural] succinctly describes them. Since the default Number is singular, the morphological component will automatically assign them singular morphology, whatever that is.

In Serbo-Croatian, on the other hand, in addition to the plural *pera* of *pero* 'feather,' we find a collective form *perje*, which agrees in the singular but refers to 'a set of feathers'. It is grammatically singular but semantically plural, hence the setting [+Singular, +Plural] will describe this class.[6]

Many words can have two or three Number forms but one such form always seems to be the basic or base form. For example, it appears that *tables* is derived from *table*, and that the latter is the base form. The base form of *pera* and *perja* is *pero*. If this assumption is correct, the Lexicon must contain a rule which converts singular nouns into plural and collective ones. The only operation required of these rules is the power to change the values of the Number features, as illustrated in (3).

(3) [+Singular, –Plural] → [–Singular, +Plural]

We call such rules *Feature Value Switches* to describe the process.

3.1.2 Functional Lexical-Derivation

The derivation illustrated by example (2) above involves another process: the addition of functions culled from the Base Component. The addition of values to a lexical base requires a discrete type of action by the Lexicon. The single syntactic base structure of example (2) may culminate in two possible realizations morphologically. The *Grammatical Functions* present as features in the base

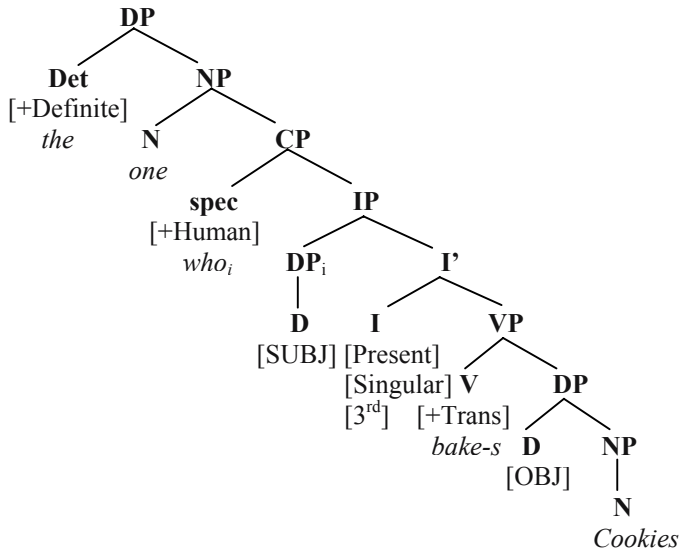
[5] Some languages also have a Dual (indicating two objects) and a few, a Trial (indicating three). LMBM takes these to be alternative interpretations of [+Singular, +Plural], since none of these languages have Collective nouns.

[6] The Serbo-Croatian collective nouns are similar to British collectives which trigger plural number to verbs when they are subjects, e.g. *the government are in session*, *the team practice every day,* etc.

structure, i.e., SUBJECT and OBJECT, assure that their meanings remain substantially unchanged.

One result is that the selected Lexemes *bake* and *cookie* become part of a syntactic structure whose empty syntactic nodes are completed by the insertion of Morphemes, resulting in a clause, i.e., *the one who bakes cookies*:

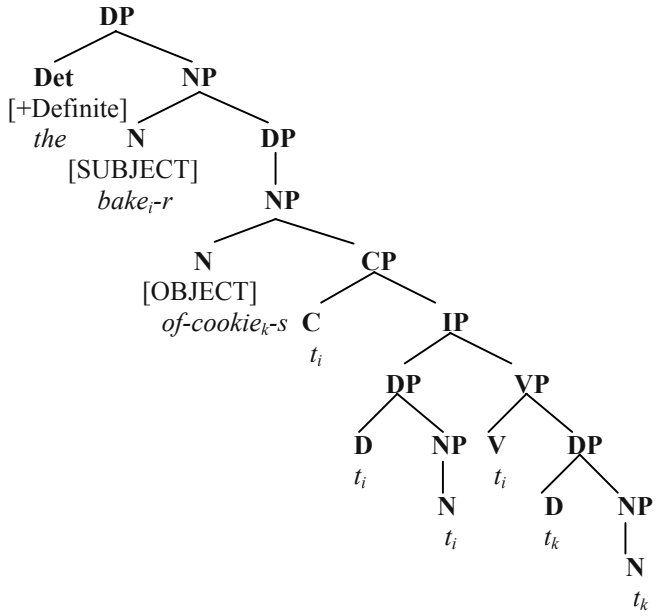
(4)



A second possible result is an example of a *Functional-Lexical Derivation*. Functional Lexical-Derivations consist of a Lexeme combined with one of the forty-four UGFs recognized by LMBM (see Appendix). The operation of Functional Lexical-Derivation takes place completely in the Lexicon where it "reduces to a lexical variety of raising with the amalgamation (incorporation) of complements and adjuncts" (Beard, 1995: 349).

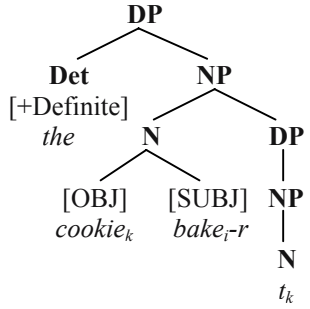
The Lexeme *bake*, incorporated into the head of an NP with the function SUBJECT, becomes the noun *bak-er* via the Transposition V → N (see below). Post-syntactic morphological spellout of the appropriate determiner, the proclitic *of*, the plural *-s* and the agentive suffix *-(e)r* yields *the baker of cookies*:

(5)



Further incorporation of the complement *cookie* in the Lexicon, prior to morphological spellout, yields the compound *cookie-baker* at spellout:

(6)



The most commonly occurring grammatical function for nominative-accusative languages is SUBJECT, a necessary argument of all VPs. For this reason, examples of SUBJECT Functional Lexical-Derivation of the type made possible by (2) abound in English, e.g., *boxer*, *judge*, and *participant*. In accord with the Separation Hypothesis their phonological realizations are varied despite realizing the identical Grammatical Function

In summary, languages choose from the set of universally available Grammatical Functions (the *Unitary Grammatical Function Hypothesis*) which then may be realized as inflectional morphology in the syntax or as derivational morphology, i.e., Functional Lexical-Derivations in the Lexicon. Volpe (2002) is a specific argument for de-nominal LOCATION and LOCATUM VERBS, e.g., *to shelve* and *to saddle*, as

Functional Lexical-Derivations of the Grammatical Functions GOAL and POSSESSION, respectively (cf. Hale and Keyser, 1993).

3.1.3 Transposition

In addition to grammatical functions, lexical items bear a feature or features which determine their lexical class (N, V, A) and subclasses (e.g., ±Transitive Verbs ±Animate Nouns, and ±Gradable Adjectives). It is assumed that:

The Lexicon may transpose any member of any major lexical class (N, V, A) by providing it only with the lexical grammatical features (G-features) of the target class and neutralizing the inherent G-features (Beard, 1995: 177).

Theoretically languages can contain the following transpositions:

Verbalizations	**Adjectivizations**	**Nominalizations**
N → V	N → A	V → N
A → V	V → A	A → N

Table 2 *Possible Transpositions*

A Transposition common to many languages is A → N, whereby gradable Adjectives become abstract Nouns. The Separation Hypothesis predicts that identical derivations may be realized by a variety of Morphemes. Consider the following Transpositions and their realizations in English and Japanese:

English	Japanese
new-ness	*atarashi-sa*
importan-ce	*jûyô-sa*
leng-th	*naga-sa*
beauty-Ø	*utsukushi-sa*

Table 3 *A → N Transpositions*

LMBM denies the existence of a separate morphological process such as *conversion* (cf. Lieber, 1992), whereby words are moved from one lexical class to another without affixation, as an explanation of examples such as those in (7):[7]

(7) a. slow to slow
b. thin to thin
c. warm to warm

Assuming the Separation Hypothesis, we simply classify such A → V Transpositions together with those that have morphological realizations, as in (8):

[7] Lieber (1992) argues for the inclusion of conversion among the types of morphological derivation.

(8) a. wide to wide-n
b. legal to legal-ize
c. pure to pur-ify

This way, only one derivation rule is required for (7) and (8) and those in (7) are simply marked for no phonological realization at the morphological level.

3.1.4 Expressive Derivations

Arguably the most enigmatic of morphological derivations are the *Expressive Derivations*. Cross-linguistically Expressive Derivations are limited to Augmentatives, Diminutives, Pejoratives, Affectionates, and Honorifics. Expressive Derivations are unique in that, in contrast with e.g., Number, Gender and Tense, they are optional operations that often apply recursively. In contrast with typical derivational operations, Expressive Derivations never involve the Transposition of lexical category. Additionally they are pragmatic in that they express neither a grammatical function nor a lexical meaning but merely a subjective evaluation of the speaker, the interpretation of which is contextually determined.

An example of an Expressive Derivation in Japanese is *Subject Honorification* (*sonkei-go*). Morphologically, Subject Honorification has both suppletive verb forms and a productive paradigm that acts as the default in the absence of a suppletive form. The default consists of the paradigm: *o*-V-stem-*ni naru*, where *-ni* is an enclitic, *o-* a prefix with a general meaning of honorification, and *naru* a light verb meaning 'become':

Base Verb	**Suppletive Verbs**	**Default**
iru, kuru, iku 'be, come, go'	*irassharu*	**o-i-ni naru*
iu 'say'	*ossharu*	**o-ii-ni naru*
suru 'do'	*nasaru*	**o-shi-ni naru*
yomu 'read'	∅	*o-yomi-ni naru*
kaku 'write'	∅	*o-kaki-ni naru*

Table 4 *Subject Honorification: Suppletive Verbs / Default*

The verb 'do' has the suppletive verb form *nasaru*. Example (9b) is the Subject Honorific of the polite form in (9a) There is no change of truth value and in the same context, the use of example (9a) would be equally acceptable. The difference is in the speaker's attitude towards the subject:

(9) a. Sensei-wa shi-mashi-ta.[8]
teacher-TOP do-POLITE-PAST

[8] The morpheme *-mashi-* is an addressee-oriented marker of politeness.

'The teacher did (something).'
b. Sensei-wa nasai-mashi-ta
teacher-TOP do-HONORIFIC-POLITE-PAST
'The teacher deemed to do (something)'

In Example (10) we see Subject Honorification applied recursively. Recursive forms consist of a suppletive V-stem, here *nasari-* 'do', submitted to the productive paradigm:

(10) Sensei-wa o-nasari-ni nari-mashi-ta
teacher-TOP do-HONORIFIC-PARADIGM-POLITE-PAST
'The teacher deemed to do (something).'

Again there is no truth value-semantic change. Since Expressive Derivations are completely optional, example (9)a would again be just as grammatically acceptable in place of (10).

Expressive Derivations show a semantic plasticity so that Subject Honorification in Japanese can be used for sarcasm as well as honorification (Martin, 1975). This is similar to diminutives in Turkish, used for affection, as well as sarcasm or contempt (Thomas, 1967) Because of this pragmatic-semantic elasticity, Wierzbicka (1992: 238-9) writes:

> [C]onventional linguistic labels such as diminutive or pejorative prove singularly unhelpful… [*however*, *the (MV)*] changeable value of a given [*Expressive Derivation (MV)*] can be accounted for, to some extent, in terms of irony, sarcasm, jocularity and other similar devices.

One of the mysterious aspects of Expressive Derivations is that, despite the wide range of human attitudes, the expressive categories are restricted to those which reflect only the five attitudes; that is, Augmentative, Diminutive, Pejorative, Affectionate, and Honorific.

4. CONCLUSION

LMBM is a morphological theory that provides a comprehensive account of both inflectional and derivational morphology. Its postulation of forty-four universally available functions that constrain the possible semantics of inflectional and derivational morphology both VP-internally and word-internally is in line with the more recent work of Cinque (1999) on the universal functions of VP's extended projections.

It distinguishes itself from other morphological theories by three central hypotheses: (1) derivation rules change grammatical functions only and are distinct from the rules that mark these changes phonologically (the Separation Hypothesis), (2) the functions that inflectional rules operates over are the same as those which lexical (derivational) rules operate over (the Unitary Grammatical Function Hypothesis), and (3) this is accomplished via a set of grammatical functions which are inserted by the Base Component of grammar (The Base Rule Hypothesis). The

base rule component of a theory of language, therefore, cannot be not a strictly syntactic component but must be one which feeds both lexical operations (derivations) and high-level syntactic operations (inflection). The types of lexical derivation rules that are available to grammars, therefore, are determined by the categories of the base and the Lexicon.

APPENDIX

1. Primary Functions

Grammatical Functions (IE languages: English)	**Lexical Derivations** (Japanese)
1. **Agent** (Ergative)	Ø
2. **Patient:** (Absolutive)	Ø
3. **Subject** (Nominative: Word Order)	*kyôiku*-SHA[9] 'educator', *hikô*-SHI 'pilot', *hanashi*-TE 'speaker'
4. **Object** (Accusative: Word Order)	*taihô*-SHA 'the arrested', *higai*-SHA 'a victim'
5. **Possessivity** (Genitive: *of*)	?
6**. Possession** (Genitive: *with* / *of)*	*kane-mochi* 'gold carrying'='a rich person', *yoku-bari* 'greed spreading'='a glutton', *dep-pa* 'protruding teeth' = 'a bucktooth person' (cf. *a red-head*, etc.in English)
7. **Measure** (Accusative: Word Order)	**?**
8. **Material** (Genitive: (*out) of*)	TETSU-*dô* 'iron road'=railroad, MOKU-*hai* 'wood cup'
9. **Partivity** (Genitive: *of*)	GYÛ-*nyû* 'cow-milk', TON-*soku* 'pig-feet'
10. **Distinction** (Ablative: *than*)	?
11. **Absolute** (Ablative: Word Order)	Sentential Adverbs
12. **Means** (Instrumental: *by/with*)	*shigeki*-ZAI 'stimulant drug', *hikô*-KI 'flight machine'='airplane' (cf. *hikô*-SHI above)
13. **Route** (Instrumental : *by/via*)	*kei*-YU 'via', YU-*rai* 'the source'
14. **Manner** (Accusative/Instrumental: *like*)	*Osaka*-FÛ 'Osaka-style', *tôsei*-RYÛ 'in the contemporary style'
15. **Ession** (Accusative/Instrumental: as)	Essive Adjectives with suffix *-ku:* antepenultimate stress) (cf. Manner Adverb with suffix *-ku*: penultimate

[9] The derivational morpheme realizing the UGF is indicated by small capitals.

	stress)
16. **Duration** (Instrumental: *for*)	*ichinen*-KAN 'a one year period', *kû*-KAN 'a space', *ki*-KAN 'a period'
17. **Iteration** (?: (*on) ...s*, e.g., *on Sundays*)	MAI-*getsu* 'every month', SAI-*hôsô* 're-broadcast'
18. **Accordance** (Ablative: *by*)	*nenrei*-BETSU 'according to age', *shokugyô*-BETSU 'by occupation', *kokuseki*-BETSU 'according to nationality'
19. **Purpose** (Dative: *to/for*)	*gaikokujin*-YÔ 'for foreigners', *kôji*-YÔ 'for use in construction', *jikken*-YÔ 'for experimental use'
20. **Exchange** (?: *for*)	*ryô*-GAE 'change of monetary denomination', *nori*-KAE 'change trains, planes, etc.', *fuki*-KAE 'foreign language dubbing'
21. **Cause** (Ablative: *from*)	*minshu*-KA 'democratization', *kikai*-KA 'mechanization'
22. **Sociation** (Adv + Instrumental: *with*)	DÔ-*ryô* 'co-workers', KYÔ-*son* 'coexist', *hanashi*-AU 'discuss'
Spatial	
23. **Location** (Locative: *at, on, in*)	*chûsha*-JÔ 'parking lot', *kenkyû-jo* 'research center', *saiban*-SHO 'court room'
24. **Goal** (Accusative/Locative: *to*)	*Osaka*-YUKI 'Osaka-bound', *Osaka*-CHAKU 'Osaka arrival'
25. **Origin** (Ablative: *from/of*)	*gaikoku*-SEI 'foreign-made', *gaikoku*-JIN 'a foreigner', *Osaka*-HATSU 'Osaka departure'
2. Secondary Functions **Spatial**	
26. **Inession** (Locative: *in*)	UCHI-*umi*[10] 'inland sea', *koku*-NAI 'domestic', *kûki*-CHÛ 'mid-air'
27. **Adession** (Locative: *on*)	UWA-*shiki* 'top- spreading'='rug', *sen-jô* 'on board a ship', *kai-jô* 'on the

[10] Beard (1995: 308) claims that cross-linguistically Primary Grammatical Functions are distinguished from Secondary Grammatical Functions by the fact that the morphological realizations of Primary Functions can never appear in Lexical Functional-Derivations. In other words, the nominative case-marker will never appear as the morphological realization of the LF-Derivation [SUBJECT]. Underlined Lexical-derivations are examples of Secondary Functions which use the same Morpheme for both Lexical Functional-Derivation and inflectional derivation. The existence of this phenomenon in Japanese, as well as the IE-languages English and Serbo-Croatian, strengthens the claim of its universality, in addition to providing concreteness to the Primary-Secondary bifurcation. (See Appendix a, Beard, 1995)

	sea', *oku-jô* 'on the roof'
28a. **Anteriority** (Adv + Genitive: *in front of*)	*moku*-ZEN 'before one's eyes', MAE-*gaki* 'preface', MAE-*ba* 'front tooth'
28b. Temporal (Adv + Ablative: *before*)	SAKI-*barai* 'pre-pay', ZEN-*daitôryô* 'previous President', *go*-ZEN ('noon before'='A.M.')
29a. **Posteriority** (Adv + Ablative: *behind*)	USHIRO-*awase* 'back to back', USHIRO-*yubi* 'behind finger'='talk behind one's back, gossip'
29b. (Temporal) *after*	ATO-*aji* 'after-taste', KO-*ki* 'after term'='2nd semester of the school year', *sen*-GO 'after World War 2'
30. **Superession** (Adv + Genitive: *over*)	UWA-*gi* 'overcoat', *zu*-JÔ 'overhead'
31. **Subession** (Adv + Accusative: *under*)	SHITA-*gi* 'underwear', *ishiki*-KA 'subconcious', *chi*-KA 'underground'
32. **Transession** (Adv + Accusative: *across*)	WATARI-*dori* 'crossing bird'='migratory birds', TO-*bei* 'across to America', TO-*sen-ba* 'crossing boat place'='pier', WATASHI-*bune* 'ferry'
33. **Intermediacy** (Adv + Accusative: *between*)	AIDA-*gara* 'a relation', e.g., between father and son, *nichi-bei*-KAN 'bi-lateral, between Japan and the U.S', *san-koku*-KAN 'among three countries'
34. **Prolation** (Adv + Accusative: *along*)	?
35. **Proximity** (Adv + Genitive: *by/near/at*)	*mi*-JIKA 'near at hand, CHIKA-*michi* 'close road'='shortcut', KIN-*jô* 'near place'='neighborhood', KIN-*en* 'close family relation'
36. **Opposition** (Adv + Accusative: *against*)	TAI-*saku* 'counter measure', TAI-*ketsu* 'showdown', TAI-*jin-jirai* 'anti-personnel mine'
37. **Perlation** (Adv + Accusative: *through*)	?
38. **Circumession** (Adv + Accusative: *around*)	MAWARI-*michi* 'around road'='a detour', SHÛ-*i* 'circumference', *shû-hen* 'the surroundings'
39. **Termination** (? + ?: *up to*)	*shû-ten* 'the last stop', 'a terminal'), SHÛ-*kyoku* 'the finale', SHÛ-*shinkei* 'end of body sentence' = 'imprisonment for life'
Non-Spatial	
40. **Concession** (?: *despite*)	?

41. **Distribution** (?: *ap□□□/□a□*)	KAKU-*gaku-bu* 'each academic department', e.g., Humanities, Law, Economics, etc., KAKU-*jin* KAKU-*sama* ('to each his own')
42. **Exception** (?: *except*)	?
43. **Privation** (Adv + Inst: *without*)	*na*-NASHI 'anonymous', MU-*imi* 'meaningless'
44. **Thematicity** (Adv + Accusative: *about*)	*kyôiku*-JÔ 'pertaining to education', *shôbai*-JÔ 'as regards business', *gaiken*-JÔ 'in terms of appearance'

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REFERENCES

Beard, Robert. 1981. *The Indo-European Lexicon: A Full Synchronic Theory.* North-Holland Linguistic Series, 44. Amsterdam: North-Holland.

Beard, Robert. 1987. "Lexical Stock Expansion." In: E. Gussmann (ed.) *Rules and the Lexicon: Studies in Word Formation*. Lublin: Catholic University Press, 24-41.

Beard, Robert. 1995. *Lexeme Morpheme Base Morphology*. Albany: Suny Press.

Belić, Aleksandar. 1958. *O jezičkoj prirodi I jezičkom razvitku*. Beograd: Nolit.

Botha, Rudolf. 1980. *Word-Based Morphology and Synthetic Compounding.* Stellenbosch Papers in Linguistics 5. Stellenbosch: University of Stellenbosch.

Bybee, Joan. 1985. *Morphology: a study of the relation between meaning and form*. Philadelphia/ Amsterdam: John Benjamins.

Chomsky, Noam. 1965. *Aspects of a Theory of Syntax*. Cambridge: MIT Press.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge: MIT Press.

Cinque, Guglielmo. 1999. *Adverbs and Functional Heads*. Oxford and New York: Oxford University Press.

Hale, Kenneth and Keyser, Samuel J. 1993. "Argument structure." In: K. Hale and S. J. Keyser (eds.) *The view from building* 20. Cambridge: MIT Press, 51-109.

Halle, Morris and Marantz, Alec. 1993. "Distributed Morphology and the pieces of inflection." In: K. Hale and S. J. Keyser (eds.) *The view from building* 20. Cambridge: MIT Press, 111-176.

Jackendoff, Ray. 1976. *X-bar Syntax*. Cambridge : MIT Press.

Jakobson, Roman. 1939. "La signe zéro." *Mélanges de linguistique offert à Charles Bally*. Genéve, 143-152. (Reprinted in E. Hamp, F. Householder and R. Austerlitz (eds.) (1966). *Readings in Linguistics II*. Chicago and London: University of Chicago Press, 109-115.)

Karcevskij, Sergei. 1929. "Du dualisme asymmetrique du signe linguistique." In : *Travaux du cercle linguistique de Prague* 1, 88-93.

Kuryłowicz, Jerzy. 1964. *The Inflectional Categories of Indo-European*. Heidelberg: Carl Winter.

Lieber, Rochelle. 1992. *Deconstructing Morphology*. Chicago and London: University of Chicago Press.

Martin, Samuel. 1975. *A Reference Grammar of Japanese*. New Haven: Yale University Press.

Matthews, Peter. 1972. *Inflectional Morphology*. Cambridge: Cambridge University Press.

Szymanek, Bogdan. 1985. *English and Polish Adjectives: A Study in Lexicalist Word-Formation*. Lublin: Catholic University Press.
Szymanek, Bogdan. 1988. *Categories and Categorization in Morphology*. Lublin: Catholic University Press.
Thomas, Lewis. 1967. *Elementary Turkish*. New York: Dover Press.
Volpe, Mark. 2002. "Locatum and location verbs in Lexeme-Morpheme Base Morphology." *Lingua* 112, 103-119.
Wierzbicka, Anna. 1992. *Semantic, Culture and Cognition*. Oxford and New York: Oxford University Press.

ONOMASIOLOGICAL APPROACH TO WORD-FORMATION

PAVOL ŠTEKAUER

1. INTRODUCTION

There are two basic approaches to the study of word-formation: onomasiological and semasiological.[1] The semasiological (from Greek *séma* 'sign') method, proceeding from form to meaning/concept, concentrates on the analysis of the already existing word-stock. The onomasiological (from Greek *ónoma* 'name') method, which takes the opposite direction and studies the naming act, has long been relegated to the periphery of research in works on English word-formation. As noted by Dalton-Puffer (1997: 9), a survey of the literature on English word-formation might lead to the conclusion "that meaning-oriented approaches to word-formation are practically untilled soil"; however, as she adds, the picture changes if we widen our linguistic horizons, and encompass Slavic and Romance works. In a similar vein, Grzega (2002: 2) when analysing the few recent theoretical contributions in this field states that it is astonishing that there have been very few attempts "made to view word-formation as a forming process, as an active process, in other words: as an onomasiologically and cognitively relevant phenomenon." No wonder: within the mainstream generative tradition, the naming-act perspective has been more or less ignored.

But, as noted by L. Lipka (2002: ix), "voices have been raised over the last few years pleading for a reconsideration, or re-discovery, of onomasiology." This effort, aimed at providing an alternative to the dominating approach to word-formation, has also benefited from the creditable activity of J. Grzega and A. Bammesberger, the editors of an on-line journal *Onomasiology Online*.

Interestingly, the first comprehensive onomasiological theory of word-formation, developed by Czech linguist M. Dokulil, appeared as early as 1962; and even if J. Horecký (1999: 6) aptly states that this theory did not result in a change of paradigm it found a number of proponents in other countries of Central and Eastern Europe, for instance, in Slovakia (Horecký, Buzássyová, Furdík, Štekauer), Poland (Puzynina 1969, Grzegorczykowa 1979, Szymanek 1988, Waszakowa 1994), former USSR (Neščimenko 1963, 1968), and also Germany (Fleischer 1969, von Polenz 1973, Huke 1977).

[1] M. Dokulil (1962, 1968b) distinguishes between 'word-formation' and 'word-formedness', M. D. Stepanova (1973) who distinguishes between 'process' and 'result', M. Aronoff (1976) between 'word-formation' and 'word-analysis', K. Hansen (1977) between 'Wortbildung' and 'Wortbildungsanalyse'.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 207—232.

2. METHODS OF ONOMASIOLOGICAL RESEARCH

Onomasiology is not restricted to word-formation. Actually, its scope has been much broader from its inception,[2] covering the field of lexicology. As defined by B. Quadri, onomasiology studies the ways of languages and their dialects in expressing a particular concept. The point of departure for an onomasiological approach is always a concept (1952: 1). Its tasks and objectives were identified by E. Tappolet (1895: 4) as answering a series of questions: How does a language at a particular time and at a particular place express a concept? Does it take over an expression from an earlier period or is the original expression replaced by a new one? In the former case, are the form and meaning identical with the original ones? In the latter case, in what way and by which means is the new expression formed? And the final question is the 'Why'? question: What was the reason for the change in expressing one and the same concept? And, is it actually still the same concept?

There are two basic divisions in onomasiological research. The first dichotomy concerns the *synchrony vs. diachrony* opposition, the second bears on the *empirical vs. theoretical* research. The individual approaches may also be combined. Empirical onomasiology studies the different ways of expressing (empirical aspect) a given concept in various languages (synchronic aspect) and/or the etymology of these expressions and their changes over time (diachronic aspect). The diachronic empirical method has been the dominant research method, even if – it should be noted – the major part of works written within this framework fall within the scope of lexical semantics rather than word-formation. Nevertheless, Blank's definition of the scope of diachronic cognitive onomasiology accommodates both semantic and word-formation perspectives:

> It investigates the main strategies that exist in a language sample for conceptualizing and verbalizing a given concept and tries to explain them against a cognitive background in terms of salient perceptions, prominency, convincing similarities, etc. It asks for the source concepts that seem to be universally recurrent, lays bare associative relations between source and target concepts and describes the lexical processes used by the speakers... This theoretical foundation also allows the description and explanation of changes towards a cognitively more prominent strategy and of reorganizations of conceptual structures (2001: 21-22).

There are a great number of empirical onomasiological studies. For illustration, Alinei (1995), analyzes different names for the concept of GLASSES and demonstrates different motivations underlying the naming of this concept in various languages, ranging from the semantic shift based on the associative principle (Engl. *glasses*), through coining a new word based on the contiguity[3] (It. *occhiali*) or similarity relation (Fr. *lunettes*) to borrowing from French (*briller* → Ger. *Brille*).

[2] As noted by B. Quadri (1952: vii), while the term 'onomasiology' was introduced by Adolf Zauner (1902), the first 'onomasiological' work *Romanische Wortschöpfung* (1875) by Friedrich Diez was published as early as 1875.

[3] As specified below, contiguity is a conceptual, extralinguistic relationship primarily characteristic of metonymy. In Koch's approach (1999b: 146ff), contiguity is the relation that exists between prototypical, salient elements of a frame or between the frame as a whole and its elements. One more example from Koch (1999b) will illustrate the point. The metonymical shift of Engl. *bar* 'counter' to

Driven and Verspoor (1998) review the names for the concept of CELLULAR PHONE, demonstrating that AmE *cellular (phone)* is a new coinage based on the partiality relation in the same way as BrE *mobile phone*, while *carphone* is based on the contiguity relation. On the other hand, German *Handy* is a partiality-based loanword.

In his study of Camito-Semitic and African languages, Tagliavini (1949) analyzes various names for the concept of (eye) PUPIL, indicating nine basic ways of motivation underlying the naming of this concept, including BALL/EGG/APPLE, BLACK, CENTER, STAR/LIGHT, NUT/PIP/PEARL, MIRROR, SEE/LOOK, LITTLE MAN/GIRL/BOY/PUPPET, and reduplication.[4]

Koch demonstrates – by using a sample of expressions from 27 languages for the concepts of TREE and FRUIT – that these designations display certain regular "patterns subject to cognitive constants that characterize two different types of TREE-FRUIT frames" (1999a: 345).

Brammesberger and Grzega (2001) discuss the manifold ways of naming YOUNG FEMALE PERSON in the history of English, and Grzega (2001) examines the names for WEDNESDAY in Germanic dialects. Some papers in Blank and Koch (2003) demonstrate the applicability of an onomasiological approach to syntax.

3. THEORETICAL APPROACHES

3.1 Miloš Dokulil

While little known in the English-speaking countries, Dokulil's position in the countries of Central and Eastern Europe may be compared to that of Marchand in Western Europe. No wonder, his onomasiological theory of word-formation, published as early as 1962 (and further developed in Dokulil 1964, 1968 a-d, 1997), is a pioneering, highly seminal work, presenting a unique, comprehensive theory of word-formation in which he – long before the generativists – discussed a multiplicity of essential word-formation issues, such as the place of word-formation in the system of linguistics, the differences between morphological and word-formation analyses, word-formation motivation, productivity, internal form of a word, lexicalization, word-formation paradigms, and the notion of word-formation type. In terms of its significance for the development of word-formation theory, this ingenious book is on a par with Marchand's *Categories* (1960, 1969). Although his

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bar 'public house' is enabled by our knowledge of contiguity between public houses and counters. The concept of PUBLIC HOUSE constitutes a frame one of whose salient elements is the COUNTER. Since a prototypical public house has a counter (i.e., bar), we call it *bar*. Contiguity also characterizes some cases of word-formation, e.g. *lemon → lemon tree*, where the concept expressed by N_1 (lemon fruit) and the concept expressed by N1 + N2 (lemon tree) are contiguous (Koch 1999b: 158-159).

[4] Cf., for example, A. Blank (2001) for a detailed analysis of Tagliavini's study as well as those by Koch (1999a) – the concepts of TREE and FRUIT, and Krefeld (1999) – the concept of HUMAN BODY.

theory is illustrated with Czech examples its theoretical principles are of general validity.

Word-formation is conceived by Dokulil as an 'autonomous domain within the system of linguistics' (1997: 185). The cornerstone of his onomasiological theory of word-formation is the idea of *onomasiological category*. Any act of naming an object is based on its reflection and processing in human consciousness. Onomasiological categories are thus defined by Dokulil as different types of structuring the concept in view of its expression in the given language, i.e., the essential conceptual structures establishing the basis for the act of naming. In principle, they consist of two elements. The phenomenon to be named is first classed with a certain conceptual group and functions as *onomasiological base*. Then, within the limits of this group, it is determined by an *onomasiological mark*. For example, the onomasiological base of *blackberry* is *berry* (because the concept of BERRY is common to the whole conceptual group of various *berries*). Its onomasiological mark is *black.* While one can trace an analogy with Marchand's word-formation syntagma, analysed as *determinant-determinatum*, Dokulil's terms put emphasis on the level of conceptual processing.

While base is always simple (any differences concern the level of abstraction), mark may be either simple or compound. A simple mark within the limits of the conceptual category of SUBSTANCE is Quality (*black*berry)[5] or Action conceived without regard to its Object (*work*er). Examples of a compound mark include *woodcutter*, where the Object of Action is specified, and *policeman* illustrating a non-Actional relation. The previous examples also indicate that the two elements of mark, i.e., the *determining* and the *determined* elements, may but need not be explicitly expressed. In Dokulil's view, the basic types of onomasiological structure can be determined according to the categorial nature (SUBTANCES, ACTION, QUALITY, CIRCUMSTANCE) of its polar members, i.e., according to the base and the determining element of mark, called *motive*. For example, a concept of the category of SUBSTANCE is determined by its relation to a concept of the category of (a) SUBSTANCE (*policeman*), (b) QUALITY (*blackberry*), (c) ACTION (*teacher*), (d) CONCOMITANT CIRCUMSTANCE (*evening paper*). Other onomasiological structure types are determined analogically. These types can stand for the multiplicity of *semantic relations*, including the Bearer of Quality (*blackboard*), Agent (*teacher*), Instrument of Action (*excavator*), Patient (*prisoner*), Result of Action (*print-out*), etc.[6] A certain structure may be realised by several naming units (NUs), emphasizing its different aspects (compare *hot-house*, *glass-house*, *green-house*).

Dokulil distinguishes three *Onomasiological categories*. The basic type discussed above is called *Mutational* (or, Relational). In this case, an 'object' of one conceptual category is characterized (and named) according to its direct or mediated relation to an 'object' of the same or some other conceptual category.

In the *Transpositional type*, the phenomenon, usually conceived as a mark, dependent on a SUBSTANCE, is abstracted from all the phenomena upon which it

[5] My examples, if no suitable English equivalents to the Czech examples are available.
[6] Dokulil (1962) gives a highly fine-grained classification of these relations.

objectively depends, and is viewed as an independently existing phenomenon, for example, the objectification of Quality (*rapid – rapidity*) and the objectification of Action ($fall_V – fall_N$).

The *Modificational type* is based on adding a modifying feature, for example, diminutives (*dog – doggy*), augmentatives (*a big dog*), change of gender (*waiter – waitress*), names of the young (*fox-cub*), collectiveness (*mankind*), measure/degree (*the tallest*).

3.2 Ján Horecký

A major step in the development of onomasiological theory of word-formation is Horecký's *multi-level model* of word-formation (1983, 1989), including an object of extra-linguistic reality, the pre-semantic (conceptual), semantic, and formal levels. The *pre-semantic level* is constituted by *logical predicates*. Some of the logical predicates are expressed as *semantic markers*. Horecký's semantic level is carefully elaborate. He provides an inventory of semantic distinctive features, analyzes their relations, and proposes their hierarchical organization.

At the top of the semantic marker hierarchy, there are *categorial markers* (e.g., Substance, Quality, Agent names, names of Relations), which, due to their grammatical nature, are part of the formal onomasiological level and represent the onomasiologial base. At a lower level, the *identification markers* (or, archisemes) represent genus proximum. They capture a property common to all of the meanings of a particular naming unit. The next lower level is constituted by *specification markers*.

The formal facet of linguistic sign is composed of the onomasiological, onomatological, and phonological structures. The onomasiological structure consists of a base and a mark. The base also expresses relevant grammatical categories, including a word-class. The onomatological level functions as both inventory of morphemes, and at the same time, it linguistically expresses the base and mark. Finally, the phonological level determines the specific form of morphemes and other phonological features.

An important part of Horecký's onomasiological theory is his classification of meanings. In (1994), he distinguishes four types of meaning of a naming unit: (i) categorial meaning; (ii) invariant meaning, (iii) specific meaning, and (iv) lexical meaning. The first three meanings as a whole are labeled as the 'structural' meaning (given by the interrelation between onomasiological base and mark), and underlie the lexical meaning. For illustration, the respective meanings of Sl. *tretina* ($third_N$) are as follows: (i) desubstantival noun; (ii) is defined as 'abstract quality defined by the string of semantic features –HUM –CONCR –QUAL'; (iii) 'a third part of something', (iv) 'one part of hockey match' (as one of its lexical meanings).

3.3 Pavol Štekauer

Štekauer's cognitive onomasiological theory (Štekauer 1996, 1998, 2001b) was inspired by Dokulil's idea of onomasiological structure and, primarily, by Horecký's

multilevel model of linguistic sign (1983, and Horecký et al., 1989). At the same time, it responds to the one-sided formalism of the mainstream generative word-formation.[7] The general linguistic background is that of the functional-structural approach of the Prague School of Linguistics. Therefore, the *form-meaning unity*, i.e., the bilateral nature of morphemes is regarded as the fundamental principle.

3.3.1 Word-formation as an independent component

The basic scope and principles of word-formation can be defined as follows:

(1) Word-formation deals with productive and rule-governed patterns (word-formation types and rules, and morphological types) used to generate motivated naming units[8] in response to the specific naming needs of a particular speech community by making use of word-formation bases of bilateral naming units and affixes stored in the Lexical Component.

The individual aspects of this definition are discussed below. The cognitive onomasiological theory identifies word-formation as an *independent component* of linguistics, as illustrated in Figure 1. The scheme represents a crucial *triad of relations* between extra-linguistic reality (object to be named), a speech community (represented by a 'coiner'), and the word-formation component, thus emphasising the fact, ignored by the vast majority of the mainstream word-formation theories, that each act of naming responds to a very real and specific *naming demand* on the part of a member (members) of *speech community*. The notion of speech community should not be taken absolutely, i.e., there is hardly any word-formation process which responds to a naming demand of all the speakers of a particular language. Rather, such a demand is closely connected with a limited number of 'first-contact' users; a coinage may or may not subsequently find a wider use.

The above-mentioned triad reflects the following principles:

(a) It lays emphasis on the *active role* of language users in the process of giving names to objects instead of presenting word-formation as an impersonal system of rules detached from the objects named and from language users.
(b) The naming act is not a purely linguistic act. Naming units do not come into existence in isolation from factors, such as human knowledge, human cognitive abilities, experiences, discoveries of new things, processes, and qualities, human imagination, etc. This position is in accordance with Koch's idea that the onomasiological viewpoint is closer to that of the speaker as a linguistic innovator than the semasiological viewpoint (2001: 17). An object to be named

[7] An important and most valuable exception to this formalism is Beard's *Lexeme-Morpheme Base Morphology* (1995) (cf. chapter... in this volume) which is, in effect, a variant of an onomasiological approach to word-formation.

[8] This term was first introduced by Mathesius (1975). In my approach, it substitutes for the terms like *word, lexeme*, *lexical unit*, etc., because of their inconsistent use and various connotations in linguistic literature. "Naming unit" refers here to a complex unit generated by the Word-Formation Component.

is not named in isolation but is envisaged in relation to the existing objects. By implication, any naming act is necessarily preceded (or dominated) by a network of 'objectively' existing relationships. By implication, the naming act is a *cognitive phenomenon* relying on the intellectual capacities of a coiner.

(c) It stresses a close interconnection between *linguistic* and *extra-linguistic* phenomena.

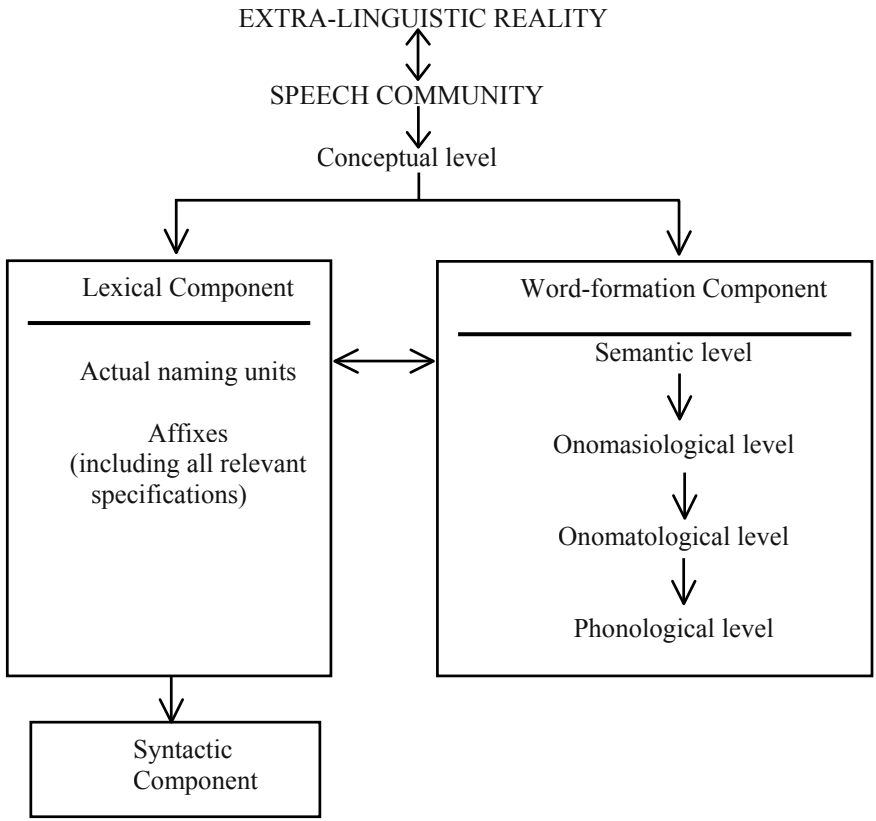

Figure 1 *Word-Formation Component and its relation to other components*

The model represented in Figure 1 also indicates a direct connection between the Word-Formation and the Lexical components, and a mediated connection between the Word-Formation and the Syntactic components. This makes this model different from those theories that consider Word-Formation as a part of the Lexicon or a part of syntax.[9] The relation between the Word-Formation and the Lexical components is

[9] Cf. Dokulil (1964) for an insightful discussion supporting the separation of word-formation from syntax.

based on their close 'co-operation'. On the one hand, the Lexicon stores all naming units (monemes and complex words, borrowed words, clippings and acronyms) as well as affixes, and feeds the Word-Formation component with word-formation bases and affixes in accordance with its needs. On the other hand, all new naming units formed in the Word-Formation component are stored in the Lexicon.

It should be noted that word-formation focuses on the process of forming *isolated* naming units rather than on using them (this being the scope of syntax). A naming unit which falls within the scope of word-formation *must* be a structurally analysable *linguistic sign***,** and the sign nature must also be an inherent feature of its constituents. This condition is identical to that proposed by Marchand (1960: 2).

It is assumed that each *act of naming* is preceded by *scanning* the lexical component by a coiner. The scanning operation determines the next procedure. Either a completely new naming unit is coined by taking the path of the Word-Formation component; or, if a naming unit is found in the lexical component that can serve as a basis for *semantic formation*, it is the path of the lexical component which is preferred (hence, two downward arrows from the 'Conceptual level' in Figure 1). By implication, no new naming units, formed according to productive and regular rules of word-formation are generated in the Lexicon (however, any and all later semantic shifts and/or formal modifications (clipping, acronymization) of naming units, productively formed in the Word-Formation component, take place in the Lexicon).

3.3.2 The act of naming

The following theoretical account of the act of naming interprets the model graphically represented in Figure 1. For ease of understanding, the theory is illustrated with an example of giving a name to the class of 'persons whose job is to drive a vehicle designed for the transportation of goods'

Extra-linguistic reality vs. speech community

As mentioned above, a speech-community, through its diverse cognitive activities, selects what there is in extra-linguistic reality that deserves a name. This interrelation between extra-linguistic reality and a speech community predetermines all the subsequent steps within the *act of naming*. One of thousands of 'objects' of extra-linguistic reality that were considered as worth naming sometimes in the past was 'a person whose job is to drive a vehicle designed for the transportation of goods'.

Conceptual level

The primary task to be mastered at the conceptual level is to analyse the object (in the broadest sense of the word) to be named; or better, a class of objects – a name is not given to a single object but to a whole class of similar objects. This is the task of the *conceptual level* which, based on the processes of generalisation and abstraction, captures the prototypical features of the class of objects by means of *logical predicates* (simple declarative sentences, also called *noemes*). A set of

logical predicates constitutes a *logical spectrum*.[10] The logical spectrum is an 'onomasiological answer' to the generation of complex words from a single 'ill-defined' kernel sentence by transformationalists, and to the account of the internal structure of complex words by a single paraphrase by lexicalists. The logical spectrum provides a more comprehensive view of the class of objects to be named, and is therefore less voluntaristic.

In our example, the logical spectrum can be represented as follows:

(2) The motivating Object 1 is SUBSTANCE$_1$.
A SUBSTANCE$_1$ is Human.
The Human performs an ACTION .
The ACTION is the Human's Profession (=Agent).
The Human is an Agent.
The ACTION concerns SUBSTANCE$_2$ (=Object of Action).
The ACTION is based on an Operation of SUBSTANCE$_2$.
SUBSTANCE$_2$ is a class of Vehicles.
SUBSTANCE$_2$ is an Object of the ACTION performed by SUBSTANCE$_1$.
The Vehicles are designed for the Transportation of goods.
Etc.

Semantic level

The logical spectrum is not a part of a linguistic sign, and is language-independent. Therefore, the individual logical predicates of this *supralinguistic level* must be represented by *semes*[11] constituting the *semantic structure* (meaning) of the linguistic sign proper.

Thus, the semantic level as the meaning facet of linguistic sign maps the defining spectrum, represented in (2), onto the semantic level of a new linguistic sign:

(3) [+Material] [+Animate] [+Human] [+Adult] [+Profession] [+Agent];
[+Material] [–Animate] [+Vehicle] [+Transportation] [+Object of Operation] etc.

Onomasiological level

At the *onomasiological level*, one of the semes is selected to function as an *onomasiological base* denoting a class, to which the object belongs, and one of them is selected to function as a *mark* that specifies the base. The mark can be, in principle, divided into the *determining constituent* and the *determined constituent*. The latter always stands for the category of Action in one of its three modifications

[10] Cf. Horecký (1983).

[11] The notion of 'seme' is conceived here in accordance with the notion of 'semantic marker' used in the theory of componential analysis).

(Action proper, Process and State). The semantic relations between the base and the two mark constituents constitute an *onomasiological structure*. Since this structure consists of semes which reflect, at the semantic level of a linguistic sign, the respective logical predicates of the conceptual level, it may be concluded that *the onomasiological structure is a conceptual-semantic basis for the act of naming*.

To return to our example, it follows from the conceptual level analysis that a good candidate for the act of naming seems to be an onomasiological structure in which the base stands for an Agent[12] (a class of Humans performing the Action as their profession) of Action (determined constituent of mark) aimed at its Object, i.e., the class of Vehicles (determining constituent of mark):

(4) (Logical) Object ← Action – Agent

Onomatological level

At this level, the onomasiological structure is linguistically expressed in accordance with the *Morpheme-to-Seme-Assignment Principle* (MSAP).[13] In particular, the individual constituents of onomasiological structure (its semes) are assigned morphemes, in particular, word-formation bases of naming units and affixes stored in the Lexicon. The operation is based on *matching* the meaning facet of a potential morpheme with the respective seme of the onomasiological structure. The MSAP operates both horizontally and vertically.

Vertically, it scans the Lexicon with regard to the lexical and affixal morphemes that can be retrieved to represent the semes of the onomasiological structure.

Horizontally, it reflects the semantic compatibility and formal combinability/ restrictions of the individual lexical and affixal morphemes.[14]

In our example, there are several options at this level. Thus, Agent can be expressed, *inter alia*, by *-er, -ist, -ant, -ian, -man*, because the meaning facet of each of these morphemes can be represented as 'Agent'. The Action of operating the SUBSTANCE_2 can be expressed, for example, by word-formation bases of naming units *drive, steer, operate*, because the meaning facet of each of them matches with the seme 'Operation'. Finally, the (logical) Object can be represented by *truck*, *lorry*, and possibly some other word-formation bases, the meaning of which is Vehicle. The selected options in our particular case are as follows:

(5)

Object	←	Action	–	Agent
truck		*drive*		*-er*

[12] The majority of logical and semantic categories have been taken over from Hansen et al. (1982).

[13] In Štekauer (1998) and all the subsequent publications I use the term Form-to-Meaning-Assignment Principle. However, I find the present labeling more accurate as it is morphemes (rather than pure formal elements) that are assigned to semes.

[14] This concept of onomasiological structure differs from that of Horecký in three points. First, Horecký's onomasiological level is a formal level; second, all morphemes in the present model are stored in the lexicon; and, third, the function of MSAP is elaborated.

There are at least two other basic representation types of the selected onomasiological structure. First, SUBSTANCE$_2$ may be backgrounded, in which case the resulting naming unit may be, for example, *driver*; and second, Action may be backgrounded, which may yield something like *truckist* or *truckman*.

The fact that all naming units are based on assigning linguistic units to semes, constituting an onomasiological structure, makes it possible to dispense with the traditional notions of word-formation processes, including compounding, prefixation, suffixation, back-formation, and blending. The traditional classification of word-formation processes is based on purely formal criteria, i.e., on the external form of naming units. Consequently, it does not reflect the 'interactions' above and within the Word-Formation component. Therefore, it appears to be more appropriate to classify the processes leading to new naming units by reflecting the mutual interaction between the concept-grounded onomasiological level and the morpheme-grounded onomatological level, i.e. by interrelating the supra- and the intralinguistic levels. This makes it possible to view all new naming units as resulting from the identically grounded acts of coining. Put differently, the generation of all naming units is put on a uniform basis. This approach makes it possible to show what is, for example, common to 'compounding' and 'suffixation'.

For illustration, they may express the same onomasiological structure of 'Action – Agent' (the common feature) of, for example, 'a person who frequently smiles', with the difference being in assigning different morpheme types: WF base + *-er* (*smiler*) vs. WF base + WF base (*smile person*).

Similarly, blending is, in principle, viewed as the same process of word-formation as compounding. It is accounted for as a regular act of naming taking place in the Word-Formation component. During this process, a particular onomasiological structure is assigned two word-formation bases (e.g., *slang* + *language*). Such a naming unit is then formally reduced in an unpredictable (and hence, irregular) way which cannot be captured by any productive Word-Formation Type/Rule. Such a change necessarily takes place in the lexical component.[15]

Phonological level

The final step in the act of naming consists in phonological shaping the new naming unit in accordance with relevant phonological rules. In our example, it is the assignment of the corresponding stress pattern.

(10) '*truck,driver*

3.3.3 Onomasiological Types

Onomasiological Types result from the interaction between the onomasiological and the onomatological levels. There are five possible relations between the two levels that identify five basic Onomasiological Types.

[15] Cf. Štekauer (1998) on the onomasiological account of back-formation and exocentric compounds.

In *Onomasiological Type 1*, illustrated in the above-given example, all three onomasiological structure constituents, i.e., the base, the determining and the determined constituents of the mark, are linguistically expressed at the onomatological level. Two more examples will illustrate the point (it should be noted that the following onomasiological structures are based on logical spectra that are not specified here for space reasons):

(11) *house-keeping* (the Process of performing some Action aimed at an Object):

Object – Action – Process
house keep -ing

(12) *signal-generator* (Instrument for an Action producing some Result)

Result – Action – Instrument
signal generate -or

The onomasiological structure of *Onomasiological Type 2* is binary: the determining constituent of the mark is absent. However, this Type is extendable to Onomasiological Type 1.

(13) Action – Agent
write -er

(14) Action – Instrument
spinning wheel

A crucial feature of the first two types is that the Actional seme (the determined constituent of the mark) is morphematically expressed, which facilitates the interpretation of naming units.

The onomasiological structure of *Onomasiological Type 3* is ternary as in Onomasiological Type 1, but the determined constituent of the mark is left unexpressed at the onomatological level:

(15) Result – Action – Agent
novel 0 -ist

(16) Patient – State – Evaluation (Diminutive)
dog 0 -ie

(17) Temporal Stative – State – Patient
summer 0 house

In *Onomasiological Type 4*, the mark is simple and unstructured, i.e., it cannot be divided into the determining and the determined constituents.

(18) Negation – Quality
un *happy*

(19) Quality – State
blue-eye *-ed*

(20) Repetition Action
re- *gain*

The MSAP principle eliminates the problem of whether or not new naming units can be based on non-existing words (cases like *handedness, unsightly, sabre-toothed*, coined – as claimed by some generativists – on the basis of non-occurring words **handed*, **sightly*, **toothed)*.[16] For example, *sabre-toothed* is based on assigning the morphemes *sabre, tooth*, and *-ed* to the onomasiological structure resulting from the conceptual-level analysis, indicating a Quality of something that has [=State] teeth similar [=Pattern] to those of a sabre:

(21) Pattern – Quality [=State]

sabre *tooth* *-ed*

In this case, *sabre* functions as the specifying and *tooth* as a specified element of the unstructured mark.[17]

3.3.4 Conceptual (onomasiological) recategorization

Štekauer (1992) argues against the notion of zero-morpheme in English inflectional and derivational morphology, and by implication, against the concept of conversion as zero-suffixation. The onomasiological approach to conversion (Štekauer 1996, 1997) is based on the fact that each naming unit results from an intellectual analysis of an extra-linguistic object to be named. Within this analysis, the object is classed with one of four general conceptual categories (cf. 3.1 above): SUBSTANCE, ACTION (including ACTION PROPER, PROCESS, and STATE), QUALITY, and CIRCUMSTANCE. The individual aspects of extra-linguistic reality do not exist in isolation; on the contrary, they can be conceived of and subsequently linguistically expressed in various relationships, from different points of view. These different 'angles of reflection' of extra-linguistic reality can be cognitively brought into a close relation by re-evaluating the already existing logical spectrum, which has its effects upon all the lower levels. Then, the most striking feature of conversion is that

[16] For the discussion on this issue see, for example, Roeper & Siegel (1978) and Botha (1984)).

[17] It should be noted that the determining constituent of mark can only be represented by an Action/State/Process seme.

it linguistically expresses the *conceptual (onomasiological) recategorization* of extra-linguistic reality.

Thus, for example, *databank* represents a SUBSTANCE. When conceptually recategorized, it becomes an ACTION; *experiment* expresses a PROCESS – after recategorization it refers to an ACTION PROPER; *limit* is a CIRCUMSTANCE – after recategorization it is an ACTION; *feature* is a QUALITY – its recategorization yields a STATE; *insert* is an ACTION – when recategorized it becomes a SUBSTANCE; *stand* is a STATE – when recategorized it becomes a SUBSTANCE.

What is the mechanism of these changes? As already mentioned, the individual logical predicates constitute a hierarchy. The recategorization process consists in replacing the original dominating logical predicate with a new one which determines the conceptual category of a new extra-linguistic object to be named. The conceptual re-evaluation of extra-linguistic reality precedes the linguistic processes proper. It is the conceptual recategorization which provides us with the evidence that conversion cannot be identified with zero suffixation: conceptual recategorization is vital to conversion while only possible for suffixation.

Let us illustrate the point. The naming unit *milk* belongs to the conceptual category of SUBSTANCE. Its typical hierarchy of logical predicates is given in Figure 2. When the hierarchy within the logical spectrum in one of the converted meanings of *milk* ('to obtain milk from a female mammal') is changed, the recategorization from SUBSTANCE to ACTION takes place. The central position within the hierarchy of logical predicates is assumed by a predicate focusing on the Actional aspect of the particular extra-linguistic object.

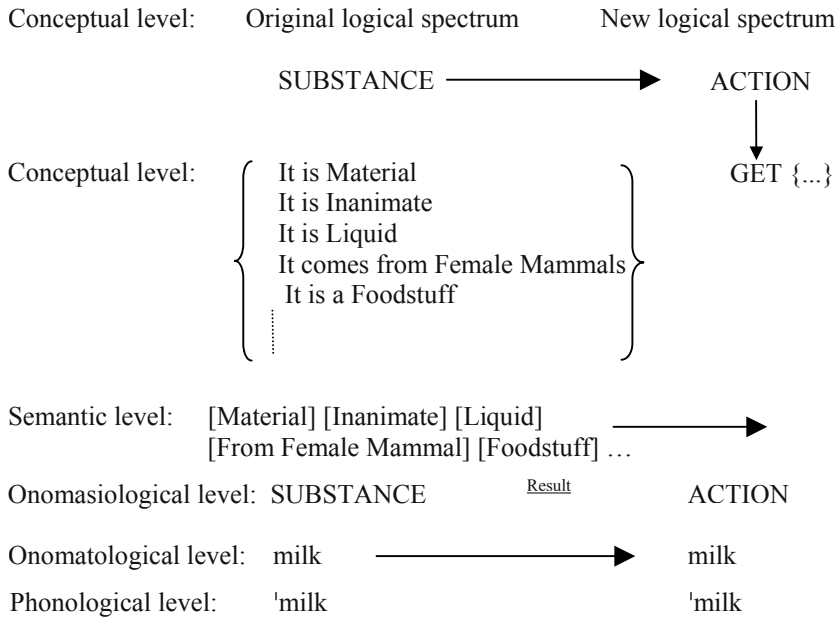

Figure 2 The conceptual level of Onomasiological Recategorization

As opposed to Types 1-4, Onomasiological Type 5 is characterized by an unstructured onomasiological level. There is neither onomasiological base nor onomasiological mark. The original and the new dominating conceptual categories are related directly (Figure 2).

The following are several examples, which, at the same time, illustrate the way of the classification of individual Word-Formation Types within the Onomasiological Recategorization:

(22) a. $bond_{N\_}bond_{V}$: SUBSTANCE$^{\underline{\text{Result}}}$ACTION
(in the meaning of a joint)
Interpretation: Substance as a Result of Action
b. $switch_{N} - switch_{V}$: SUBSTANCE$^{\underline{\text{Instrument/Result}}}$ACTION
(in the meaning of a device for completing or breaking an electric circuit)
Interpretation: Substance as an Instrument of Action
c. $insert_{V} - insert_{N}$: ACTION$^{\underline{\text{Object}}}$SUBSTANCE
Interpretation: Substance as an Object of Action
d. $time_{N\_}time_{V}$: CIRCUMSTANCE$^{\underline{\text{Temporal}}}$ACTION
e. Interpretation: Action in terms of Temporal dimension
f. $clear_{A} - clear_{V}$: QUALITY$^{\underline{\text{Result}}}$ACTION
Interpretation: Action Resulting in a certain Quality

3.3.5 An Onomasiological Approach to Productivity

One of the basic postulates of the present onomasiological theory is that all naming units, falling within its scope, that is to say, all naming units coming into existence in the Word-Formation Component, are coined by *productive*[18] word-formation and morphological types/rules. Any and all post-word-formation deviations take place in the Lexicon.

One of the major deficiencies of various computation methods, employed within the generative framework for the evaluation of productivity, seems to be their limited scope; they are usually restricted to the productivity of affixes. It may be therefore proposed that instead of the too restrictive *affix-driven productivity approach* we need a general *WF-Rule-driven theory of productivity* covering the whole stock of complex naming units. This implies the importance and the necessity of defining the (so far) vague notion of *Word-Formation Rule* (WFR). The present model distinguishes the following *levels of productivity***:**

1. the productivity at the level of Onomasiological Types
2. the productivity at the level of Word-Formation Types
3. the productivity at the level of Morphological Types
4. the productivity at the level of Word-Formation Rules

[18] Cf. Štekauer 2001b for the treatment of a group of syntax-based formations like *sit-around-and-do-nothing-ish, leave-it-where-it-is-er, son-in-law, lady-in-waiting, pain-in-stomach-gesture, what-do-you-think-movement, milk-and-water, save-the-whales campaign*.

Productivity of Onomasiological Types

As indicated above, the present model distinguishes five *Onomasiological Types* ranging over all productive ways of forming new naming units. Since they are based on the criterion of which constituents of the *onomasiological structure* are linguistically expressed at the *onomatological level*, the determination of their respective productivities is an important indicator of the *preferences* of language users (or better, coiners) in terms of employing *different cognitive processes* underlying the act of naming, on the one hand, and the *different ways of their linguistic representation*, on the other. The productivity calculation at this level may indicate which of the two universal, contradictory tendencies, i.e., economy of speech and explicitness of expression (comprehensibility), dominates in a particular language (area). Here we face two gradual oppositions: (a) Types 1-3 (complex analysis at the conceptual level) vs. Type 4 (simplified onomasiological structure) vs. Type 5 (absence of onomasiological structure), (b) Type 1 (complex linguistic representation of complex structure) vs. Types 2 and 3 (economized expression of complex structure) vs. Type 4 (economy due to onomasiological structure) vs. Type 5 (absolute economy).

Productivity of Word-Formation Types

A more specific level is represented by *Word-Formation Types*. The computation of productivity of WF Types is related to a *conceptual category*, such as Agent, Instrument, Location, Action, Result of Action, etc. This makes it possible to include in the computation of the productivity of, for example, Agent names (broadly defined as 'persons performing some activity'), naming units of different structures, hence different WF Types ([Object ← Action – Agent]; [Action – Agent]; [Location – Action – Agent]; [Result ← Action – Agent]; [Instrument – Action – Agent]; [Manner – Action – Agent]; etc.).

All of these different structures represent various WF Types. All of them, however, may be used to coin new naming units falling within one and the same conceptual category (Agent, in our example), and therefore represent a single *Word-Formation Type Cluster* (WFTC). Any WFTC is – with regard to the particular conceptual category – 100% productive; the productivity of the individual WF Types may be computed internally, within the WFTC, as a share of the individual WF Types of the total number of naming units belonging to the given WFTC.

Productivity of Morphological Types

Any WF Type may have various morphological representations (*wood-cutter* [N+V+er] – *novelist* [N+ist] – *writer* [V+er] – *cheat* [N–V] – *oarsman* [N+s+man] – *transformational grammarian* [A+N+ian] – *bodyguard* [N+N], etc.). All of these different morphological structures represent various *Morphological Types*. Since they are used to coin new naming units falling within one and the same conceptual category (Agent, in our example), they represent a single *Morphological Type Cluster* (MTC). Any MTC is – with regard to the particular conceptual category – 100% productive, and the productivity of the individual Morphological Types may be computed internally, within the particular MTC.

Productivity of Word-Formation Rules

Word-Formation Rules are constituted by the unity of WF Types and Morphological Types. Thus, the conceptual category of Agent may be exemplified, inter alia, by the following WFRs:

(23) a. Action – Agent
Verb *-er* (*driver*)
b. Instrument – Agent
Noun (*s*) *man* (*oarsman*)
c. Object – Action – Agent
Noun Verb *-er* (*wood-cutter*)

From this it follows that the WFR is constituted by the unity of the onomasiological and onomatological structures.

The reason for preferring this approach to the calculation of productivity is that it makes it possible to

(a) examine productivity from different viewpoints reflecting both linguistic and supralinguistic levels;
(b) take into consideration all new naming units (not only some word-formation processes – for example, affixation);
(c) restrict the evaluation/calculation to actual words.[19]

From the previous discussion it follows that productivity is conceived as an *implemented capacity reflecting the naming needs of a particular speech community*. As suggested in Štekauer (1998, 2001b), what seems to be crucial is that by coining a naming unit in response to the specific demand of a speech community the particular language manifests its productive capacity to provide a new, well-formed linguistic sign by employing its productive Types/Rules whenever need arises.

This approach is in accordance with Bauer's assumption that "[t]he fact remains ... that the production of new words may be the only evidence the observer has of this potential, and the lack of new words appears to deny the potential" (2001: 21) and that "...words are only formed as and when there is a need for them, and such a need cannot be reduced to formal terms" (2001: 143). In principle, the conception of productivity as implemented capacity corresponds with Bauer's (2001) notion of 'profitability'.

[19] 'Actual word' is defined here rather loosely, i.e. a naming unit which was coined to satisfy a linguistic demand, be it the demand of a single member of a speech community, be it a single-act one-off demand. A word may only qualify for the status of an actual word if it has been coined. Whether its use will be spread over the whole speech community (implying frequent use), or whether it will be confined to a single use on the part of a single speaker, is insignificant. What is important is that the respective language has, by responding to the specific demand, manifested its capacity to provide a new, well-formed linguistic sign by its productive Word-Formation Rules whenever need arises.

Productivity vs. creativity

These two terms are usually understood as mutually excluding principles in coining new naming units. While productivity is said to be rule-governed, creativity is conceived as any deviation from the productive rules. In the present context, creativity is used in a different meaning in which it is complementary with productivity. First, the logical spectrum does not necessarily lead to one single onomasiological structure. For illustration, if we try to form a naming unit for 'a person who meets space aliens on behalf of the human race' the logical spectrum may lead to various WF Types, and, second, these different WF Types may be assigned various morphological realizations by the MSAP principle. Examples are given in (24):

(24)
a. [Theme – Action – Agent]
human race representative (OT1)
homosapience represenative (OT1)
b. [Location/Theme – Action – Agent]
earth-representative (OT1)
earth ambassador (OT2)
world ambassador (OT2)
c. [Location – Action – Agent]
intergalactic diplomat (OT2)
interstellar diplomat (OT2)
d. [Object/Location – Action – Agent]
extra-terrestrial greeter (OT1)
space alien meeter (OT1)
outerspace wellcomist (OT1)
e. [Object – Action – Agent]
contactee (OT3)
greeter (OT3), etc.[20]

Example (24) illustrates what can be labeled as *creativity within productivity constraints*. On the one hand, there are different onomasiological realizations of a particular logical spectrum, and, on the other hand, different onomatological realizations of various onomasiological structures. It is the interaction between the conceptual, onomasiological, and the onomatological levels that – within the limits of productive types and rules and the relevant constraints – provides certain space for a *creative* approach to word-formation (as it follows from several options in our example). The inclusion of speech community in the model and viewing each new naming unit as a result of a very specific and real act of naming by a coiner makes it possible to reflect individual preferences, the influence of one's age, education, and profession, one's linguistic background (in a bilingual setting), fashionable trends, etc., i.e., the sociolinguistic factors which may affect the application of the MSAP in those cases that provide more than one option.

[20] The examples in (11) were proposed by native speakers.

3.3.6 Headedness

Head identification in word-formation has been a frequent topic, and a number of various criteria and theories have been proposed. An onomasiological contribution to the discussion is Štekauer (2001a). It follows from the exposition in Section 3.3.3 above that out of five Onomasiological Types, the onomasiological recategorization (Type 5) does not admit discussion of headedness: the converting and the converted naming units fall within different conceptual categories and different word-classes, feature different paradigms and, hence, different morphosyntactic features. Nothing is inherited, nothing is percolated.[21] For the remaining four Onomasiological Types, it is proposed that the onomasiological base is the head because it is this constituent that stands for the most general class of all constituents of the onomasiological structure. Instead of identifying head either positionally or morphologically (no particular morpheme of a naming unit) the onomasiological model shifts the criterion of headedness to extra-linguistic level, in particular, the conceptual level. By implication, head can be a suffix, a prefix, or a word-formation base. The head defined in this way meets the basic headedness criteria:

(a) Hyponymy (truckdriv*er* – Type 1, writ*er* – Type 2, honey*bee* – Type 3, *re*start – Type 4).
(b) Subcategorization (e.g., *-en* only combines with monosyllabic bases which end in an obstruent, optionally preceded by a sonorant – therefore black*en*; *-al* requires Verb bases stressed on the last syllable – arriv*al*; *un-* combines with (i) adjectives (ii) whose meaning is preferably positive – *un*adjustable).[22]
(c) The head determines the word-class and is the distributional equivalent of the whole naming unit). In the first three Types (truckdriv*er*, writ*er*, honey*bee*), the onomasiological base determines the word-class irrespective of whether it takes the form of affix or base). The head for *restart*, which exemplifies Type 4, is identified with *re-* which, in traditional terminology, is a class-maintaining prefix. The question which necessarily arises is whether a class-maintaining prefix may determine the word-class. The doubt is even stronger with *counter-* that combines with nouns, verbs, and adjectives.[23] The onomasiological theory responds to this problem by assigning the head the decision-making capacity. This capacity can be exercised in two different ways: either, the affix *determines* the word-class (class-changing affixes) or it *acknowledges* the word-class (class-maintaining affixes). Conceived this way it is the base which behaves as a true head. Hence, *en-* as a head determines the word-class (and consequently, the distribution) of *en*cage in the same way as *counter-* in the role of head

[21] The elimination of head from conversion is based on the presented model. Certainly, a zero-morpheme theory, such as that proposed by Marchand (1964a,b, 1965) and Kastovsky (1968, 1969,1982) brings different results.

[22] The conceptual level of *unadjustable* is, roughly, 'Negated Capacity' where Negation is logically the dominant conceptual category within this naming unit. For the determination of head in structures with more than one suffix see Štekauer (2001a).

[23] Cf., for example, Lieber (1981) and her Feature-Percolation Convention 3.

acknowledges the word-class of *counter*-evidence. By implication, *-ish* is the head of *greenish*, and *-ling* is that of *duckling*.[24]

3.3.7 Summary

This model came into existence, *inter alia*, as a reaction to the formalism that has been a mainstay of many generative morphologists. Therefore, its advantages must be sought in the areas which deviate from the mainstream generative approaches. They can be summarised as follows:

1. It reflects the triad of relations existing between the indispensable components of each act of naming: the class of objects of the extra-linguistic reality to be named – (a member of) the speech community who performs the act of naming – the word-formation component of the language system (langue) acting in close co-operation with the lexical component.
2. By implication, the model interrelates the cognitive abilities of a speech community with both extra-linguistic and linguistic phenomena.
3. The account of word-*formation* as a very real act of naming within a speech community, and performed by a member of that speech community makes it possible to interrelate the role of productive Word-Formation Types/Rules and the creative approach to word-*formation* by a specific coiner.
4. All 'traditional' word-formation processes are put on the same basis by being accounted for by means of the same word-formation principles, which makes the model of word-formation simpler.
5. The introduction of the MSAP principle (replacing the binary principle) makes it possible to do away with the problems connected with the traditional accounts, including 'bracketing paradoxes', 'exocentric compounds', 'blends', 'back-formation, etc.
6. The proposed model lends itself to the calculation of productivity that covers all types of naming units.

3.4 Bogdan Szymanek

Beard and Szymanek are the best known proponents of the *Separation Hypothesis* in word-formation, assuming strict separation of its semantic and formal levels. Since Beard's LMBM is introduced in a separate chapter in this volume, we will succinctly outline Szymanek's approach inspired by Dokulil, Beard, and cognitive linguistics and psychology. Szymanek is aware of the fact that "studies of the semantic (functional) aspect of word-coining are relatively scarce in current morphological research" (1988: 30), and therefore requires a well-balanced approach to morphology.

Szymanek's model includes three levels of representation: (a) the level of cognitive categories (concepts); (b) the level of derivational categories (functions/ meanings), and (c) the level of derivational exponents (formatives).

[24] Cf. Štekauer (2001a) for more detailed discussion on various aspects of head identification.

The relations between these levels are far from being based on the ideal state of one-to-one correspondence. What prevails is non-isomorphy, i.e., the one-to-many and many-to-one relations between them.

Like Dokulil (1962), Szymanek distinguishes between *derivational category* defined as "a class of lexemes characterized by a single derivational function", and *derivational type* defined as "a group of complex lexemes characterized by a singleness of derivational function and of its formal exponence (e.g. all English Agent nouns which end in *-er*)" (1988: 60).

Szymanek's central claim is formulated as the *Cognitive Grounding Condition* (1988: 93):

(25) The basic set of lexical derivational categories is rooted in the fundamental concepts of conception.

Szymanek proposes 25 fundamental cognitive categories, for example, OBJECT, SUBSTANCE, EVENT, ACTION, STATE, PROCESS, NUMBER, PERSON, AGENT, INSTRUMENT, POSSESSION, NEGATION, CAUSATION, SIMILARITY, PLACE. Like the relation between meaning and form, the correlation between cognitive concepts/categories and derivational categories is far from being isomorphic. A single derivational category may be motivated by two and more cognitive categories. The derivational category of, for example, privative verbs is rooted in three cognitive categories: CAUSATION + NEGATION + POSSESSION (*flea – deflea*). On the other hand, a single cognitive category may underlie two derivational categories. For example, the cognitive category INSTRUMENT underlies the derivational category of Instrumental nouns and Instrumental verbs (*open – opener* and *hammer – to hammer*).

3.5 Andreas Blank

Blank is right in claiming that "[l]iterally every referent and every concept can be verbalized by any language. It is, however, more interesting to study which concepts are *usually* and *constantly* expressed in a given language... Only from this perspective can we get insight into the way a speech-community conceptualizes the world" (2001: 9). While Blank's major work (1997) discusses the lexical-semantic aspects of onomasiology, he applies the basic principles of an onomasiological approach to the field of word-formation in (1998a) and (1998b). His cognitive onomasiological theory of word-formation is illustrated with examples from Romance languages.

The central notion is *concept* which is to be linguistically expressed. In word-formation, the first step is to analyze a concept into salient *subconcepts*, the most salient of which, the *basic concept*, serves as a basis for forming a new word. The basic concept is already represented in a language by a word. Thus, in the second step, the concept to be named and the meaning of the basic word must be lexically bridged: either by means of another word (composition) or by means of an affix

(derivation). The selection of the basic concept is controlled by the principles of prototype theory.

Concepts are embedded in *frames* (scenarios, domains). The relation between concepts themselves and between concepts and frames is based on Aristotelian associative principles of similarity, contrast, and contiguity. *Similarity* is mental abstraction and is a gradual phenomenon, ranging from *identity* to *contrast*. The highest degree of similarity is *conceptual identity* as in the case of tautology (Blank 2001: 13). *Contiguity* is based on our experiences (mental induction) with spatial, temporal and logical relations (part-whole, agent-action, cause-effect) between concepts that constitute a frame, and underlies *engynomic structures*.[25] Based on these ideas, Blank characterizes the individual word-formation processes.

Suffixation, for example, is based on either similarity/contrast or contiguity. In the former case, there are four potential deviations from the prototypical representation of referents:[26] SMALLER (it. *ragazzino*), BIGGER (*it. ragazzone*), WORSE (it. *ragazzaccio*), BETTER/ENDEARING (it. *ragazzuccio*). In the case of contiguity-based suffixation, a new concept is referred to by using a basic concept which belongs to the same frame, for example, ACTIVITY–PLACE (Sp. *lavar* 'to wash' → *lavandería* 'wash-house'), OBJECT–PERSON (Sp. *hierro* 'iron' → *herrero* 'blacksmith'), CONTAINER–PORTION (it. *cucchiaio* 'spoon'→ *cucchiaiata* 'spoonful', EVENT–AFFECTED (it. *terremoto* 'earthquake' → *terremotato* 'eathquake-damaged'.

Similar types of relations underlie prefixation. In Blank's view, a class-changing affixation (also including zero-derivation and back-formation) is based on conceptual identity, i.e., the concept remains the same.[27] Compounding is, in his view, based on two conceptual associations, which reflect the relations between the concept underlying the new compound and the two basic concepts – the concepts of its constituents. The combination of the possible conceptual relations of metaphorical similarity, deviation from the prototype, identity, and conceptual contiguity yields, several potential types, not all of which are present in the individual languages. For illustration, the most frequent type in Romance languages is the 'deviation from the prototype + conceptual contiguity' (F. *wagon-lit* 'sleeping car' (lit. 'bed-car')). The concept SLEEPING CAR deviates from the prototype of a railroad-car (= the relation of similarity, i.e., deviation from the prototype). The concept of BED is used because, as assumed by Blank, it is the most salient feature of the frame SLEEPING CAR (=contiguity).

[25] Engynomy is "a relation of concepts, such as part/whole, cause/consequence, producer/product, activity/place, etc. (Blank 2001: 10).

[26] The examples are based on It. *ragazzo* 'boy'.

[27] This assumption is dubious. Blank's examples like Fr. *père* 'father' → *paternel* 'paternal', Sp. *atacar* 'to attack' → *ataque* 'attack', It. *bene* 'good' → *(il) bene* '(the) good', and any other example of class-changing derivation, such as E. *boy* → *boyish* are clearly based on two different, even if closely related, conceptual categories of SUBSTANCE, QUALITY, ACTION, CIRCUMSTANCE. The concept of boy as a person (SUBSTANCE) is different from that of a QUALITY (characterized by some of the features of boy).

3.6 Peter Koch

While Koch's model (2001) is based on similar principles it is more elaborate and more comprehensive – it is a lexicological rather than purely word-formation model. Koch presents it in the form of a three-dimensional 'grid'.

Its horizontal axis represents cognitive-associative relations which underlie new signs. These include (a) identity; (b) contiguity (relations within a conceptual frame, the above-mentioned engynomies; (c) metaphorical similarity, (d) co-taxonomic similarity between the concepts of the same level of hierarchy, e.g., FIR and BEECH; (e) taxonomic superordination; (f) taxonomic subordination; (g) co-taxonomic contrast, e.g., GOOD – BAD; and (h) conceptual contrast between more or less incompatible concepts, e.g., PRISON – HOTEL.

The vertical axis represents formal means of expressing new concepts. They include (i) zero = semantic change (diachronically) or polysemy (synchronically)); (ii) gender change (*wood – woods*); (iii) genus change; (iv) diathesis change; (v) conversion; (vi) mutation (change of word-class by replacing a word-class specific bound grameme, e.g., fr. *manquer* 'to be short of' – *le manque* 'shortage'; (vii)suffixation; (viii) prefixation; (ix) compounding; (x) lexicalized syntagma, e.g., *red + wine → red wine*; (xi) idiom.

The third dimension concerns the 'autochtonous-borrowed' opposition. Then, individual words result from the combination of the elements represented on the former two axes, for example, the relation between *peer* and *peer tree* is the contiguity relation expressed by compounding in English, but by suffixation in French (*poire – poirier*). Obviously, not all theoretical combinations actually occur in the individual languages.

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REFERENCES

Alinei, Mario. 1995. "Theoretical Aspects of Lexical Motivation." *Svenska Landsmål och Svenskt Folkliv* 118, 321, 1-10.

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. Linguistic Inquiry Monograph 1. Cambridge, MA: MIT Press.

Brammesberger, Albert and Grzega, Joachim. 2001. "ModE *girl* and Other Terms for 'Young Female Person' in English Language History. *Onomasiologiy Online* 2 [www.onomasiology.de].

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge Studies in Linguistics, 95. Cambridge: Cambridge University Press.

Beard, Robert E. 1995. *Lexeme-Morpheme Base Morphology. A General Theory of Inflection and Word Formation*. SUNY Series in Linguistics. State University of New York Press.
Blank, Andreas. 1997. *Prinzipien des lexikalischen Bedeutungswandels am Beispiel der romanischen Sprachen*. Tübingen: Niemeyer.
Blank, Andreas. 1998a. "Outlines of a Cognitive Approach to Word-formation." In: Proceedings of the 16th International Congress of Linguists, Paper No. 0291. Oxford: Pergamon.
Blank, Andreas. 1998b. "Cognitive Italienische Wortbildungslehre." *Italienische Studien* 19, 5-27.
Blank, Andreas. 2001. "Words and Concepts in Time." In: *metaphorik.de.*
Blank, Andreas and Koch, Peter (eds.). 2003. *Kognitive romanische Onomasiologie und Semasiologie*. Tübingen: Max Niemeyer Verlag.
Dalton-Puffer, Christiane. 1997. "Developinmg a meaning oriented theory of English word formation." *View[z] – Vienna English Working Papers* 6/1, 4-18.
Diez, Friedrich. 1875. *Romanische Wortschöpfung. Anhang zur Grammatik der Romanischen Sprachen.* Bonn.
Dirven, René and Verspoor, Marjolijn. 1998. *Cognitive Exploration of Language and Linguistics*. Amsterdam/Philadelphia: John Benjamins.
Dokulil, Miloš. 1962. *Tvoření slov v češtině I. Teorie odvozování slov.* Prague: Nakladatelství ČAV.
Dokulil, Miloš. 1964. "Zum wechselseitigen Verhältnis zwischen Wortbildung und Syntax." In: *Travaux linguistiques de Prague* 1. Prague: Academia, 369-376.
Dokulil, Miloš. 1968a. "Zur Frage der Konversion und verwandter Wortbildungsvorgänge und -beziehungen." In: *Travaux linguistiques de Prague* 3. Prague: Academia, 215-239.
Dokulil, Miloš. 1968b. "Zur Theorie der Wortbildungslehre." *Wissenschaftliche Zeitschrift der Karl-Marx-Universität Leipzig.* Gesselschafts- und Sprachwissenschaftliche Reihe 17, 203-211.
Dokulil, Miloš. 1968c. "Zur Frage der sog. Nullableitung." In: H. E. Brekle and L. Lipka (eds.), *Wortbildung, Syntax und Morphologie.* Festschrift zum 60. Geburtstag von Hans Marchand am 1. Oktober 1967. The Hague: Mouton de Gruyter, 55-64.
Dokulil, Miloš. 1968d. "Zur Frage der Stelle der Wortbildung im Sprachsystem." *Slovo a slovesnost* 29, 9-16.
Dokulil, Miloš. 1997. "The Prague School's Theoretical and Methodological Contribution to ‚Word-formation' (Derivology)." In: *Obsah – výraz – význam. Miloši Dokulilovi k 85. narozeninám*. Praha: FF UK, 179-210.
Dressler, Wolfgang U.; Mayerthaler, Willi; Panagl, Oskar; and Wurzel, Wolfgang U. (eds.). 1987. *Leitmotifs in Natural Morphology*. Amsterdam: John Benjamins.
Fleischer, Wolfgang. 1969. *Wortbildung der Deutschen Gegenwartssprache*. Leipzig: VEB Bibliohraphisches Institut.
Grzega, Joachim. 2001. "On the Names for Wednesday in Germanic Dialects with Special Reference to West Germanic." *Onomasiologiy Online* 2 [www.onomasiology.de].
Grzega, Joachim. 2002. Some Thoughts on a Cognitive Onomasiological Approach to Word-Formation with Special Reference to English. *Onomasiology Online* 3, 1-29
Grzegorczykowa, Renata. 1979. *Zarys slowotwórstwa polskiego. Slowotwórstwo opisowe*. Warszawa: PWN..
Hansen, Barbara; Hansen, Klaus; Neubert, Albrecht; and Schentke, Manfred. 1982 (3rd ed. 1990). *Englische Lexikologie. Einführung in Wortbildung und lexikalische Semantik.* Leipzig: VEB Verlag Enzyklopädie.
Horecký, Ján. 1983. *Vývin a teória jazyka.* Bratislava: SPN.
Horecký, Ján; Buzássyová Klára; Bosák Ján et al. 1989. *Dynamika slovnej zásoby súčasnej slovenčiny*. Bratislava: Veda.
Horecký, Ján. 1994. *Semantics of Derived Words*. Prešov: Acta Facultatis Philosophicae Universitatis Šafarikanae.
Horecký, Ján. 1999. "Onomasiologická interpetácia tvorenia slov." *Slovo a slovesnost* 60, 6-12.
Huke, Ivana. 1977. *Die Wortbildungstheorie von Miloš Dokulil*. Inaugural-Dissertation Giesen.
Hüllen, Werner. 1999a. "A plea for onomasiology." In: W. Falkner and H.-J. Schmid (eds.), *Words, lexemes, concepts – Approaches to the lexicon: Studies in honour of Leonhard Lipka*. Tübingen: Narr, 343-352.
Hüllen, Werner. 1999b. *English Dictionaries 800-1700. The Topical Tradition.* Oxford: Oxford University Press.

Kastovsky, Dieter. 1968. *Old English Deverbal Substantives Derived by Means of a Zero Morpheme.* Esslingen/N.: Langer.
Kastovsky, Dieter. 1969. "Wortbildung und Nullmorphem." *Linguistische Berichte* 2, 1-13.
Kastovsky, Dieter. 1982. *Wortbildung und Semantik*. Tübingen/Düsseldorf: Francke/Bagel.
Koch, Peter. 1999a. "TREE and FRUIT: A cognitive-onomasiological approach." In: *Studi di Linguistica Teorica ed Applicata* XXVIII, 2, *Semantica lessicale*, 331-347.
Koch, Peter. 1999b. "Frame and Contiguity. On the Cognitive Bases of Metonymy and Certain Types of Word Formation." In: K.-U. Panther and G. Radden (eds.), *Metonymy in Language and Thought*. Amsterdam/Philadelphia: John Benjamins, 139-167.
Koch, Peter. 2001. "Bedeutungswandel und Bezeichnungswandel: Von der kognitiven Semasiologie zur kognitiven Onomasiologie." *Zeitschrift für Literaturwissenschaft und Linguistik* 121, 7-36.
Krefeld, Thomas. 1999. "Cognitive ease and lexical borrowing: the recategorization of body parts in Romance." In: A. Blank and E. Koch (eds.), *Historical semantics and cognition*. Berlin/New York.
Lieber, Rochelle. 1981. *On the Organization of the Lexicon*. Doctoral dissertation, MIT, Bloomington, IN: Indiana University Linguistics Club.
Lipka, Leonhard. 2002. *English Lexicology*. Tübingen: Narr.
Marchand, Hans. 1960. *The Categories and Types of Present-Day English Word-Formation.* Wiesbaden: Otto Harrassowitz.
Marchand, Hans. 1964a. "A Set of Criteria for the Establishing of Derivational Relationship between Words Unmarked by Derivational Morphemes." *Indogermanische Forschungen* 69, 10-19.
Marchand, Hans. 1964b. "Die Ableitung desubstantivischer Verben mit Nullmorphem im Englischen, Französischen und Deutschen." *Die Neueren Sprachen* 10, 105-118.
Marchand, Hans. 1965. "The Analysis of Verbal Nexus Substantives." *Indogermanische Forschungen* 70, 57-71.
Marchand, Hans. 1969. *The Categories and Types of Present-Day English Word-Formation*. 2nd revised edition. München: C. H. Beck.
Neščimenko, Galina Parfenevna. 1963. "Zakonomernosti slovoobrazovanija, semantiki i upotreblenija suščestviteľnyx s suffiksami subjektivnoj ocenki v sovremennom českom jazyke." In: *Issledovanija po češskomu jazyku: Voprosy slovoobrazovanija i gramatiki*. Moscow, 105-158.
Neščimenko, G. P. 1968. *Istorija imennogo slovoobrazovanija v češskom literaturnom jazyke konca XVIII-XX vekov. Moscow.*
Polenz, Peter von. 1973. "Synpleremik I. Wortbildung." In: *Lexikon der germanistichen Linguistik.* Tübingen, 145-163.
Puzynina, Jadwiga. 1969. *Nazwy czynności we współczesnym języku polskim (slowotwórstwo, semantyka, skladnia)*. Wyd. 1. Rozprawy Uniwesytetu Warszawskiego Nr. 40. Warszawa: Wydawnictwo UW.
Quadri, Bruno. *Aufgaben und Methoden der onomasiologischen Forschung. Eine entwicklungsgeschichtliche Darstellung*. Bern: A Francke Verlag.
Sproat, Richard W. 1988. "Bracketing Paradoxes, Cliticization and Other Topics: The Mapping between Syntactic and Phonological Structure." In: M. Everaert, A. Evers, R. Huybregts, and M. Trommelen (eds.), *Morphology and Modularity*. In Honour of Henk Schultink. Publications in Language Sciences 29. Dordrecht: Foris, 339-360.
Štekauer, Pavol. 1992. "On Some Issues of Zero Morpheme in English." *Linguistica Pragensia* 2, 73-87.
Štekauer, Pavol. 1996. *A Theory of Conversion in English.* Frankfurt am Main: Peter Lang.
Štekauer, Pavol. 1997. "On the Semiotics of Proper Names and Their Conversion." *AAA – Arbeiten aus Anglistik und Amerikanistik*, Band 22/1, 27-36.
Štekauer, Pavol. 1998. *An Onomasiological Theory of English Word-Formation*. Amsterdam/ Philadelphia: John Benjamins.
Štekauer, Pavol. 2001a. "Beheading the Word? Please, Stop the Execution." *Folia Linguistica* 34/3-4, 333-355.
Štekauer, Pavol. 2001b. "Fundamental Principles of an Onomasiological Theory of English Word-Formation." *Onomasiology Online* 2, 1-42 [www.onomasiology.de].
Stepanova, Maria D. 1973. *Methoden der synchronen Wortschatzanalyse*. Halle.
Szymanek, Bogdan. 1988. *Categories and Categorization in Morphology*. Lublin: Katolicki Uniwersytet Lubelski.
Tagliavini, Carlo. 1949. "Di alcuni denominazioni della <pupilla> (studio di onomasiologia, con speciale riguardo alle lingue camito-semitiche e negro-africane)." *Scritti minori*. Bologna, 529-568.

Tappolet, Ernst. 1895. *Die romanischen Verwandtschaftsnamen mit besonderer Berücksichtigung der französischen und italienischen Mundarten. Ein Beitrag zur vergleichenden Lexikologie.* Strassbourg: Karl. J. Trübner.

Waszakowa, Krystyna (1994). *Slowotwórstwo współczesnego jęyzka polskiego – rzeczowniki sufiksalne obce*. Warszawa: Wydawnictwa Uniwersytetu Warszawskiego.

Zauner, Adolf. 1902. Die romanischen Namen der Körperteile. Eine onomasiologische Studie. Erlangen.

COGNITIVE APPROACH TO WORD-FORMATION

DAVID TUGGY

1. BASIC NOTIONS OF COGNITIVE GRAMMAR (CG)

1.1 The grammar of a language under CG

Cognitive grammar (CG), as developed by Ronald W. Langacker (1987, 1991a, 2000), Taylor (2002) and others, is one of the most influential streams in the general movement known as Cognitive linguistics. CG holds that a language (or its grammar) "can be characterized as a structured inventory of conventional linguistic units." (Langacker 1987: 57) Most of the terms in this definition are technical terms, but here are some of the implications of them.

- A grammar is an *inventory*, not a machine. It holds resources that speakers use to construct utterances; the grammar itself does not construct utterances automatically and mindlessly.
- This inventory is not haphazard, but *structured*: the parts of it are related to each other in important ways.
- The inventory consists of *units*. A 'unit' is a cognitive routine

> that a speaker has mastered quite thoroughly, to the extent that he can employ it in largely automatic fashion, without having to focus his attention specifically on its individual parts or their arrangement. … It
> demand the constructive effort required for the creation of novel structures. Psychologists would speak of a 'habit', or say that 'automatization' has occurred (Langacker 1987: 57).

- When a relationship between units itself achie nit status, the whole complex becomes 'effectively simple', without the parts thereby losing their unit status. In other words, speakers can wield either the parts or the whole with ease. Units can thus become quite highly complex.
- These units must be linguistic, defined as either semantic (constituting or being part of a meaning) or phonological (in a broad sense encompassing gestures and writing or other signals as well as spoken sounds), or symbolic. *Symbolic structures* are bipolar; that is, they involve the pairing of a semantic with a phonological structure. For the word *cat*, for instance, the cognitive routines constituting the meaning CAT are a unit which is the *semantic pole*, the articulatory and auditory cognitive routines involved in pronouncing and recognizing [kæt] form a unit which is the *phonological pole*, and the pairing of

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 233—265.

the two poles to form the symbolic structure *cat* is also a unit.[1] CG does not allow you to posit any other kinds of structures in a language, beyond these three.

- The units of a language are *conventional*. That is,they are established by usage as shared by a community of people. All of language is in this sense usage-based,[2] and usage is a central, not a peripheral concern of linguistics. Usage is generally not 100% predictable, but it tends to be reasonable, and the units it produces, though often motivated in some degree, are not predictable either.
- Conventionality is enough to guarantee a unit a place in the language.It may not be excluded even if it is in some degree redundant or predictable, as long as it is in fact mastered as a unit and conventionalized within the speech community.

Virtually all the concepts involved in this definition are matters of degree. (1) Status as a unit is not a plus-or-minus quality: it takes time and repetitive usage to establish or 'entrench' a habit of any kind, including those that constitute a language, and there are notable differences of entrenchment even among those routines that clearly have 'unit' status. *Catapult* is a unit for many speakers of English, but not nearly so well-entrenched a unit for most of them as is *cat*. (2) Conventionality is gradual along several parameters, such as how well the conventionality is established, for what subgroup(s) of speakers, in what socio-historical contexts, and so forth. Among sailors of the 19th century the meanings of *cat* as a 'whip with nine cords, cat-o'-nine-tails' or as a 'catboat' were more likely to be conventional than among American construction workers of the late 20th century, for whom the meaning 'bulldozer, Caterpillar tractor' was quite certain to be conventional.

Most categories in CG are defined in terms of gradual parameters, that is, they are matters of more-or-less rather than absolute, plus-or-minus dichotomies. This fits in with the cognitive model of categorization around *prototypes* or 'best examples' or 'central members' rather than with a model that emphasizes boundaries between categories and assumes that all members of the category are of equal status. In this case, there is not a plus-or-minus distinction between what forms part of a language and what lies outside it. Some things (e.g. *cat* with the meaning 'domestic feline', or the ordering of an adjective before the noun it modifies) are very centrally part of English, whereas others (the ordering of *galore* after the noun it modifies, or the word *Freddage*, which a friend used in reference to typically hard spikes in volleyball by my brother Fred), while qualifying as English, are relatively peripheral to the category.

[1] Small caps are used, as is traditional, to represent meanings. For CG, this is a shorthand for a typically very complex collection of cognitive routines (section 2.3). Phonological forms are enclosed [in square brackets], though the level of phonetic detail we will be dealing with is minimal, and the slashes (e.g. /ˈæpl/) traditional for phonemic representations might have been used instead. They represent an acceptable (rather than 'the right') pronunciation. Familiarity with basic phonetic symbols (IPA) is assumed. Words and other bipolar, symbolic structures are represented by standard English orthographical forms *in italics*.

[2] Besides being central for conventionality, usage is crucial for the establishment of units in individuals' minds.

1.2 Lexicon and syntax

Many influential linguistic theories have made a strong dichotomy between the lexicon, where words and morphemes reside, and the syntax or grammar, where phrases, clauses, and larger structures are formed. The basic idea has been well described as constituting a 'building block' model (Lakoff and Johnson 1980: 202-203, Langacker 1987: 452-457), where the pieces of language that are stored in the lexicon are like bricks, and the grammar is the mortar that binds those simple and solid pieces together to form larger structures.

Word-formation patterns are awkward to handle under such theories. They are very like syntactic rules in involving arrangements of meaningful pieces, but the higher-order words or stems they describe often seem intuitively to be part of the lexicon, mentally stored and accessed from memory as wholes rather than necessarily constructed on the fly. And the apparently solid bricks themselves often prove, upon reflection, to be internally structured to some extent.

Under the CG definition, particular words and their meanings and phonological (or written or signed) forms are, to the extent that speakers master and conventionalize them, included as part of the grammar, and the patterns of their formation are grammatical under exactly the same conditions. The same is true of particular phrases, clauses, and so forth, and the patterns of their formation. Once again CG is positing categories that do not have strict boundaries; the differences between lexicon, morphology (word-formation), and syntax are all matters of degree rather than strict differences in kind (cf. section 4.2). Bricks and mortar and larger things built out of them are all building materials, and not all that different from each other. This will become clearer in later discussion, but one important implication of it is the view of syntactic and morphological patterns, not just lexicon, as symbolic, with phonological specifications (including word order) at one pole symbolizing meaningful (semantic) specifications at the other. As an important part of the picture, the small word-pieces often known as 'grammatical morphemes' are meaningful, and function as they do in larger syntactic constructions because of their meanings.

2. SCHEMAS AND PROTOTYPES

2.1 Schemas and elaborations

CG gives great importance to schematicity, that is to the relationship between a schema and its elaborations. It is one of the major kinds of relationships which structure units into the *structured inventory* of the definition in section 1. A schema is a pattern, a rough outline, a coarse-grained, less-fully-specified version of a concept which the elaborations render, each in a different way, in finer, more elaborate detail. All of the schema's specifications are true of its elaborations, but each elaboration of a schema specifies details which the schema does not.

Our thinking is shot through with relationships of this kind. For instance, the concept ANIMAL is a schema which includes as elaborations MAMMAL and INSECT, and each of these in turn has elaborations of its own, down as many levels as one cares to analyze. Or, MOVE is a schema which can be elaborated by LOCOMOTE (i.e. CHANGE LOCATION), which in turn can be elaborated by RUN, and so forth. The schematicity relationship is, by convention within CG, represented graphically by an arrow from schema to elaboration. Thus ANIMAL → ARTHROPOD → INSECT → SOCIAL INSECT → ANT → FIRE ANT or RUN THE 100 METERS IN 10 SECONDS ← SPRINT ← RUN ← LOCOMOTE ← MOVE (read 'ANIMAL is schematic for ARTHROPOD …' or 'SPRINT elaborates RUN which elaborates LOCOMOTE …').

If a particular pairing of a schema with an elaboration is repeated often and strongly enough to become established (a habit), it achieves unit status and is eligible to be, and will be if conventionalized, part of the language. Thus schematicity relations are at the same time relationships between units ('structuring' the 'inventory') and, if such be the case, themselves units in the inventory.

CG posits (what is eminently reasonable, if you think about it) that all linguistic structures are schemas, patterns characterizing families of more detailed cognitive events, events ultimately too detailed for us to talk about usefully. So we are not dealing with a difference in kind between schemas and non-schematic units, but rather between more highly and less highly schematic units. In fact, schematicity is another of the gradual parameters CG teaches one to see everywhere.

All categories, in CG, are sets of units related by relations of schematicity, whether full schematicity or partial schematicity (section 2.2).

2.2 Partial schematicity and the growth of schematic networks

Schematicity relationships arise when a person compares two concepts and notices similarities. Our brains seem to be so wired that the cognitive system gets excited when that happens. There are four possibilities (ultimately differing only in degree, of course) when you compare a 'target' concept, T, with a 'standard' of comparison, S. Either (i) S is fully identical to T or (ii) S is schematic for T (S → T), or (iii) some of S's specifications are true of T, but there is distortion of them, or (iv) the distortion is such that you can't really recognize S in T at all. Case (iii) is referred to as *partial schematicity*, and represented graphically by a dashed arrow (S - - - → T).

If you compare APPLES and ORATORY you will (unless you try pretty hard) decide that this is case (iv) and there isn't much point in thinking about it any more. If you compare APPLES with APPLES you of course have case (i). If you compare APPLES with FRUIT you have case (ii), where you simply recognize that FRUIT is schematic for APPLES, or as we normally express it in English, 'Apples are (a kind of) fruit'.[3] Case (iii) is particularly interesting, where you compare APPLES with ORANGES. They are certainly not identical, and APPLES are not (or at least are not

[3] Note that the English 'equative' phrase normally has the same asymmetry as a schematicity statement. T ← S does not imply, and only allows in the case of identity, T → S, and similarly if it is true that *Apples are (a kind of) fruit* it is predictably untrue that **Fruit is (a kind of) apples*.

easily seen as) a kind of ORANGES, nor are ORANGES a kind of APPLES. Nevertheless they are similar in many ways. Those ways in which they are similar constitute a potential or nascent schema, and if the comparison is made often enough it can become entrenched. This is illustrated in Figure 1. Note that in Figure 1 the (putatively) new schema (1.c) is not the same thing as the already established schema FRUIT (1.d); it contains a number of specifications which are common to APPLES and ORANGES but which do not characterize other kinds of FRUIT, such as BANANAS or WATERMELONS or RASPBERRIES.[4]

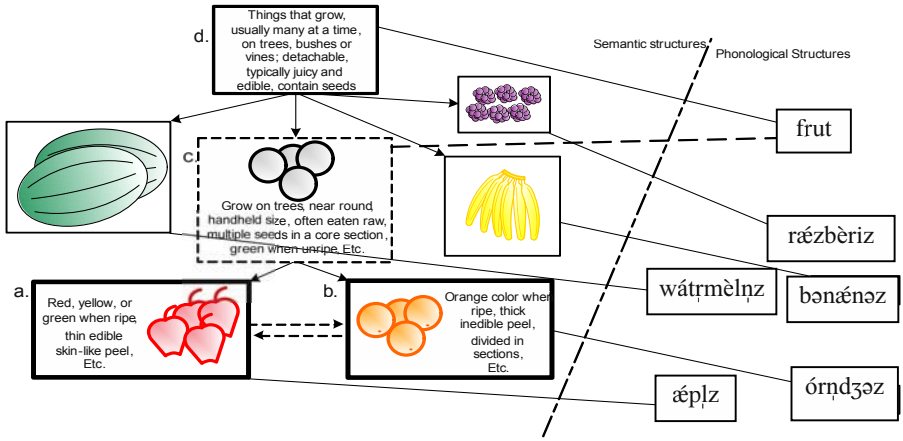

Figure 1 *Comparing oranges with apples; establishing schemas and building a network*

As this sort of process continues, more and more complex categories, consisting of units related in full or partial schematicity, are built up in people's minds. As they are conventionalized through linguistic usage, they become part of the language in question.

Sometimes it is useful to express identity with a double-headed schematicity arrow: APPLES ↔ APPLES. All the specifications of a schema are fulfilled in its elaborations, so if all the specifications of two structures are fulfilled in each other, they have to be identical.

[4] The meaning represented in 1.c will most naturally, nevertheless, be named by, and thus become linked to, the phonological pole [frut] rather than to any of the others, and such a tenuous link, in the process of becoming established, is represented in the diagram. The convention of a dashed-dotted line separating semantic from phonological structures is used without labeling later diagrams.

2.3 Prototypicality and salience

Not all units in a schematic network like that in Figure 1 are equal. Leaving aside the status of 1.c,[5] most speakers of English would agree that apples and oranges, in contrast to watermelons, raspberries or bananas, are among the most typical, first-thought-of kinds of fruits. Considerable research, much of it indebted to Rosch's work (e.g. Rosch 1973), indicates that such inequalities can be important for human categorization, and in fact that many categories are largely organized through resemblances (= relationships of partial schematicity) to a central member or group of 'best' members of the category. In many cases this 'center-out' relationship may be more important than any 'top-down' relationships of full schematicity for characterizing the nature of a category. But, CG maintains, it is not a matter of either one or the other; it works very satisfactorily to see both kinds of categorization as coexisting and cooperating.

The term *prototype* is used to designate the central part of the category. Arriving at a universally satisfactory definition of the term is not easy – the category of prototypes itself, naturally enough, shows prototype effects – but a very important, arguably the most important, characteristic is that prototypes are cognitively more prominent or salient than the other members of the category. This salience naturally results from many aspects of typical prototypes (e.g. their being the first learned and the most often encountered), and can be reasonably suspected of causing a number of others (e.g. their being the easiest to recall and the quickest to be assigned verbally to a category). Such salience, apart from contextual effects, is closely tied to (since it both results from and encourages) frequency of activation, and statistical counts of occurrences in usage provide a useful index to prototypicality.

In Figure 1, the relative prototypicality of APPLES and ORANGES is represented by the heavier-lined boxes in which they are enclosed, and the same convention will be used in other diagrams.

2.4 Access to the store of conventional knowledge, including neighboring structures

CG holds that meanings are *encyclopedic*: they include, in their degree, all that the users of the language know about the concept *and* know that each other knows (i.e. all conventional knowledge related to the concept). This includes an essentially open-ended list of potentially relevant facts and relationships, of course, and precludes our ever being able to presume that we have exhaustively defined a meaning. What it buys is realism, and an understanding of how meanings can link up to 'make sense' through highly peripheral as well as highly central and salient meaning specifications. Representations like those in Figure 1, giving a graphic shape indication and verbal indications of a few specifications, are thus not to be taken as fully adequate characterizations, though they are a bit better than just a word like APPLES in capital letters. Note that each of them is linked to a

[5] Despite what was posited for illustrative purposes in the previous section, I suppose that 5.c (and/or something closely similar that would include peaches, pears, and plums) is relatively well established for most American English speakers.

phonological structure, which is the set of cognitive routines for producing and perceiving the sound associated with that meaning.[6] Together the meaning and the phonological structure make up a symbolic structure, in these cases, a word.

These diagrams are easily interpretable via a very widespread metaphor which conceives of words (lexical items) as boxes or containers, and their meanings as contents (Reddy 1979). It is better, however, to think of the rectangles (a., b., etc.) linked to the phonological forms ([ǽp̩lz], [ór̩ndʒəz], etc.), not as boxes but as windows, each habitually opening upon pronunciation of the sound associated with it, and affording a view of, or access to, a particular part of the store of conventional knowledge (cf. Moore & Carling 1982). One advantage of taking them so is that the idea of encyclopedic meaning fits better. The meaning is what you can see through the window, and that may include details at a considerable distance. The fact that there are too many such details to fit into a small box is irrelevant.

One of the things that can be seen through the window is neighboring concepts which may have their own labeled windows; thus the overlap of meaning between closely related words is expected rather than in any way problematical. It is, on this view, part of the meanings of *apple*, *orange*, and *raspberry*, part of the store of conventional knowledge that each makes accessible, that the fruit each of them designates (and not, for instance, the fruit named by *watermelon*) is commonly made into a paste-like substance which people spread on bread to eat. It is also part of the knowledge accessed by *apple* that that substance is called *butter*, whereas for *orange* it is *marmalade*, and for *raspberry* either *jam* or *jelly*. The connections may work both ways, and be stronger one way than another: *marmalade* is connected to *orange*(*s*) more strongly than *orange*(*s*) to *marmalade*, but *butter* is not connected to *apple* so strongly as *apple* to *butter*. Not exactly the same thing, but closely related to it, is the fact that these words provide access to the constructions *apple butter*, *orange marmalade*, and *raspberry jam*, respectively. This seems at best paradoxical and at worst senseless if you are thinking via the container metaphor: it is like saying a small box contains a bigger box that contains it. But is much more reasonable if you think of accessing knowledge through a window. It is like saying that you can climb through the window and see a house of which the window is a part.

2.5 Sanction

Recognizing an established schema in a cognitive structure *sanctions* or legitimizes that structure. This makes sense: when we see that something fits a pattern we already know, we recognize it, and know what 'kind' of thing it is.

Sanction varies in strength according to (a) how well established or cognitively prominent the sanctioning schema is, (b) how close the relationship comes to full schematicity, and (c) how 'close' the schema is to the structure in question. A close schema specifies more details of the sanctioned structure, whereas a relatively distant schema despecifies more of them.

[6] Although phonology is prototypical, the CG definitions easily accommodate other kinds of *signifiants*, such as manual or facial signs or writing.

Suppose a person has a schema for APPLES (1.a), and encounters some apples of a variety new to him or her, e.g. Criterions. He or she can readily place them in his or her cognitive system, since they are strongly sanctioned, (b) fully and (c) closely, by the (a) well-established APPLES. This strong sanction would make it relatively easy for the new concept to become established as a unit, and to be used in communication, starting the process of conventionalization. Someone who had no experience of apples would doubtless recognize the Criterions as FRUIT (1.d), but the sanction would be lesser because (c) the schema is more distant. He or she might think of them as a kind of ORANGES, but here the sanction would be reduced considerably because (b) the sanction is not full but only partial. Sanction from BANANAS would be (b) much less nearly full. For someone who had in his or her cognitive system no concept of fruit of any kind, the concept of the Criterions would be hard to fit into the system at all.

Sanction can be recognized for established as well as new structures. The established structure is legitimately a part of the system in its own right, but the sanction it receives makes it even more strongly legitimate and more clearly integrated into the cognitive/linguistic system. Thus the concept of APPLES, established as it is for most English speakers, is further sanctioned because it fully and closely elaborates the schema FRUIT. In fact, establishment itself, or unit status (section 1), is usefully seen as self-sanction, a limiting case of sanction where the criteria of closeness and fullness (b and c) are at their maximum and the sanction varies only according to the prominence or entrenchment of the structure.

3. SCHEMAS FOR WORD FORMATION

3.1 Schemas for words

Words, we have claimed, are symbolic structures, combining a meaning structure with a phonological structure. Schemas for words will have the same bipolar symbolic character.

What would a schema for words denoting a fruit look like? The semantic poles (i.e. the meanings) of such words can be arranged in a hierarchy like that in Figure 1, but what of their phonological poles? What does [ǽpl̩z] have in common with [órn̩dʒəz] and [bənǽnəz] and [rǽzbèriz] and [frut]? The persistent final [z] or [əz], which characterizes all but [frut] is of course linked to the idea of plurality, and will be discussed later (in section 3.2). Concentrating on the non-plural forms ([ǽpl̩] [órn̩dʒ] [bənǽnə] [rǽzbèri] and [frut]), we would have to say that the number of syllables, the constitution of those syllables, and so forth, are not very much alike. What they have in common seems to be mainly the fact that there is a phonological

pole.[7,8] Accordingly, the schema for a 'fruit noun' will have as its semantic pole the concept of a fruit but its phonological pole will only specify "some phonological structure". This schema is represented as Figure 2.g, the symbolic union of 2.e-f. Its globally schematic relationship to *apple* (2.i) requires that both its semantic and its phonological structures be schematic for *apple*'s. (The globally schematic relationships to *raspberry*, *banana*, etc., are not represented in the diagram for simplicity's sake.)

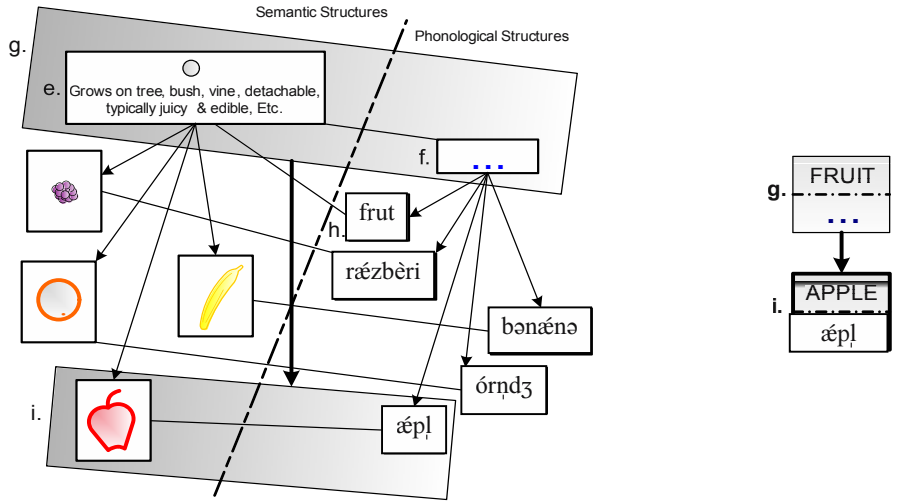

Figure 2 *Fruit words: a bipolar schema*

2.g is not the word *fruit* (2.e-h). *Fruit* has a specific phonological structure [frut], which is not schematic for [ǽp̩l] and the rest. Thus *fruit* as a whole cannot be schematic for *apple* and the other fruit nouns as wholes, although its semantic pole (2.e, cp. 1.d)[9] is schematic for theirs. 2.g shares *fruit*'s semantic structure but its phonological structure is schematic for *fruit*'s (as well as for those of *apple* and the rest), and *fruit* as a whole elaborates 2.g.

On the right side of Figure 2 is an abbreviated kind of representation for structures like 2.g and 2.i, the word *apple*, which we will use in most following diagrams: the semantic structure is represented in the top half of a box and the

[7] For English schemas the unspecified phonological material may be expected to consist of English sounds (phonemes). Even the maximally schematic phonological schemas we discuss in the rest of this article are specific in that way.

[8] One might, from these four examples (and most others), include a specification of two or three syllables, the last being unaccented. This would ultimately have to be a preferential-type specification (which fits fine with categorization by prototype), given the existence of [pitʲ] 'peach', [bóysənbèri], [marakuyá] and other forms that contradict these specifications.

[9] Actually the word *fruit* has in its semantic structure the plural/mass schema of Figure 1.d as well as the singular conception of 2.e.

corresponding phonological structure in the bottom half. It should be remembered that an arrow of full schematicity between two such bipartite boxes means that there are relationships of schematicity (or of its limiting case, identity) between the two semantic structures and also between the two phonological structures.

Schemas like 2.g can be arranged in hierarchies, and the schemas near the tops of those hierarchies are often particularly important for stating grammatical regularities. 2.g and 2.i are represented in Figure 3.g and 3.i as part of such a hierarchy. 3.j, k, and l are schemas for three different patterns which 3.g elaborates. The class of Things bounded in space (defined by schema 3.j) is a particularly salient or prototypical one (it comprises what are sometimes called physical objects), but it has much in common with Things bounded in other domains, which gives rise to a more schematic notion of bounded Things (3.m). 3.n is a higher schema over all of these, which specifies that its semantic structure designates a Thing. This is a technical term in CG, a structure roughly equivalent in its meaning to that of *thing* in the phrase *anything at all*. 3.n's phonological pole, like those of 3.g, j, k, and l, simply specifies 'some phonological structure'. This schema defines, in CG, what a noun (or other nominal structure) is; its subcases define subclasses of nouns. (3.l, m and n will show up as parts of constructional schemas in 4.u, 6.aa-ag, and Figures 7-8) A similar schema, except for specifying a Process (again a technical term denoting a relationship evolving through conceived time) as its semantic pole, defines the class of verbs (and verbal structures) (3.o), including as a typical case actions (3.p) such as *eat* (3.q) but other types as well. Other similar bipolar symbolic schemas define the other 'major grammatical classes' or 'parts of speech' (see Langacker 1987: 183-274, 1991b: 59-100 for extensive discussion). The topmost schema, 3.r, is equivalent to the concept SYMBOLIC STRUCTURE, i.e. it is schematic for all the symbolic structures of a language, and its semantic structure, often referred to as ENTITY, is equivalent to the concept CONCEPT, as it is schematic for all semantic structures.

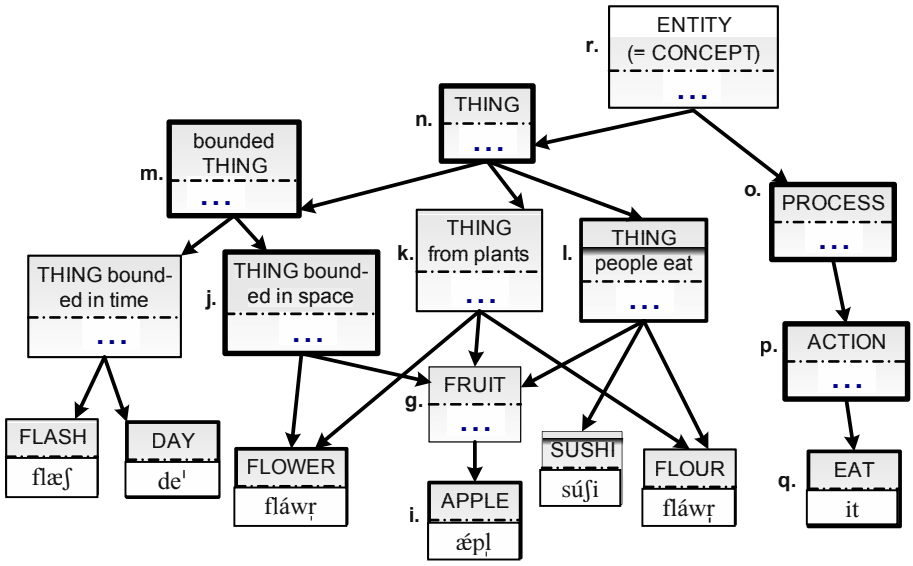

Figure 3 *Bipolar schemas for major grammatical classes*

The 'bottom-up' nature of this network is important.[10] It is the existence of words like *apple* (2.i-3.i) and *orange* and *banana* (in Fig. 2) that prompts the establishment of the FruitN schema (2.g-3.g), and the existence of such words and schemas as those and *flour* and *sushi* and dozens of others that prompts the establishment of the FoodN schema (3.l). Similarly, it is the existence of *apple* and *flower* and *stone* and *piano* and hundreds of similar count nouns (among which *sushi* and *flour* are not included) that prompts the establishment of the physical object count noun schema 3.j, which in turn supports the establishment of the count noun schema 3.m. 3.m, 3.k, 3.l and many other schemas in turn allow the establishment of the THING schema 3.m. The patterns arise, ultimately, from specific usages, and where there are different usages the schematic structures will be different. CG disallows patterns which cannot be supported empirically in this way.

The structures of the network naturally differ in their degrees of prototypicality, according (largely) to their frequency of use. Thus *apple* is represented as more prototypical (prominent and strongly entrenched) than the fruit noun schema (3.g) and even more so in comparison with *sushi*. 3.k is not as prominent as 3.j or 3.l, and so forth.

[10] There is also a kind of 'top-down'ness about it, in that the major grammatical categories are held to be closely related to fundamental cognitive abilities (RELATION to our ability to conceive of entities in connection with each other, THING to our ability to reify, PROCESS to our ability to scan sequentially, and so forth; see Langacker 2000: 2-3). This helps explain, for instance, why these categories are ubiquitous among the world's languages. But this kind of 'top-down' structure does not negate the 'bottom-up'ness of the schematic hierarchies that actually arise in different languages, which are by no means identical.

3.2 Schemas for clearly identifiable word pieces: stems and affixes and constructional schemas

Many of the phonological structures of our examples have been either incommensurate ([ǽpl̩], [órn̩dʒ] and [bənǽnə]) or identical (the phonological structures in Figure 3.g, j-p and r, for instance.) In the case of the plural nouns in Figure 1, however, there are more interesting things to say about the phonological structure.

[ǽpl̩z], [órn̩dʒəz], [[bənǽnəz], [rézbèriz] and [wátr̩mèln̩z] all have in common a [z] at the end. A schema […z] would characterize that commonality. And of course these are not the only ones: [wr̩dz] and [hórsəz] and [heʲz] and [snóbɔlz] and [snîzəz] and [broʲlz] and thousands of other words can be characterized by that schema. Many, though by no means all, of those thousands of words, including all the fruit nouns we were considering, also have a semantic specification in common: they designate a mass-like Thing consisting of an indefinite number of replications of some other Thing. Such common cooccurrence naturally gives birth, in people's minds, to a bipolar schema, in which the phonological pattern […z] is linked symbolically to the semantic pattern GROUP OF REPLICATE THINGS. This is a very important plural noun suffix in English. It is diagrammed in Fig. 4.s.

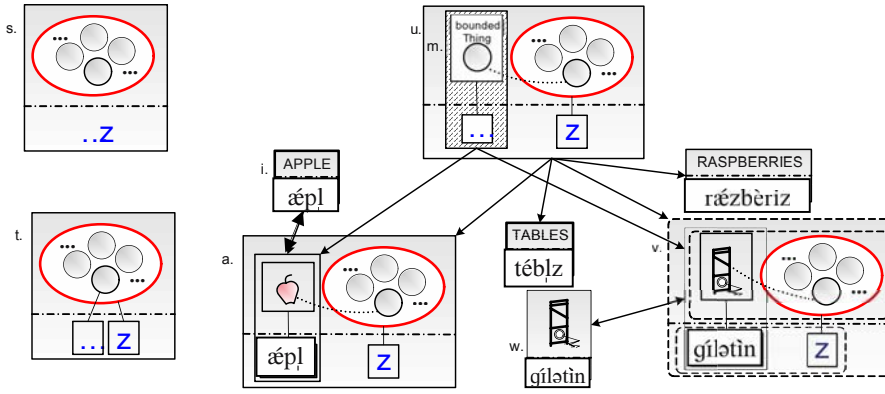

Figure 4 -z '*plural*' *and Stem*-z *constructions*

But there is more to it. The commonality of these words also includes the fact that the rest of the phonological structure, the three dots at the beginning of […z], so to speak, is in fact the phonological pole of a structure naming the kind of Thing that is replicated. Thus 4.t, where that linkage is represented, is a better, because more complete representation. 4.t can also be represented, for clarity, as in 4.u, where the replicated Thing's role as semantic pole of the phonological material preceding the [z] is separated out from its role in the mass of replicates. (The distortion engendered by this analytical separation is recorded by a dotted 'line of correspondence'.) This bipolar schema, whose phonological pole precedes the [z] in 4.u, is in fact the count noun schema 3.m, and so is labeled 4.m.

It is clear, if one considers the matter, that 4.t-u is schematic for such nouns as *apples*, *tables*, *raspberries*, etc. In other words, 4.t-u is not only a description of the plural suffix, it is also a schematic construction, a rule or pattern for plural nouns with *-z*. Its sanction of *apples* (4.a, of which 1.a is an unanalyzed version) is represented in some detail in Fig. 4. Note that the replicated Thing in *apples* is specified to be an apple, and its phonological pole is [æp̩l].It is our old friend 2.i-3.i again. Its occurrence as 4.i, outside the *apples* box to represent its independence from that construction, is linked to its occurrence inside the box by the double-headed arrow that reminds us that identity can be viewed as bidirectional schematicity.

4.m is what is termed an *elaboration-site* or *e-site*. An e-site is a 'hole' in one structure that expects to be filled by another structure. In this case, the bipolar 'hole' in *-z*, or (what is the same thing) in the Stem-*z* construction, is filled by *apple*. Similarly it is filled by *table* in the word *tables*, and by *raspberry* in the word *raspberries*, though the same level of detail is not shown. E-sites are traditionally marked in diagrams by cross-hatching, so 4.m is cross-hatched.

Typical e-sites are not fully schematic: i.e. they do not consist of 3.r, but of some schema further down a hierarchy such as Fig. 3. The e-site in 4.u, as we have mentioned, can be identified with 3.m. Thus affixes are 'choosy', in contrast to stems, which are 'promiscuous' (Taylor 2002: 266-268). (Certain kinds of phenomena, however, such as clitics which always occur in a specified position but do not particularly care what they occur next to, will have more fully-schematic e-sites.) Nevertheless e-sites are typically quite highly schematic: they come from the upper reaches of a structure like Fig. 3. An e-site which is highly specific, to the point of specifying a particular companion structure, is likely to be less than widely useful. (They do exist, however, e.g. *gruntled* has a strong e-site specifying that it be preceded by *dis-*).

We can now characterize the difference between stems and affixes. Affixes, like *-z*, have a gaping hole, a salient e-site, strongly associated with them. If the e-site precedes the affix phonologically, you have a suffix, if the e-site follows you have a prefix. The e-site resides in a constructional schema with which the affix is associated; in the typical case the affix cannot in fact be activated without activating the whole schema. The e-site is so important, and so schematic, usually at the semantic pole but especially at the phonological pole, that the pattern cannot be easily or usefully thought, and cannot be pronounced, unless a specific stem, such as *apple*, is drafted into service to elaborate the e-site (to fill the hole). Affixes are thus *conceptually dependent*, at both poles, upon the stems they combine with. This dependence varies in proportion to the salience of the e-site and its schematicity relative to the forms that fill it (Langacker 1987: 300).

This is a case of the sort described in section 2.4, where upon entering through the 'window' opened by a phonological form we are faced with a larger structure of which this is a part. The Stem-*z* construction is so closely associated with *-z* as to be invariably activated when it is.

Prototypical stems, in contrast, are *conceptually autonomous*. Though they are (of course) usually used next to some other symbolic structures, they can be usefully

thought and pronounced without being joined to any other particular kind of structure, and they can join with many kinds (they are 'promiscuous'). They do not have salient e-sites, and are not inevitably activated as part of some more inclusive structure. So *apple* can be, and often is, used without being joined to something like *-z*, but *-z* can only be used after a count noun, and that is the basic difference between them. It is not just a matter of different usage, but of different cognitive structures that result from that usage and perpetuate it.

Autonomy and dependence are matters of degree, however, and the distinction between stems and affixes is accordingly not absolute. Some affixes (e.g. *super-*, or *half-*) may occasionally or even fairly commonly be used in relatively autonomous ways, and of course doing so lessens their connection to the relevant affix-stem constructions. Some usually-independent forms may in special uses be dependent (e.g. *over* when used with the meaning 'more than is desirable', as in *overeat*, is normally prefixal.) Stems can be quite highly dependent (e.g. the stem *dent-* of *dentist*, *dental*, *dentition* and *dentifrice*, or the stem *gruntled*, mentioned above), and only recognizable as stems because they are less dependent than the affixes with which they join. In many languages dependent stems are the norm: e.g. in Latin noun and adjective stems need case suffixes, and verb stems need person-tense-mood suffixes. Sometimes strong dependence is so balanced that it makes sense to speak of affixes joining with each other instead of with stems.[11]

3.3 Complex semantic and phonological poles

The semantic and phonological poles of both morphemes and constructions are often complex categories, families of related structures, rather than single unitary structures.

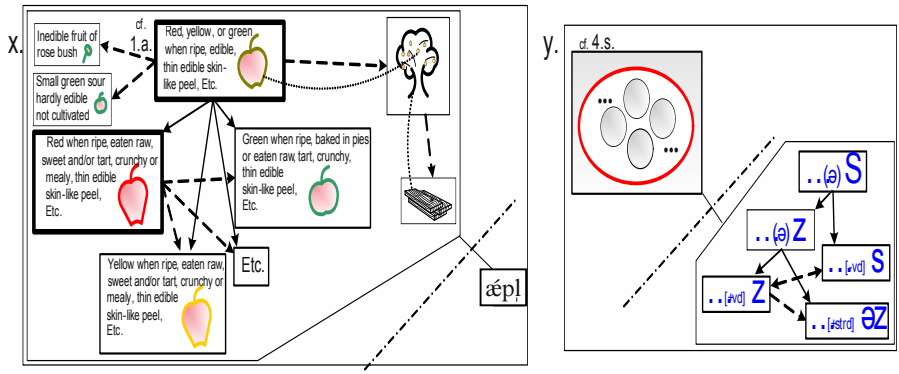

Figure 5 *Complex semantic and phonological poles*

[11] This last configuration is not common in English, though it is more so in some other languages. The word *re-up* meaning 're-enlist' approximates it, though the *up* (cf. *sign up*) is not clearly affixal. *Fl…*, *sl…*, *sn…*, *…ip*, *…ap*, *…op*, and similar 'sound-symbolic' formatives, if they are taken as affixal, link up in structures of this sort (*flip*, *flap*, *flop*, *slip*, *slap*, *slop*, *snip*, *snap*, etc.) See Tuggy 1992 for more detailed discussion of these sorts of phenomena and the stem-affix gradation generally.

Complex semantic poles are easily documented in the complex entries that any reasonably complete dictionary has for most of its words or morphemes. But even where a dictionary gives one meaning it often covers up considerable complexity. For instance, the meaning APPLE, for many American English speakers, has as its prototype something like a Red Delicious apple, with its typical red color (when ripe), sweet taste, tallish shape, particular consistency, common usage for eating raw, and so forth. Other kinds of apples, such as Granny Smiths, Pippins, Galas, Rome Beauties, and so forth – which may be rounder or squatter, green or yellow or of variegated colors when ripe, tarter and crisper, more commonly used for making pies or applesauce or cider, etc. – are, however, very good exemplars of the category as well. Crab apples and custard apples are not very good exemplars, and rose apples are even less so, to the point where many would deny that they are apples at all. The good examples generally fall under the schematic characterizations given by most dictionaries (e.g. Webster's Seventh New Collegiate: "The fleshy usu. rounded and red or yellow edible pome fruit of a tree (genus *Malus*) of the rose family.") It can easily be seen that if the 'edible' specification is relaxed crab apples can be fit in, and if the genus specification (with its Latin name which of course is not part of the meaning for many English speakers) is relaxed, custard apples can fit in, and if both are relaxed rose apples fit. An extension from this cluster of meanings allows the tree on which prototypical apples grow to also be called an apple, and a further extension allows wood from such a tree to be called apple. The whole cluster of meanings, as suggested in Fig. 5.x, constitutes the semantic pole of the morpheme *apple*.

The phonological pole of the plural morpheme is similarly complex. The endings [-z], [-əz] , and [-s] are all well-established as variants of each other. Again, schemas can be extracted representing the commonalities among these structures, and the whole complex (represented in 5.y), is the pole of the plural morpheme.[12]

Clearly these kinds of complexity are not limited to morphemes, as again can be documented easily by consulting a dictionary. The word *constitutional*, for instance, has meanings related to foundational documents of organizations but can also mean a walk undertaken with a view towards improving one's health. It also has differing pronunciations as a word alone and as the first element of the word *constitutionality*. Similar complexities can be documented for both the semantic and phonological poles of more schematic constructions as well.

These kinds of complexity are, on CG's view, perfectly normal. As a limiting case, a single cognitive configuration may constitute a semantic or a phonological pole, but there is no strong pressure for this to be the case. By the very nature of complex categories, it is not always possible to specify how many subcases should be distinguished (e.g. how many senses constitute the semantic pole of *apple*) nor how they should be grouped – it depends on the relative saliences of the units, the density and saliences of the categorizing relationships, and the purposes of the

[12] Displays of a schematic hierarchy of morphemes with identical semantic or phonological poles should be considered a notational variant of the type of diagram in Fig. 5. Such a display, corresponding to 5.y though less complete, may be found in Fig.7.ah and its three subcases.

analyst. “The definition allows a single network to be divided into lexical items in multiple and mutually inconsistent ways. I regard this as a realistic characterization of the phenomena in question.” (Langacker 1987: 388).

3.4 Schemas for compounds

Stems commonly join together to form compounds, where neither element depends strongly on the other. As an example, consider *apple butter* (6.z). This form is established (for many American English speakers, at least) in its own right and thus, by the CG definition (section 1.1), is part of the grammar of English. It also belongs to several extended families of forms, one of which is a family of compounds whose first element is *apple* (6.ac and subcases), another of compounds ending in *butter* (6.ae and subcases), and one of FoodN-FoodN compounds (6.ad and subcases). Other *apple*-N compounds would include *apple jelly*, *applejack*, *apple cider*, *apple blossom*, *apple orchard*, and so forth.[13] Clearly some of these are more closely related than others to *apple butter*, and a schematic network can easily express those relationships, e.g. by schemas such as 6.aa. Other N-*butter* compounds would be *cocoa butter*, *garlic butter*, *honey-butter*, *peanut butter*, and others. Since *cocoa butter* is (for many Americans, at least) primarily an ingredient in skin care products and only secondarily, if at all, an edible commodity, it is represented as an extension rather than an elaboration (subcase) of 6.ab.

Neither the *apple*-N schema (6.ac) nor the N-*butter* schema (6.ae) is likely to be particularly well-entrenched. There are not that many compounds subsumed under either pattern, nor are they particularly common. The more-specific *apple*-Food and Food-*butter* schemas (6.aa and 6.ab) include the majority of the specific forms, and their sanction is therefore likely to be more important for forms like *apple butter* (by principle (c) of section 2.5). Furthermore, the connection between *apple* and the *apple*-N patterns, and between *butter* and the N-*butter* patterns, are not very strong. *Apple* and *butter* can easily be, and often are, activated without activating the compounding patterns. This is in direct contrast with the N-*z* pattern (4.u) which is well-entrenched itself, and which is inevitably activated whenever *-z* is activated. Thus, while the *apple*-N and N-*butter* patterns can rightly be thought of (and are represented in Figure 6) as providing e-sites for the construction, the degree of dependence through those e-sites is minimal. *Apple* and *butter* remain stems and not affixes.

These schemas are themselves subject to further schematization. 6.aa and 6.ab are subcases of 6.ad, the relatively well-entrenched FoodN-FoodN schema, which includes hundreds of examples like *banana pie* and *shrimp cocktail*, and 6.ad in turn is a subcase of the component-N schema 6.af, which includes thousands more

[13] For the question of whether some of these are single words or not, see section 4.2. On the CG view, it is not a crucial question. The differences in accentuation can be made definitional for the question if one wants, but it is far from clear that this is generally revelatory. In other words, nothing prevents a linguist from setting up a schema that specifies a primary stress on the first stem and a secondary or no stress on the second stem, and calling it by the name ‘compound’; but that would not deny the important generalities represented in Figure 6 which ignore that specification.

examples, such as *paperboard*, *iron horse*, *cotton shirt*, etc. 6.af and all other right-headed N-N compounding patterns, including 6.ac, are subsumed by 6.ag.

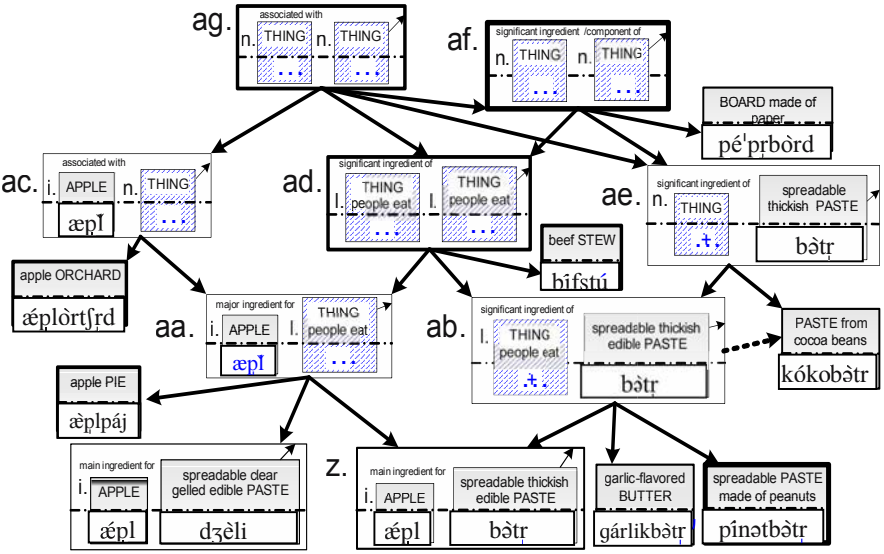

Figure 6 *Apple butter and schemas sanctioning it*

6.ad, 6.af and 6.ag are noteworthy in having multiple e-sites, and in fact in being constituted largely by those e-sites. These are the analogues, in CG, of what other models might call morphological rules. They are even more closely the analogues of the constructions of Construction grammar (Fillmore et al. 1988; Goldberg 1995). But clearly they differ not in kind, but only in degree of schematicity, from structures such as 6.aa, ab, ac and ae, which specify one of their e-sites more fully, and they in turn differ only in degree of schematicity from fully specified compounds like 6.z and the others displayed in Figure 6. Similarly the difference between something like 6.aa-ac or ae and an affixal structure like 4.u is only a matter of the strength and inevitability of the cognitive connection between the morpheme in question and the construction of which it is a part.

Note also the repeated use of schematic structures from Figure 3 as e-sites in these constructional schemas (6.l = 3.l, 6.n = 3.n; also of course 6.i = 3.i). This is directly parallel to the appearance of 3.m as the e-site of the plural constructional schema 4.u, and is quite typical. It confirms the grammatical utility of such hierarchies as Figure 3.

Finally, note that in all the structures in Figure 6 the second bipolar element (i.e. the one whose phonological pole follows the other) is represented as schematic for the semantic construction as a whole. This is in accordance with the facts that APPLE BUTTER is a kind of EDIBLE PASTE rather than a kind of APPLE, an APPLE ORCHARD is a kind of ORCHARD rather than a kind of APPLE, PAPERBOARD is a kind of BOARD

rather than a kind of PAPER, and so forth. This is (at least the major part of) what constitutes headship for CG: the head of a construction is that element whose semantic pole is elaborated by the construction as a whole.[14] If the suffix *-z*, in 4.u and its subcases, were represented in a box different from that of the construction as a whole (a notational variant which is shown for 4.u in 7.u), it also would be shown as head, since *apples*, and all plural nouns, designate a group of items of the same type rather than an APPLE or other non-plural THING.

The fact that *apple butter* has several layers of schemas above it is by no means a feature unique to compounds: Fig 7 shows several layers of schemas above *-z* as well. 7.ah embodies the topmost schema of 5.y, and is strongly prototypical relative to the other patterns of plural formation (the suffix *-en*, stem-vowel change, and zero).[15] There may be a schema 7.ai which subsumes them all, but it is not necessary. If there is all it can say is essentially, 'do something or nothing to mark plurality.' It is marked with dashed lines and rounded corners to indicate its marginal status.

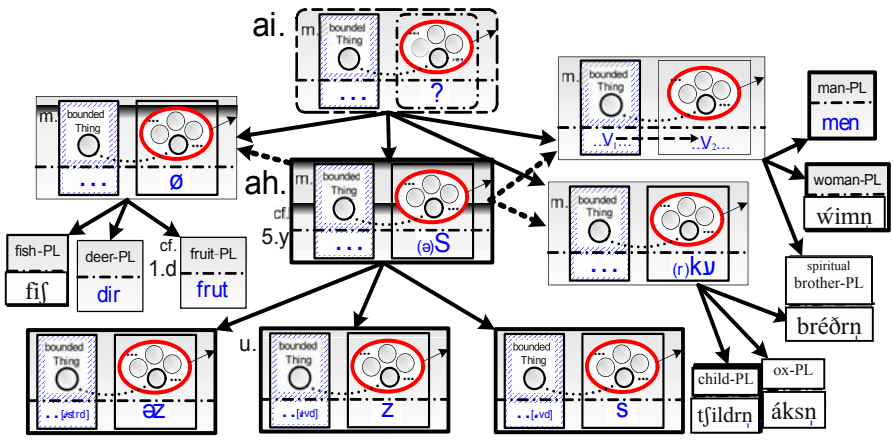

Figure 7 *Plural constructional schemas*

[14] The term often used in CG writings is the *profile determinant* (*profile* = 'designatum'). Profile determinance may be thought of as a major component of what might be termed "semantic weight," and the notion of semantic weight approximates that of some other traditional usages of 'head'. *-z* is clearly profile determinant in *apples*, as noted above, but *apple* carries the vast majority of the semantic weight apart from specifying the kind of profile, and this explains why analysts have differed as to which element is the 'head' of such words.

[15] Zero morphemes and process morphemes such as the stem-vowel change fit naturally in the CG model as limiting cases of affixation. A zero morpheme analysis turns out to be identical, under CG, to an analysis of semantic extension (Langacker 1987: 470-474).

3.5 Structural descriptions, creativity and productive usage

The *-z* suffix, including the Stem-*z* construction which automatically comes along with it (7.u), characterizes many independently-established words such as *apples*, *oranges*, *raspberries*, *tables*, and so forth. It sanctions all these words (section 2.5), and gives speaker-hearers a solid basis for understanding or analyzing them. The higher-order schemas 7.ah and 7.ai provide a somewhat lesser degree of sanction (lesser because they are more distant, point (c) of section 2.5). Similarly the set of schemas 6.aa-6.ag sanction *apple-butter* and its relatives. The set of such schemas which sanction a form constitutes its *structural description* (Langacker 1987: 428-433). They embody the linguistic generalities to which it conforms.

The same patterns, however, can also be used to craft, or to understand, new words.

Suppose a person has never encountered the word *guillotines* before, but hears someone else say it. The word *guillotine* (4.w), we are supposing, is already established. It is very easy to plug this autonomous, already-existent bipolar structure into *-z*'s e-site and allow the resultant structure to sanction the particular pronunciation and contextual meaning of the novel word. Essentially the same thing would happen for a person who thinks of a group of several guillotines and co-activates the stem and the suffixal construction to guide his pronunciation of the new word. This kind of usage is diagrammed in 4.v. As in 7.ai, the dashed lines and rounded corners of the boxes indicate that the structures, in this case the combinations of GUILLOTINE with PLURAL and of [gílətĩn] with […z], as well as the whole structure *guillotines*, are not (yet) established as part of the linguistic system.

Similarly, the N-N compound schemas of Figure 6 can be used to sanction the formation and understanding of novel structures. Suppose an English speaker has never heard of 'apple pancakes' and runs across the term in a cookbook. He or she will immediately recognize *apple* and *pancakes*, and perceive the extremely close similarity of this to the schema 8.aa (= 6.aa), and the likelihood in any case that, since it consists of two food nouns following each other, it is a subcase of the well-entrenched FoodN-FoodN construction 8.ad (=6.ad). The result will be a structure such as 6.aj, Similarly, if one wants to construct a new form to describe a curry dish in which octopus is a major ingredient, the easiest thing to do is to use the words *octopus* and *curry* in a construction (8.ak) sanctioned by 8.ad. Even in the absence of more specific constructions *octopus*-FoodN or FoodN-*curry*, (which, if they exist, are likely to be quite marginal), such sanction is enough.

This is how rule-governed linguistic creativity works under CG. The same schematic structures that are extracted from well-entrenched (sub)cases may (though they need not) also be used as patterns for generating novel subcases. Thus sanction is central to both the understanding of already-established forms and the production of new ones. So the model is not geared only towards the formation of new words nor only towards the analysis of the existing word-stock; rather it accommodates both with the same mechanism.

The difference between rule-governed creativity and linguistic creativity in a more general sense is a matter of the strength and closeness of the sanction the established system affords a novel usage. This is certainly stronger for *guillotines*

(4.v), for instance, than for *octopus curry* (8.ak), and other, less directly sanctioned, more highly creative, formations are certainly possible (e.g. *Freddage*, mentioned in section 1.1, or the Jabberwockian word *slithy*.) They are sanctioned by extension (partial schematicity) rather than full schematicity. But the differences are, as usual, matters of degree.

To the extent that such usage to sanction the formation or understanding of non-established structures itself becomes entrenched and habitual, a structure may be said to be productive (Taylor 2002: 289-293). *-z* (or the Stem-*z* construction) is quite productive, as such things go. It is readily, and reasonably often, called into service to deal with novel usages. *Apple*-FoodN is much less productive: speakers do not commonly invent new compounds of that type, though if occasion warrants, they will no doubt do so readily enough. The FoodN-FoodN construction is doubtless more productive, though in many cases it will be sanctioning the novel structure through one or more more-specific schemas on the order of 8-6.aa and 6.ab. Only occasionally will it sanction directly as in the (putative) case of 8.ak. It is certainly not as productive as the Stem-*z* construction.

If CG is right, other linguistic models have badly overestimated how much of usage is in fact productive. For instance, words like *apples*, *oranges*, *raspberries*, *shoes*, and so forth, are commonly thought of as produced by a grammatical rule of pluralization operating on their respective singular forms. This is valued because it allows one to simplify the posited grammar by no longer listing the plural forms themselves in the lexicon. CG, to the contrary, encourages us to take seriously the likelihood that these and thousands of other commonly used plural nouns are in fact learned by speakers and thus do reside in the lexicon as conventional units, readily available for use without constructive effort.[16] Even a word like *guillotines*, once it has been used a few times as in this and the preceding paragraph, is on its way to being entrenched and conventionalized. Only a minority of the forms whose structure is in accordance with the Stem-*z* schema are likely to be fully novel. But in the end, it does not matter a great deal whether a usage is novel for one or another interlocutor or both. If it is novel it can be readily constructed or understood, and if it is already established, all the more so.

[16] Bybee (2001: 109-113) summarizes a number of studies that make the general point that complex forms, regular as well as irregular, tend to behave as lexically stored items according to how frequently they are used. Perhaps most relevant to the immediate point is Sereno and Jongman (1997), in which relatively high-frequency regularly inflected English plurals produced faster response times than the corresponding singulars, whereas when the singular was the higher-frequency item, it produced the faster response times.

Traditional generative theory gives the impression, if it does not claim as a basic fact, that if a form follows a general pattern it is unlikely to be learned, perhaps even impossible to learn. CG suggests rather that such conformity to the known tends to make the form easier and thus more likely to be learned.

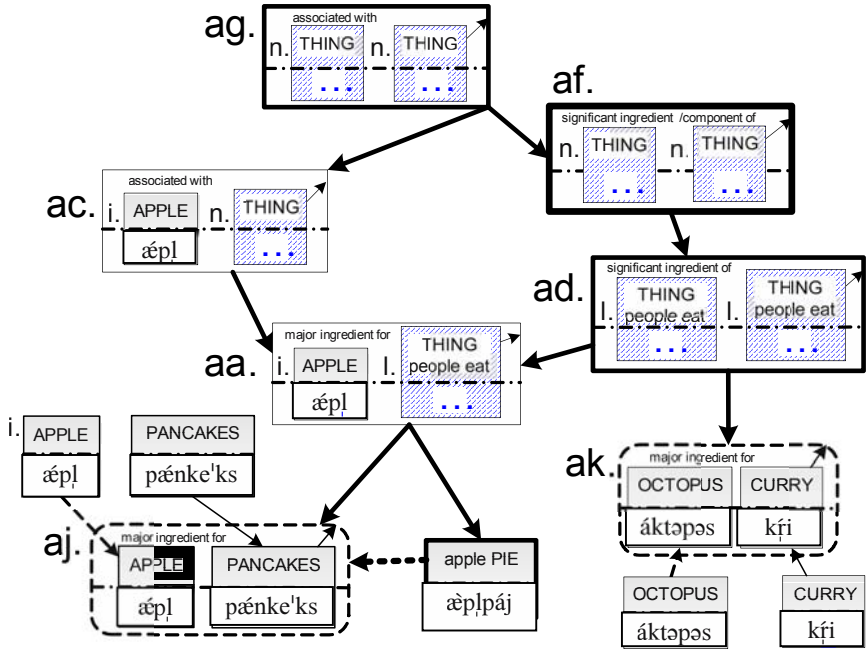

Figure 8 *Productive use of compound constructional schemas*

Even the most productive morphological schemas, then, are likely to have more established than novel subcases. And the token-frequency of their novel usages is (naturally) much smaller even than the type-frequency. On the other hand, many schemas that linguists have branded as non-productive still occasionally sanction novel forms. The 'strong' English verb patterns (*slide>slid*, *break>broke>broken*, *sing>sang>sung*, etc.) are commonly cited as non-productive, but I have collected several dozen forms that were novel to me and quite possibly to those who spoke or wrote them (e.g. *I just about froke out when she said that*, *I brothe a lot easier once the window was opened*, *had you ever hung-glid before?*, *he had lotten go of the kitestring*, *with his composition [Mahler] only rept mockery and derision*). It is gratuitous to write off forms like these, idiosyncratic and even anomalous though they are, as performance errors or something of the sort, not to be accounted for by the same grammatical mechanisms that explain novel usages elsewhere.

A structure's productivity is somewhat independent of its prominence or degree of establishment, though of course it results in increased usage and so naturally increases them. For example, there is a family of noun-*age* words, where *-age* usually means a mass-type construal of (many instances of) the noun. This is a rather common pattern, and a very old one. Some examples are relatively transparent (e.g. *acreage*, *baggage*, *footage*, *parentage*, *leafage*, *usage*), though even in these cases their meanings are typically a good bit less than fully predictable (i.e. they are not fully compositional semantically). E.g. a collection of paper bags does not constitute *baggage*, nor a collection of parents *parentage*, nor a collection of feet *footage*, a

pile of fallen leaves is not *leafage*, though the leaves belonging to a particular tree are, and so forth). Sometimes *-age* appears where it is less than obvious what noun (or other kind of stem) precedes the *-age* (e.g. *carnage*, *courage*, *garbage*, *pillage*, *silage*, *village*, *vintage*.)[17] This noun-*age* pattern was rarely used during my lifetime, as far as I am aware, to form novel structures, until the mid-1990's, when I suddenly started hearing many new forms from my children and others of their generation. (E.g. *That woman has whole closets full of shoeage*, or *We need some more chairage in here*, or as a pretty girl walked by at the beach, *Whoa, there goes some serious babeage!*) What changed? The cognitive routine of using noun-*age* to sanction a novel structure was repeated enough that in certain social groups it achieved unit status. In other words, noun-*age* became productive. Its extension to a proper-noun-*age* construction such as *Freddage* is still norm-bending and quite creative, but if it spread enough it too would become normal.

Productivity, in sum, is one more of the gradual parameters of CG. It is not the case that productive morphology can be taken care of in one module and non-productive morphology in another: the two categories overlap far too much, and individual patterns vary far too much along the parameter of productivity, for that to be feasible.

It is worth noting that *-z* is non-absolute in another important way: by no means every word ending in [z] is sanctioned by it. Nouns like *haze* and *rose* are not plural, nor are verbs like *broils* or *slumbers*, and though words like *sneezes* and *fries* in some contexts are plural nouns in *-z*, in other contexts they are singular verbs. This lack of absoluteness is quite typical with relatively short affixes, though in some cases something nearer absoluteness holds (e.g. the vast majority of words ending in [izm] are Stem-*ism* constructions.) And of course most words beginning with [æp̩l] are *apple*-Stem structures (though words like *Appalachian* must be considered as well).

3.6 Sanction (of various kinds) from components

The stem *apple* (4.i) is represented as identical to a part (the first part) of *apples* (4.a), and similarly *guillotine* (4.w) is shown as identical to the first part of *guillotines* (4.v). This is a common type of component relationship, but not the only one. It is also common for the relationship to be a one-way schematic relationship. Thus in *apple butter* the meaning of *apple* is something like PEELED, CORED, COOKED AND PUREED MASS APPLE(S). This is either an elaboration of a more schematic meaning for *apple* which despecifies the count/mass distinction, or else an extension from something like the topmost schema of 5.x. In neither case is the relationship one of identity. More strikingly, the designatum of *butter* in *apple butter* is something that would not in other contexts be called *butter* at all. And there are many other cases where more drastic results obtain. At the far distant end might be something like *eavesdrop* where the meaning of *eaves* may be something like 'place

[17] It also occurs with verbs, forming a noun which may be a count noun (e.g. *carriage*, *haulage*, *luggage*, *marriage*, *package*), and some forms can be analyzed as having either a noun or a verb stem (e.g. *postage*, *wreckage*). Note that *village*, listed in the text, is also a count rather than a mass noun.

where one might listen surreptitiously', and *drop* might refer to words being spoken where they can be overheard. In such cases the relationship between the component as an independent structure and its usage within the complex construction is not one of identity or of full schematicity.

Sanction at the phonological pole also may vary from identity to full schematicity to partial schematicity. [ǽpl̩] may be fully recognized, unchanged except perhaps in very minor details, in [ǽpl̩z]. Similarly [ivz] and [drap] are quite recognizable in [ívzdràp], despite the imposition of a special stress contour (much like the ones on [ǽp̩lbə̀tr̩] or [æ̀p̩lpáj]). But [ǽnələ̀ˈz] (the phonological pole of *analyze*) is not so easily recognizable within [ənǽləsìs] (*analysis*), nor [kənsív] (*conceive*) within [kánsèpt] (*concept*).

CG simply requires of a component that it sanction some part of the complex construction. This can range from sanctioning through a rather tenuous relationship of partial schematicity (as in the case of EAVES as a component of EAVESDROP or [ǽnələ̀ˈz] as a component of [ənǽləsìs]) through cases where there is a more solid partial schematicity relationship (the case of prototypical APPLE as a component of APPLE BUTTER) to cases of full schematicity (the case of schematic PIE as a component of APPLE PIE or of [drap] as a component of [ívzdràp]) to cases of identity (the cases of APPLE and [ǽpl̩] as components of *apples*.) The differences between these types of components are matters of degree, and there is no non-arbitrary dividing line where they could be split into disjoint categories.

Besides this cline of similarity of the component to what actually occurs in the construction, there is a cline of *analyzability*, namely the degree to which the components are discerned at all. In some constructions (e.g. *cockroach hotel*) the components are likely to be highly salient as such. It is hard to imagine someone saying or hearing the construction without discerning the parts (i.e. strongly activating the schemas *cockroach* and *hotel* to sanction the parts of the construction.) But for structures like *breakfast*, or *cigarette*, or *filth*, or *halter*, it is entirely normal for speakers to activate the whole without particularly activating *break*, *fast*, *cigar*, *-ette*, *vile*, *-th*, *halt*, or *-er*, and in fact many speakers will claim they never had realized that those pieces might be components of the words.

Yet a third parameter of difference is the degree to which the components together exhaust the meaning of the construction. (This parameter is often called *compositionality*.) *Apples* does not mean much, or perhaps anything, beyond what could have been deduced from the meanings of *apple* and of *-z*, given the mode of their combination, nor is there much if anything in [ǽpl̩z] that does not come from [ǽpl] and [...*z*]. But in many constructions there are important parts of the meaning and (a bit less often) the sound that cannot well be attributed to any of the components. The notion of the first noun being an ingredient or component of the second is part of the construction in 6-8.aa., 6.ab., 6-8.ad. and 6-8.af. In the abstract, there is not a good way to tell from the components *apple* and *butter* that the designatum of apple butter is not, for instance, an apple that has been packed with butter, or butter flavored with apples, or any of a number of other possible construals. And, once more, other cases are often more extreme in this regard. For

instance, no one could get from *cockroach* or from *hotel* the information that what is designated is in fact a plastic compartment inside of which cockroaches are poisoned, or from *cocoa* and *butter* that *cocoa butter* is an ingredient for skin lotions. Nor could one tell from *shut* and *out* that a *shutout* is a game in which one team is prevented from scoring, or from *cow* and *lick* that a *cowlick* is place where hair grows in a swirl on a person's head, or from *slam* and *-er* that a *slammer* is a jail, or from *Adam's* and *apple* that an *Adam's apple* is a prominent larynx.

Apples, then, is a limiting case along three parameters: (i) its components sanction their respective pieces of the construction by relationships of full identity rather than more distant or partial schematicity; (ii) they are prominently discernible in the construction, so the construction is highly analyzable; and (iii) the construction is highly compositional: there is little or nothing of the meaning or sound that is not sanctioned by one of the components. Such structures fit the building-block model reasonably well, but the other cases we have mentioned do not. For linguistic theories which assume the building-block model, cases like these are problematic and must be dealt with by some mechanism other than the one that handles *apples*. In CG none of them causes any theoretical problem;[18] rather they are all handled by the single mechanism of sanction. Sanction can vary in its distance and partiality, in its importance or even whether it is invoked at all, and in its completeness of coverage. The fact that *apples* and other structures like it stand at one extreme on these three parameters does not make them different in kind from structures which are more towards the middle or the other end, nor does it cause a disconnect between the ways they are handled by the theory.

3.7 Components and patterns for the whole; overlapping patterns and multiple analyses

As we have seen (section 3.2), the second component of *apples*, *-z*, does not consist only of the part of *apples* that does not overlap with *apple*. Rather it includes, as an invariant feature or specification, the Stem-*z* construction (4.u), which is schematic for the whole of *apples*. This is in fact another kind of limiting case: a component which sanctions the whole of the construction rather than just a proper subpart of it.

The total overlap of the semantic area sanctioned by *apple* by that of *-z* is noteworthy. Under the building-block model it does not make sense that the components should overlap at all, but under the CG model it is not only natural, it is virtually inevitable (point (1) of section 4.1). It is, in fact the overlap of components that permits their being united into a coherent whole. And it causes no problem for the one piece to totally overlap another.

Of course constructional schemas like 6.aa-ag also overlap completely with the specific structures they sanction. They also can be seen as components at the limiting pole of inclusiveness. And of course the cases that have part of the

[18] This is not to say, of course, that they are necessarily all equally easy for speakers to learn or use.

semantics and phonology more fully specified (6.aa-ad, 6.ae) are especially similar to affixal structures like 4.u.

A related issue is that of multiple analyses, cases where more than one set of components (including constructional schemas) can sanction a structure. CG provides no bar to this. A word like *hangman* may be sanctioned in some speakers' minds by *hang*, *man*, and a Verb+Subject compound schema (so that a hangman is understood to be a *man* who *hangs* people, just as *cutgrass* is *grass* that will *cut* you), while for other speakers it may be sanctioned rather by a Verb+Object compound schema (so that a hangman is a person who *hangs* a *man*, just as a *killjoy* is person who *kills* people's *joy*.) For yet other people both schemas may be concurrently active.

For any of the above simultaneous sanction from an unanalyzed, unitary, morpheme-like stem *hangman* or *cutgrass* or *killjoy* is perfectly possible. This is of course closely related to the issue of analyzability (section 3.6); as sanction by such an unanalyzed structure is becomes primary over sanction from other possible components, the analyzability of the form fades.

3.8 Constituency

Another related issue is that of different constituencies or orders of construction and analysis. When more than two components are combined, there often is a standard order of combining or of decomposing a whole into its parts. This corresponds to what is generally called *constituent structure*. CG views constituent structure as by nature somewhat variable, and typically no great issue hangs on the order in which things are combined, or analyzed out. This is particularly true of phrase or clause-level structures, but even within words it often holds true. Langacker lays this out clearly (1987: 310-324, 2000: 147-170), saying "the kinds of constituents reflected in syntactic phrase trees are neither essential nor fundamental to linguistic structure. They are instead … *emergent* in nature, … arising in language processing just in special (though not untypical) circumstances."

The word *unbelievably* might be analyzed first into *un-* and *believably*, and *believably* into *believe* and *-ably*, yielding the constituency *un*[[*believe*]*ably*] (9.al), or it might be first *unbelievable* and *-ly*, then *un-* and *believable*, then *believe* and *-able*, in which case [*un*[[*believe*]*able*]*ly* (9.am) emerges, and there are a number of other possibilities as well. *Believable*, *believably*, *unbelief*, *unbelievable*, *-ably*, and (arguably, perhaps (un)deniably) *un-…-able* and *un-…-ably*, are all pre-established units in many speakers' inventories, and can be pulled "off the shelf" to form the basis for *unbelievably* or to sanction parts of it or each other. And of course *unbelievably* is itself a unit which can be activated alone (9.an).[19] The meanings and the phonological structures add up to be the same thing in any case, under CG, and

[19] Saying that these constituencies are all possible does not mean they are all equally probable. The independent existence or not, and degree of entrenchment, of such word partials as *unbelief*, *believable*, *-ably*, *un-…-able*, etc., clearly has an effect on the likelihood that they will be prominently recognized in the word or used in its construction. Also the nature of the constructional schemas available to guide the construction or analysis affects things.

different speakers may well do it differently, or do it differently on different occasions, and still communicate perfectly well. What matters more is *how* the pieces are combined (or analyzed out), not *when* or *in what order* or even precisely *which pieces* get combined (or analyzed).

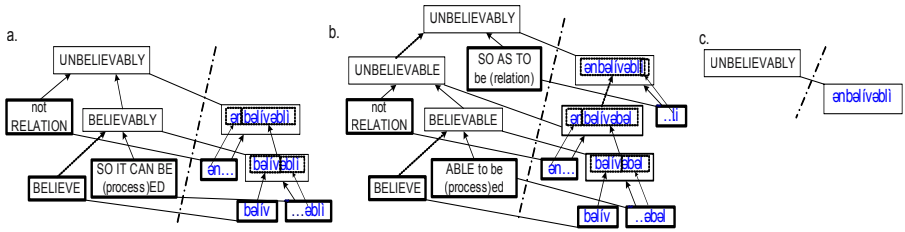

Figure 9 *Alternate constituencies*

4.OVERVIEW OF OTHER ISSUES

Many theories start out presupposing the validity of the building-block and container metaphors, assuming that lexicon, morphology and syntax are incommensurate 'modules' operating by quite different rules, that the stem / affix, component / noncomponent, and component / (morpho)syntactic pattern differences are absolute, that either a form is 100% in the lexicon or 100% produced by the grammar, that either a pattern is productive or it is not, and so forth. They typically go on to posit many other absolute categories, exceptionless principles, and strict rules. Many of these will show up under CG as strong tendencies, for which it is always of interest to seek some sort of functional explanation, but they will not be absolute.[20]

The following sections give extremely brief characterizations about how certain issues are dealt with under CG.

4.1 Valence

Valence involves the relationships between the components of a structure. Very briefly:

1. There always is some overlap of meaning (correspondence of parts of the meanings) which forms the connection between two components. Even if you try to invent a form composed of semantically unconnected parts, people will connect them. Often these connections are multiple, not infrequently they involve quite peripheral parts of the meaning.

[20] Much linguistic argumentation has proceeded by assuming a hard-and-fast distinction between categories, and then exhibiting as representative only cases from opposite ends of the spectrum, which indeed look rather different. In-between cases are either (1) crammed uncomfortably into these absolute categories, (2) consigned to a separate compartment or module', or (3) ignored.

2. Typically the components differ in dependence, with one relatively dependent, and the other autonomous. In section 3.2 we noted the importance of this difference (coordinated at both poles) for defining the stem-affix distinction. Cases of mutual dependence (each fills a hole in the other) and non-dependence (neither fills much of a hole in the other) are not uncommon.
3. Typically one semantic component is fully schematic for the composite semantic structure. This component is the head of the construction (section 3.4). There is nothing incoherent, however, in a double-headed or non-headed construction, and many exist of both types.
4. When the head depends (at the semantic pole) on its companion, you have a head-complement structure. When the head is autonomous and its companion depends on it, you have a head-modifier structure. The differences between them are matters of degree, and plenty of intermediate cases of several kinds exist.

(See Langacker 1987: 277-377, 1991b: 165-183 for further discussion of these matters.)

Constituency (section 3.8) may also be seen as a part of valence. Some theories define subject and object, or head and modifier, in terms of a constituent ('tree') structure, which therefore must be fixed. CG does not. Semantically-based definitions of head and modifier are immediately above in (4); subject and object have to do with cognitive prominence, not constituency.

4.2 The morphology-syntax boundary

It is exceedingly difficult, if not impossible, to come up with a definition of 'word' that works in all languages. A reasonably good one might be "a stem (or combination of stems), plus any affixes attached to it."[21] But as we have seen, the stem-affix distinction is a matter of degree (section 3.2) and so is the distinction between affixes (or stems, for that matter), and separate words. In CG this is not seen as a crucial issue. Elements can be more or less tightly bound to the phonological core of a word, and whether or not they are taken as tightly enough bound to be 'in' the word, as long as the proper connections are made as they are integrated into the complex structure, a close-enough semantic result will obtain that communication can take place, and so it doesn't much matter if it is different for different speakers.

The model presented here utilizes exactly the same mechanisms and definitions for syntax as we have seen for morphology. The two domains are not in separate 'modules' of the grammar, and nothing very important hangs on whether a formation is considered to be morphological or phrasal. It can change from one category to the other gradually over time, and speakers are unlikely to be bothered by the change at all.

[21] Taylor's (2002: 171-175) attempt to characterize the notion in terms of a word's phonological stability, phonological integrity, phonological promiscuity, and semantic coherence, while interesting and important, is, if taken as criterial, problematic even for English, and more so for other languages, particularly agglutinative languages. It is a reasonable approach to characterizing a prototype for the notion, and it may well be that in the nature of the case that is all we can do.

Literate English speakers have their sensibilities trained by strongly reinforced conventions for writing some things separately and others connected, but even so there are cases where contradictory conventions occur (e.g. *can not* vs. *cannot*, or *cup full* vs. *cupful*). Hyphens are used as a sort of orthographic halfway/half-way/half way point between writing as single words or as phrases. Many languages have families of phonological patterns that help define words. English is fairly typical in (usually) allowing only one primary stress per word, and some sounds may pronounced in special ways at word boundaries. A mechanic's manual contained the remarkable compound noun *torsion bar control arm spring anchor housing*. Although this was written as if it were separate words, it is pronounced with only one primary stress (on the word *spring*, for me), and thus conforms to the pattern for English single words.

Sometimes differences of constituency (section 3.8) can affect word boundaries, and that again is no problem for CG. For instance, what is *up* [*on the table*] for one speaker can be [*upon*] *the table* for another, and communication still work fine. There is no necessary hard-and-fast line between what is or is not part of a given word.

Some have thought that specialization of meaning coincides with storage in the lexicon, and accordingly give it great importance in this regard. CG rejects that assumption, claiming rather that novel items may be specialized from birth, and many quite predictable, non-specialized forms are entrenched in the lexicon. Also, there is an enormous inventory of established English phrasal structures that have specialized, not-fully-predictable meanings. Many of these behave in certain ways, or in particular circumstances, more like words than like phrases. A large class that often does this are 'verb-particle' structures like *throw up*, *fall down*, *get over*, *stick out*, and so forth.

In certain cases English conventions allow whole phrases to be converted into what are effectively single words. Traditionally these are often written with hyphens: e.g. *She's a know-it-all*; *He's a really off-the-wall kind of guy*, *with an in-your-face*, *put-up-or-shut-up kind of an attitude*. Again, the difference between what are word-formation patterns and what are phrasal syntactic patterns is not a *hard-and-fast* one.

4.3 Inflection vs. derivation

Some affixes make major changes in their stems, often producing a composite structure in a different grammatical class (section 3.1, Figure 3). *-able* and *-ly* (cf. Fig. 9) are of that type. Such affixes tend to act unpredictably and not to be highly productive, though some are quite predictable and productive. Other affixes make only relatively minor, predictable changes, and may be required by certain kinds of constructions. Some of these are highly productive. An example would be the suffix *-s* 3RD PERSON SINGULAR SUBJECT, as in *crackle-s*. The first kind are known as derivational affixes, and the second as inflectional. As usual, the differences between them are matters of degree, and very many affixes are derivational in some respects and inflectional in others, or somewhere between inflectional and

derivational for a given parameter (Tuggy 1985, cf. Bybee 1985: 81-110). (The plural suffixes in Figures 4-6 are examples.)

There is a strong tendency in many languages for more strongly derivational affixes to occur next to stems, in effect forming new, larger stems, and for inflectional affixes to occur 'outside' them. Just as the distinction is a matter of degree, so this pattern is a tendency, and not an absolute rule. The CG account would certainly not set up separate modules to handle these two types of morphology.

5. WHAT'S SPECIAL ABOUT ENGLISH WORD FORMATION?

The question may be asked, what is there that is special about English word formation as opposed to word formation in any other language? The answer that CG gives is a simple one: what makes English special is its particular inventory of established words and schemas. And the same is true of any other language, of course.

But it is worth pointing out a few general characteristics of the English set of established structures which are somewhat unusual and give English words a rather different 'flavor' from those of many other languages.

English has, more clearly than a number of other languages do, an extensive repertoire of sounds that vaguely suggest kinds of meanings without quite achieving the separate prominence and clarity of meaning that prototypical morphemes have. Structures such as *fl*... and *cl*... and *cr*... and *str*... and ...*ap* and ...*ash* and ...*ip* and ...*op* are of this type. They are not usually productive, but can be so. For instance, a woman recently used the word *flumptuous* to describe a full-skirted Zapotec dress, and the author's family used the word *blap* to mean something like '(with) a sharp non-rebounding blow'. One special type (among quite a few others) involves a reduplicative syllable or pair of syllables, with a change of the main vowel, often from [ɪ] to an [æ] or an [a]. Examples would be *riff-raff*, *shilly-shally*, *fiddle-faddle*, *kitty-cat*, *zig-zag*, *slip-slop*, *tip-top*, *hip-hop*, *flip-flop*, *sing-song*, *King Kong*, etc. These and other 'ideophonic', 'phonaesthetic' or 'sound-symbolic' structures (Rhodes and Lawler, 1981, Hinton et al. 1994) give certain English words a kind of 'ring' and a sense of appropriateness to their meanings that I do not know how to duplicate in any other language I know. (Those languages, of course, have special structures of their own that cannot be duplicated very well in English.) Under CG the schemas expressing the commonalities of these structures are perfectly normal schemas that just happen to be limited in the number of their sub-cases and the percentage of the vocabulary they might characterize, and tend not to be salient in speakers' minds. Other theories often consider them 'peripheral', and may exclude them from a language's word formation 'component' (though they may be accounted for by non-morphological *lexical redundancy rules*). Under CG they fit perfectly well into the spectrum of structural types that may be expected.

English exhibits a definite propensity for diminutivity, even monosyllabicity, in its lexical formulations; on the other hand, it likes long words too. It is like 'isolating' languages in the first quality, and resembles 'agglutinative' languages in

the second. This is in some degree a result of English being historically an amalgam of Germanic Anglish and Saxon, which contributed lots of small, pithy words to the vocabulary, with Latin-based French, which brought in lots of derivational constructions. There is still a notable tendency, 800 years later, for the short words to be those of Germanic origin and the long ones to come from Latin.

An ubiquitous manifestation of the aforementioned propensity for diminutivity is the prevalence of *zero-derivation*, where you simply plop a word into a construction requiring the 'wrong' category and let people figure out what you mean. As Calvin (of Calvin and Hobbes) said, "Verbing nouns weirds language." And of course as such coinages catch on and are entrenched and start to form patterns, the language changes. Many kinds of zero-derivation are quite common and even productive in English, including noun-to-verb and verb-to-noun, or intransitive-to-causative/transitive and causative-to-intransitive changes. Examples would include (*rear*) *wheel* vs. *wheel* (*it over here*), *cook* (*potatoes*) vs. (*a good*) *cook*, (*the door*) *opened* vs. (*she*) *opened* (*the door*), (*she*) *drives* (*the car*) vs. (*the car*) *drives* (*easily*). One common result is that it comes to be difficult or impossible (and unnecessary) to determine for sure which kind of stem an affix is attaching to. E.g. is *wreck-age* derived from the noun or from the verb *wreck*? If it is the verb, is it the intransitive verb or the transitive one? In some languages this kind of indeterminacy is much less often tolerated: stems tend to stay put in their categories, and affixes attach to only one kind of stem. The habit of making words out of phrases (section 4.2) is also related to the zero-derivation habit, and is somewhat unusual among the world's languages.

English is also unique (though not entirely unprecedented) in its combination of a long history of writing and a prolific literary tradition, enormous numbers of speakers and readers, vast geographical distribution, and usage as a *lingua franca* for many peoples and professions. It is spoken as a second language by great numbers, and by many conversant with other cultures. It has enjoyed very widespread diffusion through radio and television, which of course was not an option for any language up till the last century. English speakers have tolerated or even welcomed (more than speakers of some other languages) words of non-English origin. It is also a part of the culture of many English-speakers to enjoy and applaud (and thus encourage) clever and creative word-play. All of these factors contribute to a great richness of the English lexicon.

6. CONCLUSION: IMPLICATIONS OF ACCOUNTING FOR MORPHOLOGY BY SCHEMAS

Let us summarize some of the implications of analyzing word formation patterns as schemas. A number of these ideas contrast with the explanations other theories give in terms of rules or templates of various sorts for combining building-block morphemes.

- These are 'bottom-up' rather than 'top-down' structures. The primary data are the specific cases from which a generalization is extracted. These are typically

established as units in their own right, and if the generalization were removed from the grammar they would not necessarily disappear with it. This coexistence of structures at different levels of generality (schematicity) is extremely central to the theory.

- The rules of other theories need not resemble at all the structures they are supposed to produce. This is especially true of various sorts of filters, which decry bad or undesirable patterns rather than producing good ones. Schemas by definition embody the commonality of the established (good) patterns, and are automatically activated in the mind every time a good structure that they describe is used.
- Structures (at all levels of schematicity) can vary greatly in how well-entrenched they are in a given speaker's mind. Besides that, it is to be expected that speakers will differ among themselves in the degree to which different structures are established or conventionalized, as long as the inventory of them matches well enough for communication to take place. Such variations are the crucible of language change.
- The schemas for words and word-pieces are bipolar, symbolic structures like the particular cases. Morphology and syntax, like lexicon, deal with paired sounds (or other signals) and meanings. Most of what we have discussed is as relevant to syntax as it is to morphology.
- Phonological generalizations or rules are not different in kind from semantic or morpho-syntactic or morphophonemic rules or generalizations. They are all schemas, constituted by what is common to the cases they subsume.
- These generalizations are not expected to be absolute. They cover the cases that they cover to the degree that they cover them. The existence of relevant cases which they do not cover, or even of other cases and patterns which contradict them, does not deny their existence.
- There is an important difference between small-scale, 'iffy' generalizations like those of 6.aa-ac and ae, or the *fl*... and ...*ap* of *flap*, and robust, highly entrenched schemas supported by thousands of examples, like those of 4.u, 6.ad, 6.af, and 6.ag. Yet the difference is a matter of degree, not an absolute difference in kind. The mechanisms that are necessary to account for the 'iffy' cases function perfectly well to account for the highly entrenched, productive ones as well. There is neither reason nor any motivated way or place to draw a line between a 'component' or 'module' for 'regular' or 'productive' morphology and one for less-regular or less-productive morphology.
- Networks of schematic relations can become quite complex: it is absolutely typical for a structure to elaborate (and thus receive sanction from) a number of different schemas.
- Some structures (components) sanction proper subparts of a structure. Others, including constructional schemas, sanction the whole. The difference between the two types is one of degree.
- The same sanctioning structures, be they constructional schemas or components, are used both by speakers and by hearers, for construction of novel structures and

re-construction of already-established ones, and for analysis of novel or established ones.

- Structures differ in analyzability, the extent to which one can discern in them sanction from components. The difference between components and non-components is a matter of degree.
- Stems sanction a subpart of a complex structure. Affixes are strongly linked to constructions which sanction the whole but leave the affix's companion (the stem) unspecified. The difference between affixes and stems is a matter of degree.
- Process morphemes, zero morphemes, reduplications and other 'exotic' morphological mechanisms can be handled with the same apparatus as the more common additive morphemes ('normal' roots and affixes), and differ from them only in degree, not in kind.
- Schemas can sanction novel structures, functioning as patterns for their formation and thus legitimizing them. Such sanction can range from being so completely automatic that one hardly notices it (e.g. 4.u → 4.v) to norm-bending cases like *Freddage* or *flumptuous*.
- Productivity, the habit of using a schema to sanction novel structures, is a matter of degree.
- Constituency, the order in which pieces are put together to form, or analyzed out of, a complex structure, is often variable, with the same overall meaning and sound achievable through alternate orders.
- The difference between what is and what is not part of a given word is not always clear, and may vary.
- As a limiting case there may be absolute rules or laws of morphology in a given language, but they are very much the exceptional case. Most categories and distinctions are matters of degree.

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REFERENCES

Bybee, Joan. 1985. *Morphology: A study of the relation between meaning and form. Typological Studies in Language*, Vol. 9. Amsterdam and Philadelphia: John Benjamins.

Bybee, Joan. 2001. *Phonology and natural language use*. *Cambridge Studies in Linguistics*, 94. Cambridge: Cambridge University Press.

Fillmore, Charles J.; Kay, Paul; and O'Connor, Mary Kay. 1988. "Regularity and idiomaticity in grammatical constructions: the case of *let alone*." *Language* 64, 501-538.

Goldberg, Adele E. 1995. *Constructions*: *A construction grammar approach to argument structure.* Chicago: University of Chicago Press.
Hinton, Leanne; Nichols, Johanna; and Ohala, John J. (eds.) 1994. *Sound symbolism*. Cambridge: Cambridge University Press.
Lakoff, George and Johnson, Mark. 1980. *Metaphors we live by*. Chicago: University of Chicago Press.
Langacker, Ronald W. 1987. *Foundations of Cognitive grammar: Vol. I, Theoretical prerequisites.* Stanford CA: Stanford University Press.
Langacker, Ronald W. 1991a. *Foundations of Cognitive grammar: Vol. II, Descriptive application.* Stanford CA: Stanford University Press.
Langacker, Ronald W. 1991b. *Concept, image, and symbol: the cognitive basis of grammar*. Berlin & New York: Mouton de Gruyter.
Langacker, Ronald W. 2000. *Grammar and conceptualization*. Berlin and New York: Mouton de Gruyter.
Moore, Terence, and Carling, Christine. 1982. *Language understanding: Towards a post-Chomskyan linguistics*. New York: St. Martin's Press.
Rosch, Eleanor. 1973. "On the internal structure of perceptual and semantic categories." In: T. E. Moore (ed.), *Cognitive development and the acquisition of language*, 111-144. New York: Academic Press.
Reddy, Michael J. 1979. "The Conduit metaphor – A case of frame conflict in our language about language." In: A. Ortony (ed.), *Metaphor and thought*, 284-324. Cambridge: Cambridge University Press.
Rhodes, Richard A., and Lawler, John M. 1981. "Athematic metaphors." *CLS* 17, 318-342.
Sereno, Joan A., and Jongman, Allard. 1997. "Processing of English inflectional morphology." *Memory and Cognition* 25, 425-37.
Taylor, John R. 2002. *Cognitive grammar*. Oxford: Oxford University Press.
Tuggy, David. 1985. "The inflectional/derivational distinction." *Workpapers of the Summer Institute of Linguistics at UND* 29,209-222. Grand Forks, ND: SIL.
Tuggy, David.1992. "The affix-stem distinction; A Cognitive grammar analysis of data from Orizaba Nahuatl." *Cognitive Linguistics* 3/3, 237-300.

WORD-FORMATION IN NATURAL MORPHOLOGY

WOLFGANG U. DRESSLER

1. INTRODUCTION

Whereas 'natural' has often been used by linguists in an inductive way as a synonym of intuitively plausible or of cross-linguistically frequent, in *Natural Morphology* (henceforth NM), 'natural' is synonymous with cognitively simple, easily accessible (esp. to children), elementary and therefore universally preferred, i.e. derivable from human nature, or with the terms unmarked or rather less marked: for in NM it is clearly a relative, gradual concept. This establishes a first difference with its two main forerunners, namely Jakobson's (1941) concepts of markedness (including his introduction of the Peircean semiotic notion of iconicity) and Stampe's (e.g. 1973) model of Natural Phonology (cf. Wurzel 1988a).

Properties which go back to these forerunners are the search for a motivation of morphological principles and preferences outsides morphology, both a) in other components of language such as syntax, phonology, discourse and the lexicon and b) outsides the linguistic system, i.e. psychological, neurological, cognitive, semiotic motivation; the assignment of equal importance to internal and 'external' evidence (particularly from diachronic change and language acquisition); functional explanation (cf. Dressler 1995, 2002).

Functional explanation starts with the two main functions of language, the communicative and the cognitive function, i.e. the function of supporting cognition. Word formation serves both main functions. The specific main functions of word formation are partially shared with inflectional morphology, i.e. semantic and formal motivation of a complex or derived word by its parts or, in a rule format, by its base(s) and the word-formation rules deriving the complex word. Only word formation, but not inflectional morphology, has the lexical function of lexical enrichment. In addition to these major functions, there exist very minor functions, such as the textual function of providing anaphoric, cohesive links between chunks of text.

The theory of NM (cf. Kilani-Schoch 1988, Dressler et al. 1987, Dressler 2000a) takes naturalness as a cover term for a set of more specific terms which are defined in three subtheories: 1. a universal markedness theory of system-independent morphological naturalness (cf. Mayerthaler 1981), focussing on universal preferences, 2. a theory of typological adequacy (cf. Dressler 1985a, 1988a), 3. a theory of system-dependent naturalness or system-adequacy (cf. Wurzel 1984, Dressler and Ladányi 2000). These subtheories function as subsequent filters on possible and probable words of a language: what is allowed or even preferred universally, may be rendered dispreferred or even disallowed by typological adequacy and then by language-specific system adequacy.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 267—284.

2. UNIVERSAL, SYSTEM-INDEPENDENT MORPHOLOGICAL NATURALNESS

2.1 Preferences

This subtheory of universal markedness is a *preference theory* (cf. Vennemann 1983, Dressler 1999). Preferences of NM differ from violable constraints of Optimality Theory particularly insofar as they are based on external foundations, i.e. not postulated ad hoc, and as their interaction is not extrinsically ordered but depends both on principles of interaction (cf. section 4.3) and on the filtering by the subsequent subtheories (see above). Much discussion of these differences can be found in Dziubalska-Kolaczyk (2001). More similarities to NM can be found in Cognitive Linguistics (cf. Croft and Cruse 2004). For a comparison between Cognitive Linguistics and Optimality Theory, see Nathan & Winters (2001).

Universal preferences hold both for grammatical and extragrammatical morphology (often called plain vs. expressive morphology, cf. Zwicky & Pullum 1987, Dressler 2000b). What unites extragrammatical morphology are various violations of universal properties. Thus echo-words such as *tick-tock*, *hip-hop*, *zig-zag* may be formed either from a left-hand or a right-hand base or have no existing base at all. Also blends (contaminations) such as *smog* (from *smoke* and *fog*) and other abbreviatory operations are extragrammatical.

Naturalness does not refer to any global or overall preference, but to what is universally preferred separately on each of a restricted number of naturalness parameters established deductively by universal markedness theory. Each of the following parameters and its preference degrees are deduced from the extralinguistic bases mentioned in 1 (cf. Dressler et al. 1987, Kilani-Schoch 1988, Dressler 2000a).

2.2 Preference for iconicity

The best-known semiotically-derived parameter is the parameter of *iconicity*, based on Peirce's (1965) concept of icons with its hypoicons, i.e. images, diagrams and metaphors.

Images are the most iconic hypoicons insofar as they represent a direct similarity between signans and signatum. A case in point is the preference for expressing diminutive formation via palatality (cf. Dressler & Merlini Barbaresi 1994, 2001, pace Bauer 1996). This is clearest with small children. Thus, in a famous diminutive-formation experiment devised by Berko (1958), the youngest age group formed a diminutive from a nonsense word, such as *wug*, by changing the vowel into the most palatal one and thus producing *wig*. Older children produced suffixed diminutives with the palatal suffix, as in *wugg-ie*, whereas adults produced less iconic diminutives such as *wug-let*, *wug-ette* as well.

Diagrams represent an analogy between the relations of the signans and the signatum. Thus the fact that in the compound *corner stone* the second element *stone*

is both the morphosemantic and the morphotactic head, whereas the first element *corner* is the non-head on both levels (i.e. signans and signatum, and the same holds, with reversed roles, for its twin compound *stone corner*) is diagrammatic. For it holds that a *corner stone* is a type of *stone*, with which it shares its syntactic and semantic features of being an inanimate, concrete noun (morphosemantic headhood) and that the plural suffix is affixed to the same second element (morphotactic headhood), and this establishes an exact, diagrammatic parallel between the morphotactic and the morphosemantic head-nonhead relations in the signatum and the signans. (Semantic headedness is most evident in so-called pleonastic compounds, where the head is a hyperonym of the non-head, as in *oak-tree* (cf. Bloomer 1996). Such optimal diagrammaticity holds for most English compounds and for all the productive ones, but not for the type *pickpocket*, where in the signatum the first element governs the second one, whereas the plural suffix is still added to the second element (cf. also below section 4).

The most important instance of morphological iconicity occurs in the subparameter of *constructional iconicity* (cf. Mayerthaler 1981). According to Peirce's (1965) classification of icons, the following examples of English derivational morphology can be classified as follows: the noun *denominat-or* is derived from the verb *denominate* in a diagrammatic way, because of the analogy of addition in meaning and form, whereas the derivation of *song* from *sing* is only metaphoric (i.e. with weaker iconicity), because addition of meaning is paralleled not by addition but modification of form. Finally, the conversion of *to cut* to *a cut* appears to be non-iconic, because addition of meaning is not paralleled at all by change in form. Crocco-Galèas, however, has maintained in several publications (e.g. 1990, 2003a) that conversion represents a morphological metaphor, i.e. a metaphorical operation which is signalled by the difference in syntagmatic collocation in different syntactic frames.

The anti-iconic operation of grammatical subtraction does not occur at all in English word formation.

Since the amount of naturalness decreases on this subparameter of constructional iconicity from affixation over modification, then conversion to subtraction, we can predict that crosslinguistically affixation should be more frequent and productive than modification and much more so than conversion, not to speak of subtraction. This is true (cf. Dressler 1982) and holds also for English, with the exception of conversion being more frequent than modification. Moreover conversion is very productive in English, modification not at all. This makes Crocco's proposal of defining conversion as metaphoric instead of non-iconic, quite attractive, because then modification and conversion would be both metaphoric and no rank order of frequency and productivity would be predicted.

Even a higher amount of iconicity can be predicted for extragrammatical morphology, since there universal preferences are not curbed by grammatical system adequacy. Thus echo words, such as *zigzag* are highly iconic: the repetition of the consonantal frame *z_g* diagrams repetitions in the word's meaning, the change of the vowel symbolizes metaphorically change of direction.

Extragrammatical subtraction occurs in all abbreviatory devices and derives there from a conscious action of economizing. The relatively high amount of

awareness in the formation of abbreviations of all types and the lack of a semantic difference between the input and the output of the abbreviatory operations of clipping, acronym formation, etc. separate them (as being extragrammatical) from grammatical word formation.

Small children prefer higher degrees of iconicity even more than adults, not only in the above-mentioned case of diminutives but also on the subparameter of constructional iconicity, i.e. their first morphological rules are diagrammatic suffixation rules.

2.3 Indexicality preferences

Another parameter derived from Peircean semiotics is the parameter of *indexicality*. An index is a sign where the signans directly refers to the signatum. All of morphology is indexical insofar a morphological marker refers to the base of the rule that introduces it. This fulfils the semiotic definition of an index which refers deictically to its nearby object. Thus also on this parameter, affixation is more natural than modification, because the indexical relation between an affix and its base is clearer, and much more so than conversion, which lacks an overt signans. Moreover, in indexical relations, as already claimed by the Greek Stoics and by Peirce, adjacency is preferred to distance. This preference has been radicalized into the status of a constraint, Siegel's (1977) adjacency constraint/condition.

Therefore affixation of a marker to an immediately adjacent base is preferred to having something inserted between an affix and its base, as is the case with intermediate interfixes, e.g. in Sp. *pueblo* 'village' → diminutive *puebl-ito* and, with interfixation, *pueblo-ec-ito* (cf. Dressler & Merlini Barbaresi 1994), where the interfix *-ec-* is inserted between the base and its diminutive suffix *-ito*. English lacks this unnatural morphological operation, as well as meaningless interfixes between two elements of a compound (as in German, Dutch and Slavic languages), unless one analyses the element *-o-* in *gas-o-meter* as an interfix.

Another consequence of the adjacency preference is the preference for fixed morpheme order within a morphological word (due to stacking affixes to their respective bases), always maintained in English but not in very agglutinating languages such as Turkish, Quechua and Mari.

Most of the compounds in all languages have their head within the compound, thus they are endocentric compounds, such as in *blackboard*, which is a type of board. Exocentric compounds have their head outsides or more precisely, the head has to be inferred. Thus a *loud-mouth* is a person who, metaphorically, has a loud mouth, *bare-foot* an adjective derived from a noun-phrase, *pick-pocket* is a person who picks pockets, and a *pass-port* was originally a document which allows to pass a port. Endocentric compounds are by far preferred to exocentric compounds in the languages of the world, because they allow much easier access to the head, i.e. they are more natural on the parameter of indexicality. Sometimes endocentric and exocentric compounds are morphologically differentiated. For example, the plural *sabre teeth* refers to teeth (endocentric), the plural *sabre tooth-s* to animals having sabre teeth (exocentric).

2.4 Preference for morphosemantic transparency

From the semiotic preference for transparency (Koj 1979), we can derive the two parameters of morphosemantic and (2.5) morphotactic transparency. On the parameter of *morphosemantic transparency*, full transparency means fully compositional meaning, as is generally the case with inflectional meanings. Motivation of a complex or derived word by its parts or by applying a word-formation rule to its bases (or bases in case of compounds) is best served in case of optimal transparency (on the preference character cf. Rainer 2001).

In word formation, morphosemantic transparency can never be complete, because Frege's principle of semantic compositionality can hold only for syntax where the meaning of a syntactic unit is typically fully derivable from the meanings of its syntactic constituents (except in idiomatic phrases, such as *to kick the bucket*). This does not hold for word formation, insofar as all accepted words are stored and thus lexicalised (Bauer 1983, Meyer 1992), whereas not yet accepted neologisms, generally, realise only one of the potential meanings of a compound or derivation. Thus we must differentiate between transparent word formation meaning (G. Wortbildungsbedeutung, cf. Corbin's 1987 notion of *sens construit*) and lexicalised word meaning. Hence word formation rules can only predict word formation meaning but not the opacifying differences between word meaning and word formation meaning.

The end point of *opacification* (= non-transparency) is fossilization, where members and their combination are hardly visible, if at all. For example, E. *lord* and *lady* are not recognizable as compounds any more, E. *nostril, gospel, handsel* barely for the first member, if at all. In contrast, E. *dandelion* may be recognized as a compound, whose first member is difficult to identify, whereas its second is semantically totally opaque (diachronically a loan from Fr. *dent de lion*, lit. 'tooth of lion'). Less lexicalization means more transparency, more lexicalisation more opacity. More transparency implies more motivation of the compound via its members.

Due to Frege's *principle of compositionality*, the meaning of a non-idiomatic noun-phrase, such as *a high school* is fully compositional and thus transparent, the cognate compound *high-school* is not. Still the compound high-school may be classified as a morphosemantically transparent compound, because the meaning of the head is fully transparent and because the semantic motivation by its first member (non-head) is still evident: *a high-school* is high in a metaphorical sense, i.e. relatively high in contrast to elementary and grade school. In fact, *a high-school* is a specific instance of what a 'high school' may mean potentially. Thus, in a first approximation, we may define an actual transparent compound as one whose meaning is a subset of the set of potential meanings of the compound as constructed grammatically via the combination of the meanings of the two parts. This is more precise than Shaw's (1979) criterion that the head must be an hyperonym of the compound. This is also relevant for psycholinguistic research on non-existing, but potential compounds. They are always transparent, but their use depends on the possibility to instantiate via (e.g. metaphorical) inferences a pragmatically plausible potential meaning.

Based on this approach and following Libben (1998) we can differentiate the following four fundamental degrees of morphosemantic transparency (which are clearer and more systematic than Shaw's 1979):

1) transparency of both members of the compound, e.g. *door-bell*,
2) transparency of the head member, opacity of the non-head member, e.g. *straw-berry*,
3) transparency of the non-head member, opacity of the head member, e.g. *jail-bird*,
4) opacity of both members of the compound, e.g. *hum-bug*.

This scale of transparency presupposes that transparency of the head is more important than of the non-head.

Further refinement is possible, if we differentiate between direct and indirect, i.e. metaphoric motivation (cf. de Knop 1987), which would allow to divide degrees 1) – 3) above into subdegrees with metaphorically motivated vs. unmotivated opacity. opacity. Thus *ratchet tooth* has a transparent first member, but a metaphorically motivated second member (the leaves are compared with teeth), thus belonging to the less transparent variant of transparency degree 1).

The same procedure is possible with derivations. For example, the agent noun *undertak-er* belongs to an opaque variant of transparency degree 1), insofar as the meaning of the lexical base undertake is specialised into a very specific undertaking. In derivation, however, transparency of the head is much more important than in compounding. In fact, there appears to be an, at least implicit, unanimity among morphologists to speak of, for example, an agent noun only, if it is really an agent noun, i.e. if the morphosemantic contribution of the suffix *-er* is transparent. Otherwise, one speaks of instrument nouns (e.g. *print-er* of a PC, (*Geiger*) *count-er*) or local nouns (e.g. *din-er*, *sleep-er*).

In principle, compounds are morphosemantically more transparent than derivations, because they are more descriptive (cf. Seiler 1991), for example, the compound *dishwashing machine* tells the language user more about what it is, than the derivation *dishwash-er*, i.e. the compound serves better the function of semantic motivation than the corresponding derivation (cf. Crocco-Galèas and Dressler 1992). Therefore, in the process of first language acquisition, several children have been observed to replace temporarily the less transparent (and ambiguous) agent and instrument noun *open-er* with *open-man* and *open-thing* respectively (Clark, Hecht, and Mulford 1986).

2.5 Preference for morphotactic transparency

On the parameter of *morphotactic transparency*, the most natural forms are those where there is no opacifying obstruction to ease of perception. Purely phonological processes opacify very little, e.g. resyllabification, as in *roast* → *roaster* or the application of compound-stress rules, as in *blǻck bóard* → *blǻckboard*. More morphotactic opacity occurs when morphonological rules intervene, such as in *conclude* → *conclusion*, even more so in cases of allomorphic rules, as in *divide* →

division, *five* → *fifth*, *broad* → *breadth*. Most opaque is suppletion, as in *three* → *third* (weak suppletion) and even more in *one* → *first*, *two* → *second* (strong suppletion).

Another aspect of the preference for morphotactic transparency is the preference for continuous (rather than discontinuous) morphs. Therefore suffixation and prefixation is preferred over infixation (discontinuous base) or circumfixation (discontinuous affix). Thus diminutive/hypocoristic suffixes are generally preferred to such infixes, as in Sp. *Cesar-ito* vs. *Ces-it-ar*, hypocoristics of the name *Cesa*r (cf. Méndez Dosuna and Pensado 1990). English has no infixation, other than within extragrammatical morphology of forming depreciatives, as in *absolutely* → *abso-blooming-lutely*. Circumfixes can occur only in languages which have a rich prefix system (e.g. German and Dutch). Thus English has none and is thus more natural in this respect than those closely related languages.

Bases of word-formation rules are, ceteris paribus, morphotactically and morphosemantically most transparent, if they are autonomous words in their uninflected form, already less so in their inflected citation form (Dressler 1988a, cf. Rainer 1993: 98ff). This universal preference for word-based morphology applies to compounding even more than to inflection and derivation. Smaller bases than autonomous words are more opaque and occur in English, in contrast to Latin, Slavic and Semitic languages, very rarely, for example in the Latinate prefixed verbs *re-ceive, per-ceive, con-ceive, re-duce, ad-duce, con-duce*, etc., whose bases are morphosemantically opaque anyway.

Larger and thus also universally less preferred bases are represented by inflected words which are not identical with citation forms. Such bases are very rare and restricted in English, e.g. *sport-s-man, sale-s tax* with a pluralised first base (cf. Jensen 1990). Pluralised second bases are wide-spread in Romance languages.

Still larger bases, namely phrases appear in synthetic compounds of the types *dish-wash-er* and *lion-heart-ed*, *good-natur-ed* (cf. Crocco Galéas 2003b), in the type, *three-star general*, *three-phase motor*, *three-color process*, etc., where the modifier of the noun-phrase in the non-head position is often difficult to omit (e.g. *star general* belongs to a different compound type and designates a 'general who is a star'). For other phrasal-compound patterns cf. Lieber (1992: 92ff) and Booij (1992: 45ff). Whole sentences as first members of a binary compound occur only rarely, such as in *do-it-yourself movement,* which is less natural than *eye movement.* Complex sentences occur only in consciously formed occasionalisms, such as *an oh-what-a-wicked-world-this-is-and-how-I-wish-I-could-do-something-to-make-it-better-and-nobler-expression* (J. K. Jerome: Three Men in a Boat).

There is an interaction between the parameters of iconicity and transparency. Often we find in the same type of word formation a tendency towards iconicity between morphosemantic and morphotactic transparency/opacity. For example comparable nominal compounds tend to be morphotactically opaque when they are morphosemantically opaque. For example, the first base is morphosemantically more transparent in *mother-land* and *main-land* than in *Dixie-land*. In analogical parallelism in morphotactics, the phonological shape of the second base has more rarely a reduced (ant thus morphotactcially more opaque) vowel in the first and second than in the last compound.

2.6 Preference for biuniqueness

Another semiotically-based parameter has *biuniqueness* as its most natural option. Biuniqueness, which holds if one and the same form always has the same meaning (and vice-versa), is more natural than uniqueness and especially ambiguity. Agglutinating languages have much morphological biuniqueness, English very little (cf. Bauer 1983, Plag 2003). For example, the suffixes *-able, -less* and many prefixes are biunique, although biuniqueness is relative even here because *-able* has the unproductive allomorph *-ible* and the meaning of *-less* overlaps with that of the prefix *un-*.

Examples of uniqueness (one-to-many relations) is the formation of ordinal numbers via the suffix *-th*, but *-th* also forms nouns from adjectives, as in *wid-th*, *bread-th*, *leng-th*. Or the suffixes *-ity* and *-ness* have no other function than forming nouns from adjectives, but they are competitors.

Examples of ambiguity (many-to-many relations) are the suffixes *-er* (agent and instrument and local nouns, comparative vs. agent nouns in *-ist*, *-ator*), *-al* and *-ant* (forming nouns and adjectives), *-en* (forming adjectives and verbs, also a plural marker), always in competition with other suffixes (cf. also Plag 2004).

Biuniqueness can be obtained more easily in terminology (Felber & Budin 1989: 122f). However even here terminologists do not strive for obtaining general biuniqueness but only terms which are biunique within each scientific domain (in the horizontal stratification of languages for specialized purposes), particularly for the most abstract level of theoretical argumentation (in the vertical stratification of LSP). Thus it is unproblematic that a term such as *articulation* has a very different meaning in phonetics and in medicine, as long as it has always the same meaning in phonetics and if this phonetic concept is not expressed by another concept as well. Sciences where different terms are indiscriminately used for the same concept (as often in pedagogy) are likely to get a low rating for such usage. Since, however, different schools of a discipline often tend to use the same terms differently, the quest for biuniqueness must be limited to the same text world, i.e. biuniqueness of a term should hold at least within the same text (cf. Dressler 1994: 956f). In addition we find a tendency to enhance biuniqueness of the morphologically decomposed parts of words, such as compound members, e.g. in attributing the sense of an applicative descriptive science to the combining form *-graphy*, as in *lexico-graphy*, *termino-graphy* vs. *lexico-logy*, *termino-logy*.

2.7 Figure-ground preferences

Another universal preference is the tendency towards *figure-ground* sharpening (Scherer 1984), i.e. for contrasting syntagmatically between a more important, more dynamic and clearer foreground and a less important, more static and fuzzier background. In word formation the head represents the figure, the non-head the ground. Therefore, as we have seen in section 2.4, morphosemantic transparency of the head is more important than that of the non-head. This is also another reason why endocentric compounds are preferred to exocentric ones (cf. section 2.3).

The figure-ground distinction between head and non-head is established by morphosemantic and morphotactic subordination of a non-head under the head (cf. section 2.2). This is by far the preferred situation in suffixation and compounding. The only partial exception in suffixation is diminutive formation (and augmentative and pejorative formation in other languages), as in *dogg-ie*, where the suffix does not determine the class of the base (a typical head property), unless in rare instances such as *brown-ie*, where the suffix transforms an adjective into a noun.

The preference for subordination of a non-head to a head holds even in exocentric compounds. Not only is the non-head morphosemantically subordinated to the absent head. But subordination holds, secondarily, even among the actually present members of exocentric compounds: *loud* is subordinated to *mouth* in *loud-mouth*, whereas in *pick-pocket* we find again non-uniformity of (secondary) head-hood: although the primary, semantic head which designates the person who picks pockets, is not expressed, *pocket* is, secondarily, the morphotactic head which determines inflection, whereas syntactically *pocket* is subordinated to *pick*.

In compounding, subordinate compounds are universally preferred over coordinate compounds which have two or more morphosemantic heads (cf. Wunderlich 1986: 241), i.e. without the clear figure-ground distinction of subordinate compounds. Thus in *speaker-hearer* both members are of equal status, although the plural ending attaches only to the right member, another example of non-uniform headhood. Coordinate (or coordinative) compounds may again be endocentric, such as *speaker-hearer* or the adjective *bitter-sweet*, also called appositional compounds, or they may be exocentric, such as *morphology-syntax interface,* where the two coordinated compound members have their semantic head outsides: it coincides with *interface,* the syntactic head of the whole noun-phrase. More subtle properties of coordinate compounds may differ considerably from language to language (cf. Olsen 2001): The linear order of members in coordinate compounds is not grammatically determined (since all members are equipollent), but pragmatically (e.g. the most important first) or stylistically, e.g. prosodically (e.g. the longest last). The first reason explains the order of *speaker-hearer* (because linguists tend to think more of the speaker than of the hearer, cf. the term *native speaker*), the second explains why the order of the synonym *speaker-listener* is even more difficult to reverse (?*listener-speaker*) than in the case of *speaker-hearer*.

On the syntagmatic level, this lexical-pragmatical grading of importance in *speaker-hearer* is antagonistic to the inverse morphological order of non-heads followed by heads in English and the majority of languages. The latter sequence represents a universal preference for heads to be on the right side of non-heads, called the righthand head rule by Williams (1981: 248). A minority of languages has large classes of lefthand-headed compounds as well (cf. Zwanenburg 1992a, b, Scalise 1992: 179ff, Rainer 1993: 57). This recalls the suffixing preference, whereby suffixes are preferred to prefixes. Most explanations of the suffixing preference start from the assumption that it is better for a word to start with the lexical basis (cf. Hall 1992), which would hold for both right-headed and left-headed compounds. Thus if one compares compounds, then the more valid generalisation seems to be that it is better for complex words to end with the head. This would also explain the tendency for prefixes not to be heads (cf. Hall 1992). An explanation for the right-hand head

preference may lie in the psycholinguistic recency effect which makes the end of a word more salient, which is especially important in early language acquisition (cf. Wijnen et al. 2001).

2.8 Preference for binarity

Semiotic and thus also grammatical relations are preferentially *binary*, as already observed by Peirce (1965: II.277), a preference which is maybe based on the binary nature of neurological information transmittance), and this both in paradigmatics and syntagmatics. As has been ascertained already within structural linguistics, even apparently ternary relations usually have to be split up into two binary relations. For example, morphology has to be subdivided into inflectional morphology and word formation, the latter in its turn into derivation and compounding.

In syntagmatic relations, the preferred patterning consists in concatenating one element to one base, for example by prefixing or suffixing to only one base, whereas in circumfixing (less natural) two elements are affixed to one base. The same holds for compounding, both in subordinate and coordinate compounding. This preference holds true for coordinated compounds such as *queen-mother* or *prince-consort*, but (due to entirely extralinguistic reasons) not for flags, e.g. *red-white-red* for the Austrian and Peruvian flag. Subordinate three-member compounds usually have to be grouped into two binary relations, e.g. [[[three][star]][general]], where the phrase [[three][star]] forms an intermediate unit.

2.9 Optimal shape of units

The *optimal extension* of a grammatical morpheme, be it an autonomous one such as pronouns or of a bound morpheme (prototypically an affix), is one syllable. The optimal extension of a simplex lexical word is one foot, which means in combination with the preference for binarity (2.8), a bisyllabic foot. The binarity preference also entails that one word has only one derivational or inflectional affix. If these consist of no more than one syllable, then the resulting word shape lies optimally still within the limit of a trisyllabic foot. English derivational affixes are indeed prototypically monosyllabic, such as the suffixes: *-cade*, *-cy*, *-dom*, *-fold*, *-ful*, *-hood*, *-let*, *-like*, *-ly*, *-ment*, *-ness*, *-ship*, *-scape*, *-some*, *-ward*, *-wise*, and without the syllable onset: *-age*, *-al*, *-a/ence*, *-a/ent*, *-ate*, *-ed*, *-ee*, *-eer*, *-en*, *-er*, *-ese*, *-esque*, *-ess*, *-ette*, *-(i)an*, *-ie/y*, *-ic*, *-ing*, *-ish*, *-ism*, *-ist*, *-ive*, *-ize*, *-ous*, *-ure*. Smaller shapes, such as the coda, are represented by *-c*, *-th*. Suffixes which extend over more than one syllable are: *-able*, *-ary*, *-ation*, *-ency*, *-ery*, *-ical*, *-ify*, *-itis*, *-ity*, *-teria*.

2.10 Alternative naturalness parameters

The naturalness parameters of 2.2 – 2.8 differ partially from Mayerthaler's (1981), which are essentially maintained by Wurzel (1984 and later).

For example, instead of the parallel pair of morphotactic and morphosemantic transparency, Wurzel has one single parameter of 'morpho-semantic transparency' with several subparameters. One of them is called 'semantic transparency (compositionality)' and corresponds to the parameter of morphosemantic transparency (2.4), whereas the subparameter of 'morphological (formal) transparency' corresponds to morphotactic transparency (2.5).

Mayerthaler's parameter of uniform symbolisation corresponds, on the one hand, to the parameter of biuniqueness (2.6). On the other hand, it is partially covered by the subparameter of the optimal base of a morphological rule (2.5).

When comparing such alternative solutions, the following criteria are relevant: which solution is more consistent, both internally and with the theory of naturalness? Which has a more solid extralinguistic base, including psycholinguistic evidence? Which one is terminologically more transparent? Which one is empirically more satisfactory?

Furthermore, which solution allows a better functional explanation? Thus morphological naturalness is connected to the main function of morphology which consists in word-internal morphosemantic and morphotactic motivation.

Which solution allows better intercomponential comparisons, i.e. which concepts have wider application in Natural Phonology, Natural Textlinguistics (cf. Dressler 1985b, 1990)? Thus preferences for iconicity, indexicality, transparency (incl. continuity), (bi)uniqueness, and binarity have been shown to hold in other components as well.

Finally, there is the criterion of coverage: Mayerthaler's (1981) three parameters of constructional iconicity, transparency and uniformity have much less explanatory coverage than the seven preferences of 2.2 – 2.8.

2.11 Predictions and conflicts

The above-sketched deductive subtheory of universal morphological naturalness preferences allows several predictions (cf. Mayerthaler 1981, Dressler 1985c):

Universal preferences should have a significant effect on cross-linguistic distribution. And in fact, more natural options on one parameter occur more frequently than less natural ones on the same parameter (cf. Dressler 1982). If such a frequency prediction does not hold cross-linguistically, then it is either falsified or it must be shown that diminution of statistical significance is due to naturalness conflicts, i.e. to conflicts between universal preference parameters within the morphological component itself or between preferences of different components, for example between morphology and phonology, a perspective put forward already by the Neogrammarians of the 19th century in their conceptualization of the diachronic conflict between sound law (G. Lautgesetz) and analogy (cf. Wurzel 1988b).

Morphosemantic transparency (1.4) holds much more in inflectional morphology than in word formation. Dressler (e.g. in Dressler et al. 1987) has tied this to a biuniqueness conflict within word formation, i.e. to a conflict between the tendency towards biunique form-meaning relations of morphemes vs. those of whole words. For example, in *flut-ist*, morpheme biuniqueness should hold separately for the

meaning and form of a) *flute* and b) agent noun formation with *-ist*, whereas whole-word biuniqueness holds for the whole complex word *flutist*. Since words as units have a semiotic priority over morphemes, lexical (whole-word) biuniqueness wins out and accounts for idiosyncratic lexicalisations in word formation. This is, predictably, not the case in inflectional morphology, because inflected words are not lexical entities in their own right.

The meager distribution of biuniqueness vs. uniqueness and ambiguity in general is due to another conflict, viz. with economy, i.e. parsimony of storage (cf. Ronneberger-Sibold 1980), a general cognitive factor.

More specific predictions hold for domains of external evidence. Thus, in diachronic change, more natural options should be more stable than less natural ones on one and the same naturalness parameter, and the direction of morphological change should be preferably towards more morphological naturalness. In addition to naturalness conflicts (such as the above-mentioned), there is a need for a specification of types of morphological change (cf. Wurzel 1994, Dressler 2002b).

Or in the domain of language acquisition, children should identify and acquire morphological rules the earlier the more natural these rules are according to universal parameters (cf. above 2.2, 2.4). But clearly naturalness conflicts are of a different nature in children than in adults (cf. Dressler & Karpf 1995).

3. TYPOLOGICAL ADEQUACY

Inspired by basic insights of Skalička (1979) on ideal language types which are approached by natural languages to a greater or smaller degree, and which consist of properties which favour one another, language types have been reinterpreted within NM as (alternative) sets of consistent *responses to naturalness conflicts*. Since not the most natural options on all parameters can be combined within one language, naturalness on certain parameters must be, so to say, sacrificed for greater naturalness on others (cf. Dressler 1985c, 1988a).

Thus the inflecting-fusional type (as approached by Old English) combines optimal values on the universal parameters of binarity (2.8), of optimal shape (2.9), figure-and-ground sharpening (2.7) and indexicality (2.3) with less than optimal values in constructional iconicity (2.2), morphosemantic and morphotactic transparency (2.4, 2.5) and biuniqueness (2.6). Rather the opposite holds for the agglutinating type, as well represented by Turkish. The isolating type has ideally no grammatical morphology, especially no inflection, but may have much extragrammatical morphology, and has a preference for monosyllabic words.

Modern English morphology presents a rather peculiar typological mix. Its morphological components or submodules approach different ideal types: English inflectional morphology is rather isolating, which is also the true for its greater preference for monosyllabic base words than is the case for other Germanic languages (except Afrikaans). Another impact of the isolating type lies in its very productive conversions. The Germanic stratum of its derivational morphology is rather agglutinating (in its great iconicity and transparency, including the preference for words as bases). In contrast, the Latinate stratum of its derivational morphology

approaches the inflecting-fusional type (especially in its allowance of less iconicity and transparency). Finally the richness of English compounding recalls the polysynthetic-incorporating type, including the allowance of noun incorporation as in the synthetic verbal compounds of the type *to dish-wash*.

Thus universally rather unnatural options may be typologically adequate if they fit the properties of the respective language type (in the framework of the subtheory of typological adequacy). In contrast to universal, 'paradigmatic' and autonomous naturalness (section 2.), typological naturalness thus is relational, in that it relates different universal naturalness parameters and various language components to each other. System-dependent naturalness (4) is then relational within the language-specific means and operations of a single component, e.g. morphology.

4. SYSTEM-DEPENDENT NATURALNESS

4.1 System-adequacy

Language-specific, system-dependent naturalness, as conceived by Wurzel (1984) for systems of inflectional morphology, represents what is normal or system-adequate within the morphology of a language, although it may contradict some universal morphological preference (as delineated in 2). Among competing system-defining structural properties the most dominant is the most adequate one.

For both the word stock and derivational morphology of English it is system-specific that they are not simply stratified according to a feature [+/– foreign], as most other languages (cf. Rainer 1993: 129f), but according to the feature [+/– Latinate] (cf. Plag 2004: 84). Thus suffixation with *-ity* is restricted to Latinate bases, whereas suffixation with *-ness* is non-Latinate. Non-Latinate derivation is dominant, thus *-ness* may also be attached to Latinate bases, as in *opaque-ness* as a variant of *opac-ity*.

The most important aspect of dominance is productivity. Morphological productivity, on the level of the potential system of grammar, can still be defined in Henk Schultink's way, as translated by van Marle (1985: 45) = 'the possibility for language users to coin, unintentionally, a number of formations which are in principle uncountable' (cf. also Bauer 2001).

As with many other concepts of naturalness theory, productivity is also gradual. This gradualness corresponds – similar to inflectional morphology – to the following hierarchy of linguistic criteria (cf. Dressler & Ladányi 2000):

a) Wurzel's (1984) secondary productivity in the integration of unfitting foreign words (where unfitting properties must be fitted, i.e. adapted to the indigenous system),
b) Wurzel's (1984) primary productivity in the integration of foreign words with already fitting properties,
c) derivation from indigenous abbreviations and other extragrammatically formed bases,

d) change within a derivational class,
e) other indigenous WF productivity

We start from the general assumption that it is more difficult to integrate words coming from a foreign language [marked alternative] than indigenous words [unmarked alternative]), 2) when these foreign words have unfitting properties, and 3) when these unfitting properties are 'fitted', i.e. accommodated to the properties of a derivational class or of the respective language-specific system adequacy in particular. Clearly a WFR must have optimal productivity in order to overcome the difficulties of (1) and (2) and to enforce accommodation (3). Similarly abbreviations are not formed via grammatical WFRs but by extragrammatical means and are therefore both marginal and marked within the lexical stock of a language.

It is very difficult to distinguish the first two criteria in contemporary English, because nowadays rather few foreign words are loaned into English and English WFRs are rather liberal with their input conditions. Lumping these two criteria together we can identify English right-hand-headed nominal compounding as fully productive, because it may be freely applied to nouns of foreign origin, e.g. *traffic jam spiel, delicatessen shop*.

Criterion c) can be illustrated with the ordinal-number-forming suffix *-th*. Although the domain of its application is severely limited, i.e. to cardinal numbers, it may freely attach to abstract numbers, as in *n-th*, *x-th*, and *a-th*, *b-th*, *c-th* are potential ordinal numbers. In contrast, the homophonous noun-forming deadjectival suffix *-th* (as in *warm-th*) is completely unproductive, because it cannot form any new noun from adjectives. Criterion d) applies mainly to diachronic substitution of one affix by another one, where substitution is preceded by a stage of competition between an older derivation with a less productive affix and a new variant which exhibits a more productive suffix (cf. Bauer 2001: 177ff), as in *apprais-al* vs. *apprais-ement*.

4.2 Dynamic vs. static morphology

Productivity has obtained a still more important role in a recent development of NM, which distinguishes the two interacting components of *static morphology* (the organisation of stored morphological forms, including stored compounds and derivations) and *dynamic morphology* (based on morphological rules, with its core in productive morphology). We assume in performance competition between dynamic and static morphology for all morphological constructions which can be handled both by rules and by direct lexical access (cf. for performance the morphological race model by Baayen & Schreuder 1991 and Frauenfelder & Schreuder 1992).

This means for word formation that, on the one hand, all accepted words are in the domain of static morphology, because their word meaning is lexicalised. On the other hand, all potential words (in the sense of Aronoff 1976), at least those formed by productive word-formation rules, are in the domain of dynamic morphology, but for all accepted, i.e. lexicalised words, dynamic morphology just handles word-formation meaning.

4.3 Universal vs. typological vs. system-dependent naturalness

Typological adequacy (section 3) may be understood as a filter and elaboration on universal naturalness/markedness (section 2), and language-specific system adequacy (4.1) as a filter and elaboration on typological adequacy. Each lower-level filter can specify and even overturn preferences of the preceding higher-order level (cf. Dressler et al. 1987, Bittner 1988, Wheeler 1993).

As a consequence, lack of the typological and the language-specific system-dependent filter leaves universal preferences intact. Therefore these play a higher role in the earliest phases of morphology acquisition by small children (cf. Dressler & Karpf 1995) and in extragrammatical or expressive morphology (Dressler 2000b, see above section 2.1), such as in echo-word formation. Symptomatically, small children produce many more echo-words and similar extragrammatical reduplications before they really start to acquire morphological grammar, i.e. before system-independent preferences of universal naturalness are filtered by language-specific system adequacy.

In such deductive and empirically accountable ways, the theory of NM distinguishes different types of naturalness and relates them between each other.

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REFERENCES

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. Cambridge: MIT Press.

Baayen, Rolf H. and Schreuder, Robert. 1991. “War and peace: Morphemes and full forms in a non-interactive activation parallel route model.” *Brain and Language* 68, 27-32.

Bauer, Laurie. 1983. *English Word-Formation*. Cambridge: Cambridge University Press.

Bauer, Laurie. 1996. “No phonetic iconicity in evaluative morphology.” *Studia Linguistica* 50, 189-204.

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.

Berko, Jean. 1958. The child’s learning of English morphology. Word 14. 150-177.

Bittner, Andreas. 1988. “Is anything 'more natural? Considerations on establishing a hierarchy of Naturalness Principles (NP).” *Linguistische Studien A* 188, 23-35.

Bloomer, Robert K. 1996. “Die pleonastischen Zusammensetzungen der deutschen Gegenwartssprache.” *American Journal of Germanic Linguistics and Literatures* 8, 69-90.

Booij, Geert. 1992. “Compounding in Dutch.” *Rivista di Linguistica* 4, 37-59.

Booij, Geert; Lehmann, Christian; and Mugdan, Joachim (eds.). 2000. *Morphologie/Morphology I*. Berlin: de Gruyter.

Clark, Eve; Hecht, Barbara; and Mulford, Randa C. 1986. “Coining complex compounds in English.” *Linguistics* 24, 7-29.

Corbin, Danielle. 1987. *Morphologie dérivationnelle et structuration du lexique*. Tübingen: Niemeyer.

Crocco Galèas, Grazia. 1990. “Conversion as a morphological metaphor.” In: J. Méndez-Dosuna and C. Pensado (eds.), *Naturalists at Krems*. Salamanca: Ediciones de la Universidad de Salamanca, 23-32.

Crocco Galèas, Grazia. 2003a. "The morphological technique of metaphoricity in English word-formation." In: E. Mela Athanasopoulou (ed.), *Selected Papers from the 15th International Symposium on Theoretical and Applied Linguistics*. Thessaloniki: Aristotle University, School of English, 135-151.

Crocco Galèas, Grazia. 2003b. "Compound adjectives in English: the type lion-hearted and good-natured." *Studi Italiani di Linguistica Teorica e Applicata* 32, 31-43.

Crocco Galèas, Grazia and Dressler, Wolfgang U. 1992. "Trasparenza morfotattica e morfosemantica dei composti nominali più produttivi dell'italiano di oggi." In: B. Moretti, D. Petrini and S. Bianconi (eds.), *Atti del 25. Congresso Società di Linguistica Italiana*. Roma: Bulzoni, 9-24.

de Knop, Sabine. 1987. *Metaphorische Komposita in Zeitungsüberschriften*. Tübingen: Niemeyer.

Dressler, Wolfgang U. 1982. "Zur semiotischen Begründung einer natürlichen Wortbildungslehre." *Klagenfurter Beiträge zur Sprachwissenschaft* 8. 72-87.

Dressler, Wolfgang U. 1985a. "Typological aspects of Natural Morphology." *Wiener linguistische Gazette* 36, 3-26 (reprinted in *Acta Linguistica Hungarica* 35, 1987, 51-70).

Dressler, Wolfgang U. 1985b. *Morphonology*. Ann Arbor: Karoma Publ.

Dressler, Wolfgang U. 1985c. "On the predictiveness of Natural Morphology." *Journal of Linguistics* 21, 321-337.

Dressler, Wolfgang U. 1988a. „Zur Bedeutung der Sprachtypologie in der Natürlichen Morphologie." In: Albrecht, J. (ed.), *Energeia und Ergon*. Tübingen: Narr, Vol.3, 199-208.

Dressler, Wolfgang U. 1988b. „Preferences vs. strict universals in morphology: word based rules." In: M. Hammond and M. Noonan (eds.), *Theoretical morphology*. San Diego: Academic Press, 143-154.

Dressler, Wolfgang U. 1990. *Semiotische Parameter einer textlinguistischen Natürlichkeitstheorie*. Vienna: Verlag der Österreichischen Akademie der Wissenschaften.

Dressler, Wolfgang U. 1994. "LSP 'von aussen': Reflections on the 9th European LSP symposium." In: M. Brekke et al. (eds.), *Applications and Implications of Current LSP Research*. Bergen: Fagbogforlaget, 950-969.

Dressler, Wolfgang U. 1995. "Wealth and poverty of functional analyses, with special reference to functional deficiencies." In: Sh. Miller and J. Mey (eds.), *Form and Function in Language, Proceedings of the First Rasmus Rask Colloquium*. Odense: Odense Univ. Press, 11-39.

Dressler, Wolfgang U. 1999. "On a semiotic theory of preferences in language." In: M. Shapiro and M. Haley (eds.), *Essays in Semiotic Analysis, The Peirce Semiotic Papers* 4, 389-415.

Dressler, Wolfgang U. 2000a. "Naturalness." In: G. Booij, C. Lehmann and J. Mugdan (eds.), *Morphologie: ein internationales Handbuch zur Flexion und Wortbildung* I. Berlin: de Gruyter, 288-296.

Dressler, Wolfgang U. 2000b. "Extragrammatical vs. marginal morphology." In: U. Doleschal and A. M. Thornton (eds.), *Extragrammatical and Marginal Morphology*. München: Lincom, 1-10.

Dressler, Wolfgang U. 2002a. "Naturalness and functionalism." In: K. Dziubalska-Kolaczyk and J. Weckwerth (eds.), *Future Challenges for Natural Linguistics*. München: Lincom. 83-101.

Dressler, Wolfgang U. 2002b. "Naturalness and morphological change." In: B. D. Joseph and R. D. Janda (eds.), *The Handbook of Historical Linguistics*. Oxford: Blackwell, 461-471.

Dressler, Wolfgang U. and Karpf, Annemarie. 1995. "The theoretical relevance of pre- and protomorphology in language acquisition." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1994*. Dordrecht: Kluwer, 99-122.

Dressler, Wolfgang U. and Ladányi, Mária. 2000. "Productivity in Word Formation: a morphological approach." *Acta Linguistica Hungarica* 47, 103-144.

Dressler, Wolfgang U.; Mayerthaler, Willi; Panagl, Oswald; and Wurzel, Wolfgang U. 1987. *Leitmotifs in Natural Morphology*. Amsterdam: John Benjamins.

Dressler, Wolfgang U. and Merlini Barbaresi, Lavinia. 1994. *Morphopragmatics*. Berlin: Mouton de Gruyter.

Dressler, Wolfgang U. & Merlini Barbaresi, Lavinia. 2001. "Morphopragmatics of diminutives and augmentatives." In: I. Kenesei and R. M. Harnish (eds.), *Perspectives on Semantics, Pragmatics, and Discourse*. Amsterdam: John Benjamins, 43-58.

Felber, Helmut and Budin, Gerhard. 1989. *Terminologie in Theorie und Praxis*. Tübingen: Narr.

Frauenfelder, Uli H. and Schreuder, Robert. 1992. "Constraining psycholinguistic models of morphological processing and representation: the role of productivity." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1991*. Dordrecht: Kluwer, 165-183.

Hall, Christopher. 1992. *Morphology and Mind*. London: Routledge.

Jakobson, Roman. 1941. *Kindersprache, Aphasie und allgemeine Lautgesetze*. Uppsala: Almqvist & Wiksell.
Jensen, John T. 1990. *Morphology: Word Structure in Generative Grammar*. Amsterdam: John Benjamins.
Kilani-Schoch, Marianne. 1988. *Introduction à la morphologie naturelle*. Bern: Lang
Koj, Leon. 1979. "The principle of transparency and semantic antinomies." In: J. Pelc (ed.), *Semiotics in Poland*. Dordrecht: Reidel, 376-406.
Libben, Gary. 1998. "Semantic transparency in the processing of compounds: consequences for representation, processing and impairment." *Brain and Language* 61, 30-44.
Lieber, Rochelle. 1992. "Compounding in English." *Rivista di Linguistica*. 4, 79-96.
Mayerthaler, Willi. 1981. *Morphologische Natürlichkeit*. Wiesbaden: Athenaion (English translation: 1988. *Morphological Naturalness*. Ann Arbor: Karoma Press).
Méndez Dosuna, Julián and Pensado, Carmen. 1990. "How unnatural is Spanish *Víctor --> Vict-ít-or?* Infixed diminutives in Spanish." In: Méndez Dosuna, J. and Pensado, C. (eds.), *Naturalists at Krems*. Salamanca: Acta Salmanticensia, Estudios Filologicos 227, 89-106.
Meyer, Ralf.1992. *Compound Comprehension in Isolation and in Context*. Tübingen: Niemeyer.
Olsen, Susan. 2001. "Copulative compounds: a closer look at the interface between syntax and morphology." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 2000*. Dordrecht: Kluwer, 279-320.
Peirce, Charles S. 1965. *Collected Papers*. Cambridge: Harvard University Press.
Plag, Ingo. 2003. *Word-Formation in English*. Cambridge: Cambridge University Press.
Plag, Ingo. 2004. "Syntactic category information and the semantics of derivational morphological rules." *Folia Linguistica* 38, 193-225.
Rainer, Franz. 1993. *Spanische Wortbildungslehre*. Tübingen: Niemeyer.
Rainer, Franz. 2001. "Compositionality and paradigmatically determined allomorphy in Italian word-formation." In: C. Schaner-Wolles, J. Rennison, and F. Neubarth (eds.), *Naturally!* Torino: Rosenberg and Sellier, 383-392.
Ronneberger-Sibold, Elke. 1980. *Sprachverwendung, Sprachsystem, Ökonomie und Wandel*. Tübingen: Niemeyer
Scalise, Sergio. 1992. "Compounding in Italian." *Rivista di Linguistica* 4, 175-199.
Scherer, Bernd M. 1984. *Prolegomena zuu einer einheitlichen Zeichentheorie*. Stuttgart: Stauffenburg Verlag.
Seiler, Hansjakob. 1991. "Die Prinzipien der deskriptiven und der etikettierenden Benennung." In: H. Seiler (ed.), *Linguistic Workshop* 3, 2-57.
Shaw, Howard J. 1979. *Motivierte Komposita in der deutschen und englischen Gegenwartssprache*. Tübingen: Narr.
Siegel, Dorothy. 1977. "The adjacency constraint and the theory of morphology." *NELS* 8, 189-197.
Skalička, Vladimír. 1979. *Typologische Studien*. Braunschweig: Vieweg.
Stampe, David. 1973. "On Chapter Nine." In: M. Kenstowicz and Ch. Kisseberth (eds.), *Issues in Phonological Theory*. The Hague: Mouton, 44-52.
Van Marle, Jaap. 1985. *On the Paradigmatic Dimension of Morphological Creativity*. Dordrecht: Foris.
Vennemann, Theo. 1983. "Theories of linguistic preferences as a basis for linguistic explanations." *Folia linguistica historica* 4, 5-26.
Wheeler, Max W. 1993. "On the hierarchy of naturalness principles in inflectional morphology." *Journal of Linguistics* 29, 95-111.
Wijnen, Frank; Kempen, Masja; and Gillis, Steven. 2001. "Root infinitives in Dutch early child language: an effect of input." *Journal of Child Language* 28, 629-660.
Williams, Edwin. 1981. "Argument structure and morphology." *Linguistic Review* 1, 81-114.
Wunderlich, Dieter. 1986. "Probleme der Wortstruktur." *Zeitschrift für Sprachwissenschaft* 5, 209-252.
Wurzel, Wolfgang U. 1984. *Flexionsmorphologie und Natürlichkeit*. Berlin: Akademie-Verlag.
Wurzel, Wolfgang U. 1988a. "The structuralist heritage in Natural Morphology." *Linguistische Studien A* 188, 99-116.
Wurzel, Wolfgang U. 1988b. "Hermann Paul – Analogie und die Natürliche Morphologie." *Zeitschrift für Germanistik* 5, 537-544.
Wurzel, Wolfgang U. 1994. "Grammatisch initiierter Wandel." In: Jeßing, B. (ed.), *Sprachdynamik. Auf dem Weg zu einer Typologie sprachlichen Wandels*. Bochum: Brockmeyer, Vol.1, 7-114.
Zwanenburg, Wiecher 1992a. "Compounding in French." *Rivista di Linguistica* 4, 221-240.

Zwanenburg, Wiecher 1992b. “La composition dans les langues romanes et germaniques: essuie-glace / wind-shield wiper.” *OTS Working Papers*. OTS-WP-TL, 92-113.
Zwicky, Arnold M. and Pullum, Geoffrey K. 1987. “Plain morphology and expressive morphology.” In: J. Aske, N. Beery, L. Michaelis and H. Filip (eds.), *Proceedings of the 13th Annual Meeting of the Berkeley Linguistic Society*, 330-340.

WORD-FORMATION IN OPTIMALITY THEORY

PETER ACKEMA AND AD NEELEMAN

1. INTRODUCTION

1.1 Optimality Theory

A grammar can be defined as the set of principles that distinguish the possible morpheme combinations, word combinations and sound combinations in a language from the impossible ones. In traditional grammars a possible word, sentence or syllable is one that satisfies all the principles pertaining to it. Data may be accounted for by a conspiracy of principles, but the principles themselves do not compete with one another. No principle is violated in order to avoid violating another principle. In fact, no principles are violated at all in a grammatical sentence; violation of even a single grammatical principle inexorably means ungrammaticality.

In recent years, theories of grammar have come up in which this no longer holds true, in particular *Optimality Theory* (henceforth OT) (see Prince and Smolensky 2004 [1993]). This theory emphasizes the role of *competition* in determining which forms are grammatical and which are not. The crucial question is which of a number of forms that compete for the realization of a particular concept satisfies the principles of grammar better than the others (where 'better' is defined in a precise way, to be discussed shortly). This will be the grammatical structure. This implies that grammatical structures can violate principles of grammar – as long as there is no competitor that does better. This also implies that different principles of grammar can impose demands on structure that are in direct conflict (meaning that in any structure at least one of them will be violated).

Let us sketch the outlines of an OT-style grammar in a bit more detail.[1] Such a grammar consists of two components. The first is a device, called *GEN(erator)*, that determines how elements can be combined into a structure. The demands that GEN imposes on structures cannot be violated. (Thus, there remains room for inviolable principles in OT). Below, we will assume a minimal GEN component for morphology, one in which an operation of merger is applied to morphemes, so that hierarchically ordered structures for words are built. This parallels the building of structure in syntax, but the morphological GENerator is distinct from the syntactic one and builds structures specifically for the sub-word level. In other words, we assume word structures are not the result of operations in phrasal syntax such as head movement. For a defense of such a specific 'word syntax' component to build

[1] For a detailed introduction see for example Kager 1999.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 285—313.

morphological structure, see Ackema & Neeleman (2004); we will have nothing further to say on it here.

The second component of an OT-grammar is an *evaluation metric* that chooses from the output of GEN the structure that best satisfies a set of universal *constraints*. These constraints are all violable. Their impact in a specific language follows from a language-particular *constraint ranking*, against which the various candidate structures are evaluated.

Evaluation proceeds as follows. The structures to be compared (which make up the so-called candidate set) are first evaluated with respect to the highest-ranked constraint. In case two or more candidates receive an equal score, they are judged by the next highest constraint. In case there is still more than one surviving candidate, they are judges on the third constraint, and so on. The candidate that finally survives this procedure is optimal and thereby grammatical. The other ones are all ungrammatical – they are blocked by the optimal one. As noted, a consequence of this view of constraint interaction is that no constraint is necessarily surface true. A lower ranked constraint can be violated in an optimal structure when this structure scores better on a higher ranked constraint than its competitors. Even the highest-ranked constraint can be violated, namely in case there is no potential output that does not violate it.

The question we will address in this chapter is whether the OT view on grammar, with its emphasis on competition between forms expressing the same concept, can be advantageously applied to problems of word formation.[2] We will see that, indeed, there are a number of phenomena that seem to ask for an account in terms of competition.

1.2 Competition in morphology

The idea that morphological forms can be in competition, so that one form may block another, is in fact crucially involved in one of the oldest regulatory principles in linguistics, nowadays usually known as the *Elsewhere Principle*. A well-known English example is the regular past tense of the verb *go*, i.e. *goed*. Although morphologically well-formed, this form seems to be blocked by the irregular *went*. One pattern frequently found in cases of blocking is that the availability of more specific forms excludes the use of more general ones. Thus, in the case just mentioned, the question is how to form the past tense of *go*, that is, how to realize the morpho-syntactic structure in (1a) (here and below we assume a realizational model of affixation; see Halle & Marantz 1993, Beard 1995; for the specific assumptions we make, see Ackema & Neeleman 2004). The English lexicon contains the following relevant morphemes: *go*, *-ed* (which is specified as past), and *went* (which is specified as the past of *go*). Since *went* spells out the most features in a single morpheme, it is the most specific form, and the one favoured in the competition (as indicated by ☞):

[2] We include inflectional phenomena in this concept, because some of the relevant phenomena only occur with inflectional morphology. We will indicate where this is the case in the relevant places.

(1) a. [GO PAST] (morphosyntax)
b. [/go/ /ed/] (morphophonology)
b'. ☞ [/went/] (morphophonology)

The structure of inflectional paradigms can often be described in these terms. The most general form is usually called the elsewhere form, since it will be inserted where no more specific form is available. The Elsewhere Principle, which regulates competition in the way described above, was introduced into generative grammar by Anderson (1968) and Kiparsky (1973). The general idea reportedly goes all the way back to Panini.

As outlined in section 1.1., such a notion of competition forms the very basis of OT, but it can be found in more or less limited forms in other frameworks as well, such as some versions of *Minimalism* (see Chomsky 1995) and Williams' (2003) *Representation Theory*. Below we will explore the type of morphological phenomena that can be analyzed in terms of competition. We will show that there are three relevant types of competition: (i) competition between different morphemes (of which classical Elsewhere cases are an instance), (ii) competition between different orderings of the same morphemes, and (iii) competition between morphological and syntactic realization of the same concept. As a second aim, we will consider in how far OT is a suitable framework to deal with these kinds of morphological competition, or whether in some cases additional or different assumptions about grammar are required.

2. COMPETITION BETWEEN DIFFERENT MORPHEMES

2.1 The basic case

As pointed out in section 1, the classical case of competition between different morphemes deals with the structure of inflectional systems, and can be described in terms of the Elsewhere Principle. In order to illustrate the general reasoning in some more detail, we consider Dutch verbal agreement in the present tense. The relevant paradigm is as follows:[3]

(2)

ik loop	wij lop-en
I walk	*we walk-PL*
jij loop-t	jullie lop-en
you walk-2.SG	*you-pl walk-PL*
hij loop-t	zij lop-en

[3] The alternation between double *oo* in the stem in the singular and single *o* in the plural does not represent any difference in the quality of the vowel, but is an idiosyncrasy of Dutch orthography (long vowels are spelled doubly in closed syllables).

he walk-3.SG *they walk-PL*

The most economical way of describing the distribution of affixes is in terms of three monovalent features: PAR(TICIPANT), ADD(RESSEE) and PL(URAL). The realization of inflection can be accounted for if the Dutch lexicon contains the following specified affixes; we use subscripts to distinguish between homophonous, but distinct affixes:[4]

(3) $\varnothing \leftrightarrow$ [PAR]
$-t_1 \leftrightarrow$ [PAR, ADD]
-en $\leftrightarrow$ [PL]
elsewhere: $-t_2$

We assume that morphosyntactic structure is fully specified for person and number features. The workings of the Elsewhere Principle can be illustrated in various ways, even for this simple inflectional system. Consider first the singular. In the first person, the information in the morpho-syntactic structure is that the verb is specified as [PAR]. Two of the affixes in (3), namely *-en* and $-t_1$, spell out features that are not present in morphosyntax in this case, and hence do not qualify as candidates (though see section 2.2). The choice, then, is between the zero ending and the elsewhere *-t* ending. Since the former is more richly specified, it blocks the latter.

In the second person singular, the question is how to spell out [PAR, ADD]. In this case there are three candidates with a feature specification that does not spell-out too much. Clearly, of these three, $-t_1$ is the most richly specified, and hence favoured by the Elsewhere Principle. The third person singular is characterized in morphosyntax by the absence of phi-features. Hence, the only possible spell-out for it is $-t_2$.

In the plural, the morphosyntax will contain the same feature specifications for the various persons as in the singular; in addition, a [PL] feature is present. As it stands, the Elsewhere Principle cannot determine which of the affixes in (3) should be used. Consider, for example, the first person plural, specified in the morphosyntax as [PAR, PL]. There are three candidates compatible with this specification: $-\varnothing$, *-en* and $-t_2$. Whereas least-specified $-t_2$ is blocked by the other two candidate realizations, the Elsewhere Principle cannot decide between $-\varnothing$ and *-en* as it stands, because neither contains a superset of the features of the other. The use of a single form in the plural suggests that the features [PAR] and [ADD] are neutralized in this context. This phenomenon can be accounted for using a context-sensitive rule of feature deletion that applies before spell-out (the point at which it is determined which of the affixes is to be used). In the case at hand, the feature [PAR] is deleted in the context of the feature [PL]:

(4) [PAR] $\rightarrow \varnothing$ / __ [PL]

[4] The syncretism between the second person and third person singular is accidental. Many dialects still show a distinct *-st* ending for the second person singular. The *-t* ending derives from an older second person plural ending, and is not an extension of the third person singular.

The result for the first person plural is trivial, as its morphosyntactic specification will now be just [PL]. Hence, *-en* is used. The same is true of the third person, where the rule in (4) applies vacuously. After application of (4), the second person plural will be specified as [ADD, PL]. This specification excludes the use of $-t_1$, which spells out [PAR], so that we are left with *-en* for this case as well. (The type of rule that deletes features prior to spell-out is referred to as impoverishment in the literature on Distributed Morphology; for relevant discussion, see Bonet 1991 and Harley and Noyer 1999).

The assumption that the second person is more richly specified than the first, rather than the other way around, is supported by a curious instance of impoverishment: when the verb inverts with the subject, the zero affix is used for the second person singular, rather than $-t_1$, as shown in (5a). (This cannot be the effect of a phonological rule of *t*-deletion, as a comparison with the third person verb in (5b), which retains its *-t* ending, makes clear).

(5) a. Loop jij?
walk you
'do you walk?'
b. Loopt Jan?
walks John
'Does John walk?'

This phenomenon can be analyzed in terms of another context-sensitive impoverishment rule that deletes the feature [ADD] and applies under inversion (see Ackema & Neeleman 2004 for details).

The discussion so far illustrates that elsewhere relations hold not only between a single default form and the rest of the affix inventory, but in fact for any two affixes whose features stand in a subset-superset relation. Yet, there is of course one morpheme in many affix inventories that is the least specified, and hence the ultimate elsewhere form. In the Dutch agreement paradigm, this is the completely unspecified $-t_2$. That this affix is a true elsewhere form, rather than it being specified for some third person feature, can be seen in so-called impersonal constructions. An example is the impersonal passive:

(6) Hier gaat niet gelachen worden!
here goes not laughed be
'There will be no laughing here!'

In such structures there is no subject for the verb to agree with, yet the $-t_2$ ending obligatorily shows up on the verb.[5]

[5] The only way to avoid the conclusion that *-t* does not spell out agreement features here, is to assume that there is an empty third person singular expletive in impersonal constructions. It is unlikely that such an expletive exists, given that it cannot satisfy the verb-second requirement that holds in Dutch main clauses: **gaat hier niet gelachen worden!* 'goes here not laughed be'. The postulation of an empty expletive in fact comes down to making an untestable assumption.

2.2 Haplology

Whereas the most basic cases of competition between morphemes are governed by the Elsewhere Principle only, there are various types of competition that involve other conditions. Once such condition is what Menn and MacWhinney (1984) call the *Repeated Morph Constraint*, a condition disfavouring adjacent morphemes that have an identical (or very similar) form. Suppose that there are two adjacent positions P_1 and P_2 in the morphosyntactic structure of some word. Suppose, furthermore, that if we look at the specifications of the morphemes in the lexicon of the language and simply apply the Elsewhere Principle, we would expect P_1 to be spelled out by m_1, while P_2 would be spelled out by m_2. If m_1 and m_2 have an identical form, or if m_1 ends in a string identical to m_2, languages may choose a spell-out different from m_1-m_2, in order to avoid a violation of the Repeated Morph Constraint.

There are four strategies in which languages deal with violations of the Repeated Morph Constraint. The first is to simply tolerate the violation, as happens in the English comparative of *clever*, which is *cleverer*. The second is to rule out spell-out of the morphosyntactic construction in question altogether. This applies to a case like English **uglily*, for which a circumscription is required, such as *in an ugly way*. In addition to this, one of the offending morphemes can fail to be spelled out separately, or it can be spelled out by a form which is not normally the optimal spell-out for the feature combination in question. We will now discuss some examples of the latter two strategies.

A simple case of non-spell-out is presented by the English genitive of plural nouns. Since both the genitive and the plural are marked by *-s*, the genitive of a plural noun should end in *-s-s*. But in fact, such expressions end in *-s* (see (7c)). Note that there is no problem in the genitive *-s* attaching to irregular plurals (see (7d), so that we indeed seem to be dealing with a case of haplology, rather than with morphological incompatibility of plural and genitive. Note, moreover, that the genitive *-s* can be attached to certain underived words ending in /s/, showing that we are not dealing with a purely phonological phenomenon either (see (7e)). (The issues involved are discussed in more detail in Yip 1998)

(7) a. The girl's house
b. *The girls's house
c. The girls' house
d. The women's house
e. Professor S.'s lectures

A similar pattern is found in Spanish clitic clusters. Grimshaw (1997) points out that at least in some dialects a sequence of a reflexive and an impersonal clitic, expected to surface as a *se se* sequence, surfaces as a single clitic instead:

(8) Se (*se) lava
one oneself washes
'One washes oneself'

The fourth strategy to deal with repeated morph cases, which consists of spelling out one of the offending morphemes by using an 'unexpected' candidate, can also be illustrated by clitic clusters. In certain variants of Italian, in structures comparable to (8) one of the clitics is realized by a clitic (*ci*) that is used otherwise for the first person plural (see Bonet 1995 and Grimshaw 1997):

(9)
a. Lo si sveglia — Impersonal *si*
3.ACC IMPERS wakes.up
'One wakes him up'
b. Se lo compra — Reflexive *se/si*
REFL 3-ACC buys
'S/he buys it for himself/herself'
c. Ci/*Se si lava — Impersonal plus reflexive
IMPERS REFL washes
'one washes oneself'

A similar case from Spanish is the phenomenon known as 'spurious *se*' (see Perlmutter 1971 and Bonet 1995). Where one would expect to find a sequence of the third person dative clitic *le* and the third person accusative clitic *lo*, the dative is replaced by *se*, a clitic that is otherwise used in various different structures (such as impersonal, reflexive and unaccusative structures). Note, by the way, that this example demonstrates that the Repeated Morph Constraint is violated by two forms that are phonologically similar, but not absolutely identical, something we cannot go into here.

(10)
a. El premio, lo dieron a Pedro ayer
the prize 3ACC gave-3PL to Pedro yesterday
'The prize, they gave it to Pedro yesterday'
b. A Pedro, le dieron el premio ayer
to Pedro, 3DAT gave-3PL the prize yesterday
'Pedro, they gave the prize to him yesterday'
c. A Pedro, el premio, se/*le lo dieron ayer
to Pedro, the prize, SE/3DAT 3ACC gave-3PL yesterday

Note that, although they both involve suppletion, there is a difference between the cases in (9) and (10). In the former, a violation of the Repeated Morph Constraint is avoided by using a clitic that is more richly specified than the clitic it replaces (the first person feature of *ci* is not present in morphosyntax). In the latter case, a clitic is used that spells out less features than are present in morphosyntax (arguably, the clitic *se* is highly underspecified; it certainly lacks the number and case features present in *le*).

In the rest of this section we will discuss why an analysis in terms of competition, and more specifically an OT account in which forms are evaluated against a set of ranked, violable constraints, may be the best way to deal with some

properties of repeated morph effects (in particular the cross-linguistic variation we see in the way the problem is dealt with).

In structures that potentially violate the Repeated Morph Constraint, various factors come into play. The first is, of course, the Repeated Morph Constraint itself (see (11a). We have already encountered some other conditions in section 2.1 (where we treated them as unviolable). For a start, each feature bundle in the morphosyntax should receive a realization in the morphophonological output. We will split this condition into two constraints. The first requires a transparent match between morphosyntactic structure and morphophonology: it is violated if there is a lack of one-to-one mapping between the two (see (11b)). The second requires that phi-features are realized by phonological material that is specified for the right features (see (11c)). Finally, no features may be spelled out that are absent in the morphosyntax. Thus, affixes that are lexically specified for some feature F may not be used for inputs that lack F (see (11d)). These constraints are independently motivated, in that they play an essential role in the analysis of various other linguistic phenomena (note that the Repeated Morph Constraint can be seen as a subcase of the *Obligatory Contour Principle*).

(11) a. *Repeated Morph Constraint*
*M_1 M_2 if $M_1 = M_2$

b. *Iconicity*
One element in the morphophonological structure is the realization of one element in the morphosyntactic structure

c. *Parse*
Assign to each feature in the morphosyntax a properly specified morpho-phonological realization

d. *Faithfulness*
The morphophonology does not realize features absent in the morphosyntax

In the OT conception of grammar, (11 a-d) must be violable constraints that are ranked in a language-particular order with respect to each other and with respect to other constraints.

Let us therefore consider the patterns of constraint violation induced by the logically possible strategies to deal with repeated morphs. Suppletion with an overspecified form involves the use of a morpheme that spells out more features than are present in the morphosyntactic input. This satisfies all conditions except Faithfulness.

Suppletion with an underspecified form satisfies Faithfulness, but violates Parse. There are two related strategies that underparse the input. The first is not to realize one of the offending morphs. This violates Parse, but also Iconicity. The second is to not realize the morphosyntactic input at all; that is, to use the so-called null parse. Of course this violates Parse, but it arguably does not violate Iconicity: since there is no morphophonological structure, the morphophonology cannot be non-iconic either.

A further strategy is to associate the two morphosyntactic feature bundles to a single phoneme (whose form will of course be suitable to spell out both, given that

we are dealing with repeated morphs). This coalescence strategy satisfies Parse, as well as Faithfulness, but it violates Iconicity, as it involves two-to-one mapping between morphosyntax and morphophonology.

Finally, repeated morphs can be tolerated, something that obviously violates the Repeated Morph Constraint, but none of the other conditions. The various constraint violation patterns are given in Table 1. (The asterisk between brackets in the column under Parse indicates that the number of violations of this constraint that is induced by the null parse depends on the number of features that are present in the morphosyntactic structure).

	RMC	Iconicity	Parse	Faithfulness
Suppletion (overspecified form)				*
Suppletion (underspecified form)			*	
Avoidance (null parse)			* (*…)	
Coalescence		*		
Deletion		*	*	
Tolerance	*			

Table 2

The ranking of the four constraints determines which strategy is employed. The crucial factor is which constraint is ranked lowest. (i) If this is Faithfulness, we will get suppletion with an overspecified form. (ii) If it is Parse, there are two possibilities, namely suppletion with an underspecified form and avoidance. Which of these is chosen depends on the lexical inventory of the language. Given that Parse prefers the spell-out of some features over the spell-out of none, suppletion will block avoidance whenever there is a phoneme that can realize a subset of the features in the morphosyntactic input. In the absence of such a phoneme, we will get avoidance, that is, the repeated morph construction is not allowed to surface. (iii) If Iconicity is the lowest ranked constraint, the best solution is to link both morphosyntactic feature bundles to a single phoneme. Finally, (iv) if the Repeated Morph Constraint itself is ranked lowest, the result is tolerance of repeated morphs.

Given that the four strategies result from the low ranking of four different constraints, an OT-account along the lines just sketched would appear to be purely descriptive. However, such an analysis has two potentially attractive properties. The first is that it rules out deletion as a strategy. This is because it incurs violations on both Iconicity and Parse. Since there are strategies that violate only Iconicity (namely coalescence) or only Parse (namely avoidance and suppletion with an underspecified form), deletion will not be the optimal strategy under any ranking of the constraints (in the terminology of OT, the candidate involving deletion is

harmonically bounded by the candidates involving the other strategies just mentioned). This implies that in all cases where repeated morphs are spelled out by a single phoneme, this phoneme must be associated with both morphemes, rather than with just one of them. It might seem that this is a difficult prediction to test, but recently De Lacy (1999) has provided empirical evidence that indicates that the relevant cases indeed involve coalescence rather than deletion.

A second potentially correct prediction is that suppletion strategies can only apply to forms that are part of a paradigm, and not to derivational affixes, compounds and the like. Suppletion only make sense if there are morphemes whose feature specification is either a superset or a subset of one of the feature bundles present in morphosyntax. Such elsewhere relations typically hold of functional morphemes (see section 2.1), but not of lexical ones. Indeed, as far as we know, repeated morph constructions involving derivational morphology or compounding are either tolerated (as in English *ex-ex-president* and Afrikaans *boon-tjie-tjie* 'bean-DIM-DIM') or avoided (as in English **uglily* and Dutch **kop-je-je* 'cup-DIM-DIM'), but they never involve suppletion. (Strictly speaking, we could expect to find cases of coalescence with lexical morphemes, but in order to test this one has to find sequences of semantically different but phonologically identical derivational affixes that are in principle grammatical. We have not been able to do so.)

Within a single language, not every repeated morph context will be dealt with in the same way (as will be clear from the English data mentioned in the discussion above). One might hope that this variation is partially due to the fact that lexical and functional morphemes will behave differently in repeated morph contexts, as just explained. In the worst case, the Parse and Faithfulness constraints might have to be split into more specific constraints that mention subcategories of features, or individual features in some extreme cases. It would take us too far afield to explore this issue here (but see below for more discussion on splitting constraints in this way).

2.3 Markedness

We now turn to another type of competition between a null form and an overt realization of an affix. In the relevant cases, the opposition between the two forms is used to mark certain properties of the syntax, in particular the markedness of particular phi-features in an object and/or subject. The phenomenon can be observed with both case and agreement.

There is a substantive literature on what counts as a marked subject or object. In a seminal paper, Silverstein (1976) argues for a universal markedness hierarchy along the following lines:

(12) 1 > 2 > 3/proper noun > 3/human > 3/animate > 3/inanimate

A *subject* is *more* marked the lower its properties on this hierarchy. For example, any third person subject is more marked than a second or first person subject. In

contrast, the lower the properties of an *object*, the *less* marked it is. Thus, a second person object is more marked than any third person one.

In some languages, morphological case is sensitive to the status of the subject or object with respect to the markedness hierarchy in (12). In particular, overt cases seem to be preferred for more marked arguments. In an absolutive-ergative case system, ergative tends to be overt; in a nominative-accusative case system it is the object case, accusative, that tends to be overt. In certain split case systems, then, marked subjects distinguish themselves from unmarked ones by carrying ergative case (rather than nominative, which does not show up morphologically). Similarly, marked objects carry accusative (rather than absolutive, which again has no morphological correlate). The answer to the question of what kind of subject is marked enough to warrant ergative case marking differs from language to language, as does the cut-off point for accusative marking on objects.

This variation amongst languages with a split-case system can be analyzed as involving competing forms, one of which is selected on the basis of a set of conflicting constraints – as in OT-grammar, that is. A proposal along these lines is developed by Aissen (1999), who translates Silverstein's hierarchy into a set of constraints that require overt case marking for particular types of arguments. The more marked a feature combination for a particular type of argument, the more prominent the constraint requiring overt case for this argument. Thus, the following two constraint hierarchies obtain (where CM stands for 'case mark'):[6]

(13) a. CM [Subj, 3/inanimate] > CM [Subj, 3/animate] > CM [Subj, 3/human] > CM [Subj, 3/proper noun] > CM [Subj, 2] > CM [Subj, 1]
b. CM [Obj, 1] > CM [Obj, 2] > CM [Obj, 3/proper noun] > CM [Obj, 3/human] > CM [Obj, 3/animate] > CM [Obj, 3/inanimate]

Crucially, it must be assumed that the constraints in (13) cannot be reranked with respect to each other, which would give rise to language-particular rankings of them, since the essence of Silverstein's markedness hierarchy is that it is universal. The constraints can be reranked, however, with respect to a constraint that militates against the morphological realization of case. To this end, Aissen adopts a very general constraint that penalizes structure (*Struc). The position of *Struc in the constraint hierarchies determines the cut-off point between case-marked and case-less subjects and between case-marked and case-less objects.

Note that in this system the marking of case for subjects and objects is in principle independent. That is to say, the ordering of the constraints in the hierarchy in (13a) with respect to the constraints in the hierarchy in (13b) has no effects. This independence means that the system may give rise to sentences with an Ergative-Accusative case pattern, namely when both the subject and the object classify as marked (the respective CM constraints mentioning their features both being ranked

[6] We simplify the details of Aissen's proposal somewhat. She generates the constraints in (13) using a technique called *local conjunction* (due to Smolensky 1995). This does not affect the argumentation here.

above *Struc). Languages with such patterns do indeed occur (see for instance Woolford 1997), but there are also languages in which such a case pattern seems to be disfavoured. Let us assume that there is a constraint which has the effect that only one argument in a transitive clause can be case-marked (OneCase). If such a constraint is sufficiently highly ranked, conflicts arise in case the subject and the object both have properties that would normally require case marking. In that case, the mutual ranking of the object and subject constraints becomes crucial. Suppose, for example, that the following ranking obtains:

(14) One-Case > CM[Obj, 3/human] > CM[Subj, 3/animate] > *Struc > CM[Obj, 3/animate] > CM[Subj, 3/human]

Given this constraint ranking, a third person animate subject will usually contrast with a third person human subject in being case-marked. However, when a third person human object is also present, this will require case marking as well, and given that CM[Obj, 3/human] outranks CM[Subj, 3/animate] while both are dominated by OneCase, this precludes case marking of the subject.

Further research is required to explore whether there are case systems that display these kinds of interactions. However, Trommer (2004) discusses an example of an agreement system in which subjects and objects compete for a single agreement slot on the verb in this way. The language in question, Dumi, favours agreement with arguments that have features that are higher on the following two hierarchies:

(15) a. 1 > 2 > 3
b. Plural > dual > singular

Dumi does not seem to care whether agreement is with the object or the subject, although object agreement in certain circumstances requires that an additional marker be added (glossed as MS for 'marked scenario'). The effects of the person hierarchy in (15a) are illustrated in (16). The example in (16a) shows that a first person dual subject beats a second person dual object in the competition for agreement, where as (16b) shows that a first person dual object beats a second person dual subject.

(16) a. du:khuts-i
see-1.DUAL
'We (dual) saw you (dual)'
b. a-du:khuts-i
MS-see-1.DUAL
'You (dual) saw us (dual)

The examples in (17) illustrate the workings of the number hierarchy in (15b). Irrespective of grammatical function, a plural argument beats a dual argument in the battle for agreement.

(17) a. do:khot-t-ini
see-NONPAST-3PL
They (plural) see them (dual)'
b. do:khot-t-ini
see-NONPAST-3PL
'They (dual) see them (plural)

A situation can occur in which one argument qualifies better for agreement on one hierarchy, while the other is to be preferred on the basis of the other hierarchy, for example if one argument is first singular, while the other is third plural. We might expect that in such circumstances either the person hierarchy outranks the number hierarchy, or vice versa. However, as Trommer notes, the situation is more complex.

For a start, it often depends on the exact feature content of the arguments which hierarchy carries the most weight. In the case of a second person singular subject and an object that is third person dual or plural, it is the number hierarchy that prevails: agreement is with the object. On the other hand, if one argument is second person dual and the other third person plural, it the person hierarchy that is decisive: the chosen agreement marker is specified as second person dual. There is a way in which this pattern can be described using the kind of constraints proposed by Aissen (see above). The idea would be to formulate a separate agreement-demanding constraint for every possible combination of person and number features, and to rank all these constraints in the appropriate order under the constraint that rules out double agreement (call it OneAgr).

Trommer shows, however, that there is a phenomenon in Dumi that excludes such an account. As it turns out, there is one case in which conflicting demands arising from the person and number hierarchies are reconciled by having more than one agreement marker after all. The crucial example involves a first person singular argument and an argument specified as second or third person and as dual or plural:

(18) a. do:khot-t-e-ni
see-NONPAST-1SG-3PL
'I see them (plural)'
b. a-du:khus-t-e-ni
MS-see-NONPAST-1SG-3PL
'They (plural) see me'

This situation cannot be described in terms of reranking OneAgr with respect to constraints that require the spell-out of certain feature combinations. One might think that (18) can be accounted for by ranking both R(ealize)[1sg] and R[3pl] above OneAgr. This will lead to a ranking paradox, however, since there are contexts in which at least third person plural does not give rise to agreement, apparently as a consequence of OneAgr. In particular, consider the situation in which a third person plural argument competes with a second person dual argument. As noted above, there is only one agreement marker in this case, for the second person argument.

This implies that R[3pl] must be ranked below OneAgr, in direct contradiction to the initial suggestion.

Trommer shows that the agreement patterns of Dumi can be captured by an OT-analysis, but that they require context-sensitive constraints of the type "Realize agreement for feature F_1 *in the presence of* F_2" (where F_1 is more prominent than F_2 on the same markedness hierarchy). Ranking such constraints (with respect to each other and with respect to a constraint like OneAgr) does give rise to a consistent grammar for Dumi. We refer to Trommer's work for details, but it is not difficult to see why this works: (18) indicates that both 'Realize 1 in the presence of 3' and 'Realize plural in the presence of singular' are ranked above OneAgr. The suppression of 3rd plural in the presence of second person dual indicates that the grammar must also have a partial constraint ranking such that 'Realize plural in the presence of dual' is ranked below both 'Realize 2 in the presence of 3' and OneAgr. These two partial constraint rankings can be combined into a single ranking without this leading to a ranking paradox.

3. COMPETITION BETWEEN COMPONENTS

3.1 Elsewhere cases

As we have seen, the basic case of competition in morphology can be characterized by the Elsewhere Principle: a more specific form is preferred over a more general one where both are in principle grammatical. By definition, competitors are those forms that can be used to express the same concepts. It is possible, therefore, that competing structures are generated in different components, in particular morphology and syntax.

A well-known example involves the English comparative affix *-er*, which must attach to short (maximally bisyllabic) adjectives (see (19a,b)). This morpheme is in competition with the syntactic modifier *more*, which can in principle attach to both short and long adjectives, and is therefore the more general form. In the context of short adjectives, the Elsewhere Principle dictates that *-er* blocks *more* (see (19c,d)). (We add (19e) to show that in circumstances where the Elsewhere Principle does not apply *more* can indeed modify short adjectives.)

(19) a. Bigger
b. *Intelligenter
c. *More big
d. More intelligent
e. Bigger means 'more big'

This classical application of the Elsewhere Principle demonstrates that a morphological complex can be in competition with a syntactic phrase. However, the effects of the Elsewhere Principle are not limited to morphology blocking syntax. As

(Chomsky 1995) can be seen as an instance of blocking. Because a lower landing site can attract a subset of the elements that a higher landing site can attract, it is, in this sense, more specific than the higher one. Consequently, movement to a higher landing site is blocked where movement to the lower landing site is possible. More relevant in the present discussion are cases in which, as opposed to the one in (19), the specific form is syntactic and the general form morphological. The English simple past, for instance, is morphological. Yet, in the perfect, it is blocked by a syntactic periphrastic construction, which is more specific as it roughly expresses past with present relevance.

Another case of competition in which a more specific syntactic construction blocks a more general morphological form concerns the negated form of the first person singular of the verb *to be*, as discussed by Bresnan (1999) (the account below is somewhat simplified and involves a slightly different interpretation of the data as compared to Bresnan's account). Normally, a sentence with a finite form of *to be* can be negated by morphological means, namely by adding *n't* to the verb (see Zwicky & Pullum 1983 for arguments that *n't* is an affix). There is a gap in the paradigm of these negative forms, however: *n't* cannot be added to first person singular *am*:

(20)
a. *I amn't working
b. you aren't working
c. s/he isn't working
d. we aren't working
e. you aren't working
f. they aren't working

If the Elsewhere Principle could only compare morphological forms, we may expect that, given the absence of the specific form *amn't*, the more general form *aren't* is used. In inversion contexts, this is indeed the form that occurs:

(21)
a. *Amn't I working
b. Aren't I working

It is important to realize that, in addition to the forms in (20) and (21), English allows a syntactic realization of negation that *is* compatible with (*a)m*:

(22) I'm not working

This syntactic combination of *am* and *not* expresses the concept "negation of the first person singular of *be*" more accurately than the more general *aren't*, and will hence block the latter if the Elsewhere Principle applies across components. We see this happening in sentences without inversion: (23) is blocked by (22).

(23) *I aren't working

The question, then, is why inversion should have an effect on the realization of the negated first person of *be*. Since inversion is an operation of head movement (Aux-to-C movement), it must strand nonaffixal negation. This rules out (24a) (in OT terms, GEN cannot generate (24a), hence this will never be a candidate

structure). The only potential competitor left for (21b) then is (24b). According to Bresnan, this structure does not actually have the right semantics to be in competition with *Aren't I working*, as the scope of negation is limited to the VP in (24b), while the interpretation we are interested in involves sentential negation.

(24) a. *Am not I working
b. Am I not working

The situation again lends itself well to an OT-analysis, by using two Parse-type constraints in addition to the ban on *amn't* (which might follow from some more general phonological constraint, an issue we will ignore here). The analysis is in the same spirit as Bresnan's, although different in execution.

Following Bresnan, we assume that there is a constraint according to which the semantic scope of negation must be mirrored by overt syntax (say NegScope). For constituent negation, this means that the negator should appear adjoined to the constituent in question; for sentential negation, this constraint demands that the negator must appear as high in the clause as possible (the more structure dominates the sentential negator, the more this constraint is violated). In negated declaratives, candidates with affixal negation (such as *I aren't working*) are as good on this constraint as candidates in which *not* is adjoined to VP (such as *I'm not working*), as in both cases the amount of structure dominating the negator is the same (the projections of Infl and higher). In negated interrogatives, candidates with affixal negation score better on NegScope than candidates with *not,* however. This is because full negation must be stranded under verb movement to C (as *not* does not form a constituent with the verb, but is adjoined to VP), while affixal negation is taken along, thereby ending up being dominated by less structure than its *not* rival in this case.

The other relevant constraint is familiar from section 2.2: it is the constraint that requires phi-features in the input to be properly realized. As will be clear, sentences with *am not* are a better spell out of 'first-person negative *be*' than sentences with more general *aren't*.

The data from (standard) English described above fall out from the constraint ranking *Amn't >> NegScope >> ParsePhi, as the following tables demonstrate:

<declarative>	*Amn't	NegScope	ParsePhi
I [amn't] working	*!		
☞I am [not working]			
I [aren't] working			*!

Table 2

<interrogative>	*Amn't	NegScope	ParsePhi
[Amn't] I working	*!		
Am I [not working]		*!	
☞ [aren't] I working			*

Table 3

Note that *Am I not working* is not ungrammatical. Although it cannot express sentential negation, it is the optimal candidate for constituent negation of *working*.

3.2 Competition between modules that does not involve the Elsewhere Principle

In the previous subsection we discussed how Elsewhere-style competition can apply across components. In the current subsection we will discuss the possibility that morphology and syntax compete in the generation of structure, even if the Elsewhere Principle does not apply. In particular we will make a case for the idea that when a syntactic phrase and a morphological construct can express the same input equally well, the syntactic option blocks the morphological one, at least in languages like English.[7]

Consider the way in which the semantic relation between a predicate and its direct argument can be realized structurally. One obvious possibility is to combine them syntactically, giving rise in the case of a verb to a standard transitive verb phrase. A perhaps less obvious, but logically equally available, option is to form a root compound. After all, the semantic relation between the two members of a root compound is not inherently restricted, and could therefore subsume the predicate-argument relation. It is, therefore, surprising that this type of root compound is systematically absent. The VP in (25a) does not alternate with the N-V compound in (25b).

(25) a. to $[_{VP}$ drive $[_{NP}$ trucks]]
b. *to $[_{V}$ $truck_N$ $drive_V$]

The pattern is more general: root compounds in general cannot have a transparent semantics. Thus, the structure of prenominal modification in Dutch (26a) does not alternate with the A-N compound in (26b).

(26) a. $[_{NP}$ $[_{AP}$ blauwe] $ogen_N$]
blue-DECL eyes
b. $[_{N}$ $blauw_A$ $ogen_N$]

This cannot be due to a lack of N-V compounding in English or A-N compounding in Dutch. Both are in fact fairly productive. (27) and (28) give lists of examples that can easily be extended.

[7] An extended version of the argument can be found in Ackema & Neeleman (2004).

(27)

to breast-feed	to hand-make	to baby-sit
to play-act	to air-condition	to bar-tend
to window-shop	to c-command	to pressure-clean
to base-generate	to chomsky-adjoin	to pan-fry
to head-adjoin	to head-govern	to carbon-date

(28)

zoet-hout	speciaal-zaak
sweet-wood	*special-shop*
'liquorice'	'specialist shop'
zwart-boek	bruin-vis
black-book	*brown-fish*
'blackbook'	'porpoise'

These examples show that the semantics of root compounds varies wildly, but in no case does the compound have a transparent compositional semantics.

Interestingly, argument-predicate relationships and transparent modifier-head relationships *can* sometimes hold between parts of words. In particular, synthetic compounds can express such relationships as a matter of course:[8]

(29) a. $[_N\ [_V\ \text{truck}_N\ \text{drive}_V\ ]\ \text{er}_N\ ]$
b. $[_A\ [_N\ \text{blauw}_A\ \text{oog}_N\ ]\ \text{ig}_A\ ]$
blue eye ed

This state of affairs can explained in terms of competition between syntax and morphology on the following assumption:

(30) Syntactic merger of (a projection of) α and (a projection of) β blocks morphological merger if the semantic relation between α and β is identical in the two cases.

(30) immediately explains why morphological merger of a verb and its direct object is blocked: a syntactic competitor is always available. The same holds of structures of prenominal modification.

At the same time, the synthetic compound in (31a) is allowed to coexist with its syntactic counterpart in (31b). The point is that in (31b) *truck* merges with a projection of *-er*, while in (31a) it merges with a projection of *drive*. As a result, one cannot say that (projections of) the same categories merge in the two cases in (31). Hence, given (30), competition does not obtain.

(31) a. $[_N\ [_V\ \text{truck}_N\ \text{drive}_V\ ]\ \text{er}_N\ ]$

[8] The argument given in this section relies on the structure of synthetic compounds being as indicated in (29). For argumentation that the alternative right-branching structure cannot express the meaning of a synthetic compound, see Ackema & Neeleman (2004).

b. $[_{NP}\ [_{N}\ \text{drive}_{V}\ \text{er}_{N}\ ]\ \text{(of)}\ [_{NP}\ \text{trucks}]]$

This result crucially relies on *-er* being a projecting affix, that is, an affix that is the head of the morphological complex it derives. Of course, we can also combine *drive* with an affix and project *drive*, rather than the affix. In such a case synthetic compounding is predicted to be impossible, since *truck* now again merges with a projection of *drive*, just as in the syntactic competitor. Therefore, (32a) blocks (32b)

(32) a. John $[_{VP}\ [_{V}\ \text{drive}_{V}\ s_{I}\ ]\ [_{NP}\ \text{trucks}]]$
b. *John $[_{V}\ [_{V}\ \text{truck}_{N}\ \text{drive}_{V}\ ]\ s_{I}\ ]$

The nontransparent root compounds in (27) and (28) are grammatical, as they do not have a syntactic counterpart in which the same projections merge either. To give an example, *to pan-fry* does not mean the same thing as *to fry pans*, but rather the same thing as *to fry in a pan*. But in the latter case, *fry* merges with a projection of the preposition *in*, and not with a projection of the noun *pan*. This syntactic phrase is therefore not in competition with *to pan-fry*.

The kind of competition characterized by (30) can trivially be modelled in OT. The account would be based on two constraints, namely more specific instantiations of the more general *Struc (see section 2.3): *MorphStruc and *SynStruc, which militate against morphological and syntactic structure, respectively. In English the former must outrank the latter. It is, at this point, an open question whether these constraints are rerankable. Possibly, ranking *SynStruc above *MorphStruc gives rise to polysynthetic languages.

4. COMPETITION BETWEEN DIFFERENT MORPHEME ORDERS

The examples of purely morphological competition discussed in section 2 all involve candidates that differ in the morphemes they use to spell out a morphosyntactic input. In this section we consider cases of competition in which candidates differ not in the morphemes they contain, but rather in the order in which these morphemes show up.

As a point of departure we may take a constraint that disfavors 'crossing correspondences' between morphosyntactic and morphophonological structures (see Marantz 1984 and Sproat 1985). In derivational morphology, for example, there usually is a one-to-one, left-to-right mapping of morphosyntactic positions to the phonemes that realize them. Thus, an input like (33a) (with the semantics 'something that is like a mini computer') is realized as in (33b), not as in (33c). An input like (34a) (with the semantics of 'something small that is like a computer') is realized as (34c), rather than (34b):

(33) a. [PSEUDO [MINI COMPUTER]]
b. /pseudo/ /mini/ /computer/
c. */mini/ /pseudo/ /computer/

(34) a. [MINI [PSEUDO COMPUTER]]
b. */pseudo/ /mini/ /computer/
c. /mini/ /pseudo/ /computer/

The constraint regulating this mirroring effect (compare Baker 1985) can be formulated as in (35) (adapted from Sproat 1985: 82). (As in (33) and (34), morphosyntactic positions are represented in capitals, while corresponding morphophonological units appear in lower case and between slashes.) Note that without *Linear Correspondence*, random affix ordering would be the norm.

(35) *Linear Correspondence*
If X is structurally external to Y,
X is phonologically realized as /x/, and
Y is phonologically realized as /y/
then /x/ is linearly external to /y/.

4.1 Conflicts between Linear Correspondence and templatic requirements

The constraint in (35) may seem trivial. But it turns out that there can be conflicting constraints on affix ordering that lead to a non-transparent ordering of morphemes. An instance of this is discussed by Hyman (2003). It concerns the ordering of certain postverbal affixes in Bantu languages, namely those affixes that express operations that change argument structure. Consider combinations of causative and applicative morphology (the applicative marks an operation by which instruments and the like are promoted to direct argument). Presumably, the morphosyntactic structures of a causative applicative and an applicative causative are distinct, with the causative affix c-commanding the applicative affix in the former, while being c-commanded by the applicative affix in the latter. Linear Correspondence requires that these structural relations are reflected by morpheme order in the morphophonology:

(36) a. [[V APPLICATIVE] CAUSATIVE] ↔
b. [[/v/-/applicative/]-/causative/]

(37) a. [[V CAUSATIVE] APPLICATIVE] ↔
b. [[/v/-/causative/]-/applicative/]

There are various languages that are well behaved in this respect, so that the applicative and causative markers used to express sentences like ‘he made the children cry with a stick’ (with *stick* being promoted to direct argument by applicative) and ‘he made the children stir with a spoon’ (with *spoon* being promoted to direct argument by applicative), respectively, show up in different orders, as in the former applicative has applied to an instrument of causation (i.e. applicative applies after causativization), while in the latter it has applied to an instrument of *stir* (i.e. applicative applies before causativization). Surprisingly,

however, one can also find languages that use the same morpheme order to express the structures in (36a) and (36b). Consider the following data from Chichewa (see Hyman 2003; for general discussion of Chichewa morpheme order, see Hyman & Mchombo 1992):

(38) a. Alenjé a-ku-líl-**íts-il**-a mwaná ndodo
hunters 3PL-PROG-cry-CAUSE-APPL-FV child sticks
'The hunters are making the child cry with sticks'
b. Alenjé a-ku-tákás-**its-il**-a mkází mthíko
hunters 3PL-PROG-stir-CAUSE-APPL-FV woman spoon
'The hunters are making the woman stir with a spoon'

Both the applicativized causative in (38a) and the causativized applicative in (38b) have the same order of the *íts* (causative) and *íl* (applicative) affixes. According to Linear Correspondence, the order should be reversed in (38b). Apparently, there is a constraint that overrules Linear Correspondence in this example. Hyman argues that all Bantu languages want their postverbal derivational morphemes to occur in a specific order, expressed by the following template:

(39) *Pan-Bantu Template* (CARP)
Causative-Applicative-Reciprocal-Passive

If CARP is ranked above Linear Correspondence, a violation of the mirror principle can result:

<[[V APPLICATIVE] CAUSATIVE]>	CARP	Linear Correspondence
[[/v/-/applicative/]-/causative/]	*!	
☞[[/v/-/causative/]-/applicative/]		*

Table 4

Reranking the two constraints leads to instances where the template is sacrificed in order to express the scopal relation between the morphemes overtly:

<[[V APPLICATIVE] CAUSATIVE]>	Linear Correspondence	CARP
☞[[/v/-/applicative/]-/causative/]		*
[[/v/-/causative/]-/applicative/]	*!	

Table 5

There is, indeed, language variation in Bantu concerning the extent to which the template is adhered to. This is not a matter of either following the template completely, or complying with Linear Correspondence completely. Within a single language, the choice made can differ for any individual pair of derivational affixes. For example, whereas the order of applicative and causative morphemes in

Chichewa adheres to the CARP template, the order between applicative and passive morphemes is determined by Linear Correspondence, with the consequence that in an applicativized passive, the postverbal CARP template is violated. This type of variation requires that either the template or Linear Correspondence is split into a family of constraints mentioning pairs of morphemes. Hyman chooses to split his version of Linear Correspondence in this fashion, since in his view violations of the template are the exception, rather than the rule (but see below).

An OT-type analysis along these lines makes two predictions. The first is that, although violations of Linear Correspondence are possible, they are not random: they must be forced by the template. This implies that if a particular morpheme order is favoured by both constraints, the opposite order should never be found in any language (it is harmonically bounded). The following tableau shows this for applicativized causatives:

<[[V CAUSATIVE] APPLICATIVE]>	CARP	Linear Correspondence
[[/v/-/applicative/]-/causative/]	*!	*
☞ [[/v/-/causative/]-/applicative/]		

Table 6

Hyman shows that morpheme order variation that would go against both the template and Linear Correspondence is indeed absent.

The second prediction is a little more involved. If either CARP or Linear Correspondence is to be split into constraints mentioning pairs of morphemes, the following situation can arise. Suppose that there is a template that favours a morpheme order /a/-/b/-/c/, and that is split into three constraints P(recede)[/a/-/b/], P[/a/-/c/] and P[/b/-/c/], plus a general Linear Correspondence principle. This set-up can have the surprising result that two morphemes that are not adjacent in the template can occur in one order when separated by a third morpheme, but in the alternate order when adjacent. This follows from the constraint ranking P[/a/-/b/] > P[/b/-/c/] > Linear Correspondence > P[/a/-/c/]. Consider an input with A taking scope over C and B taking scope over A. As the following tableau shows, the phonological output will be the one that completely complies with the /a/-/b/-/c/ template:

< … C] A] B] >	P[/a/-/b/]	P[/b/-/c/]	Linear Correspondence	P[/a/-/c/]
☞ /a/-/b/-/c/			*	
/a/-/c/-/b/		*!	*	
/b/-/a/-/c/	*!		*	
/b/-/c/-/a/	*!		*	*
/c/-/a/-/b/		*!		*
/c/-/b/-/a/	*!	*	*	*

Table 7

Consider next what happens if B is omitted from the input:

< … C] A] >	P[/a/-/b/]	P[/b/-/c/]	Linear Correspondence	P[/a/-/c/]
/a/-/c/			*!	
☞ /c/-/a/				*

Table 8

Comparing Table 7 with Table 8, we see that the order of /a/ and /c/ has switched in the two cases. This kind of 'morpheme metathesis' does indeed occur in languages with a (partially) templatic morphology (see Spencer 1991: 210ff).[9]

It is further predicted that morpheme metathesis will never affect morphemes that are adjacent in the overall template. This is because for such morpheme pairs the mutual ranking between the precedence constraint mentioning them and Linear Correspondence will determine their order in every context, as precedence constraints mentioning only one of these morphemes and another morpheme cannot interfere in this case. To the best of our knowledge, there are indeed no languages in which, say, /a/-/b/-/c/ coexists with /c/-/b/ or /b/-/a/.[10]

4.2 Conflicts between Linear Correspondence and other correspondence constraints

As we have seen, Linear Correspondence favors a particular ordering of phonological affixes (or /affix/es). Another, potentially conflicting, mapping principle states which host an /affix/ can attach to. So far, we have implicitly assumed that any host with which the /affix/ can form a phonological word will do. In reality, however, an /affix/ usually combines with the phonological correspondent of the head of the category that the morphosyntactic affix (call it AFFIX) combines with. This condition, formulated in (40), is equivalent to Sadock's (1991) *Strong Constructional Integrity*.

(40) *Input Correspondence*
If an AFFIX selects (a category headed by) X,
the AFFIX is phonologically realized as /affix/, and

[9] A comparable phenomenon can be found in English syntax. Bobaljik (2000) shows that there are triples of adverbs occurring in a fixed order that can be broken when only the highest and lowest adverb appear.

[10] Notice that this analysis assumes that the template, rather than Linear Correspondence, is broken up into smaller constraints. It is possible to achieve the same result by splitting Linear Correspondence, but this is somewhat more involved (as it requires the assumption that the order encountered when all affixes are present is in fact not the one that is completely in compliance with the template). In principle, the choice between the two approaches is empirically testable, namely by considering which of the orders (the one with all affixes present or the one with an affix absent) satisfies Linear Correspondence. We cannot go into this here.

X is phonologically realized as /x/,
then /affix/ takes /x/ as its host.

If the AFFIX selects a simplex category X, the effect of Input Correspondence is trivial: /x/ and the /affix/ form a phonological word. In case the AFFIX selects a more complex structure, (40) demands that the corresponding /affix/ forms a phonological word with the phonological realization of the head of that structure, rather than anything else. In other words, Input Correspondence favors a mapping of the left-branching morphosyntactic structure in (41a) onto the right-branching morphophonological structure in (41b).

(41) a. $[[_X$ Y X] AFFIX] ↔
b. [[/y/ [/x/ /affix/]]

Mappings of the type in (41) provide an alternative to what Hoeksema (1984) characterizes as 'head operations', morphosyntactic operations which affect the properties of a complex category by (apparently) applying to its head.

The effects of Input Correspondence become particularly clear when we consider cases in which it conflicts with Linear Correspondence. An example is provided by structures in which a complex left-headed category is selected by an AFFIX that is spelled out by a /suffix/ (see (42a)). For such structures, Linear Correspondence would favor mapping to (42b), whereas Input Correspondence would favor mapping to (42b').

(42) a. $[[_X$ X Y] AFFIX] ↔
b. [/x/ [/y/ /affix/]]
b'. [[/x/ /affix/] /y/]

This means that in general morphosyntactic representations like (13a) cannot be mapped onto a morphophonological form without violating at least one mapping principle. Consider, from this perspective, the case of left-headed Italian compounds. Some examples are given below:

(43) a. carta regalo
paper gift
'wrapping paper for presents'
b. carta carbone
paper carbon
'carbon paper'

These compounds resist further word formation with most, if not all, derivational suffixes. Although *carta* can be derived by *-iere*, *-aio*, and *-ista* (see (44), the forms in (45) and (46) are all ungrammatical (Vieri Samek-Lodovici, personal communication).

(44) a. cart-iere
'paper seller'
b. cart-aio
'paper worker'
c. cart-ista
'paper specialist'

(45) a. *carta regal-iere
a'. *cart-iere regalo
b. *carta regal-aio
b'. *cart-aio regalo
c. ??carta regal-ista
c'. *cart-ista regalo

(46) a. ??carta carbon-iere
a'. *cart-iere carbone
b. ??carta carbon-aio
b'. *cart-aio carbone
c. ?carta carbon-ista
c'. *cart-iste carbone

An OT analysis of such 'absolute ungrammaticality' may rely on the inclusion of the null parse in the candidate set (see section 2.2), in conjunction with two constraints, one requiring the realization of morphemes, the other militating against partial realization of words. We will not demonstrate this here.

Interestingly, languages can specify that the realization of particular suffixes is favoured to such an extent that even left-headed compounds derived by them are allowed to surface. In the case of Italian, this is true of the plural (and perhaps also the diminutive). A morphosyntactic structure [[$_N$ N X] PLURAL] is mapped onto a morphophonological representation at the cost of violating some mapping principle. There is a clear preference to sacrifice Linear Correspondence, rather than Input Correspondence, suggesting a ranking Parse[PLURAL] >> Input Correspondence >> Linear Correspondence:

(47) a. cart-e regalo
paper-PL *gift*
'pieces of paper for wrapping presents'
a'. *carta regal-i
paper gift-PL
b. cart-e carbone
paper-PL *carbon*
'carbon papers'
b'. *carta carbon-i
paper carbon-PL

This preference is language-specific. As Scalise (1988) notes, Somali has left-headed compounds which are inflected on the second constituent (the nonhead). This suggests that in Somali Linear Correspondence outranks Input Correspondence.

As in the Bantu languages, there will be no language variation for those cases for which there is a candidate complying with all constraints. With respect to pluralization of compounds, we know of no languages in which a right-headed compound is marked for plural by a suffix on the left-hand constituent (the nonhead), a situation which would involve gratuitous violations of both Input Correspondence and Linear Correspondence. Compare Scalise's (1988) typological schema for inflected compounds:

(48) a. head to the right; inflection to the right (occurs in English, Italian and Somali)
b. head to the left; inflection to the left (occurs in Italian)
c. head to the left; inflection to the right (occurs in Somali)

The missing option is indeed 'head to the right; inflection to the left'.

On at least one interpretation of Linear Correspondence and Input Correspondence, it seems that the input in (42a) can in fact be mapped without violating either. Suppose that the affix is spelled out twice, both on the head and linearly external to the phonological correspondent of the left-headed compound:

(49) a. $[[_X$ X Y] AFFIX] ↔
b. [[/x/ /affix/] [/y/ /affix/]]

If the mapping principles in (35) and (40) require that *some* spell-out of the affix occupies the relevant position in the morphophonology, (49b) satisfies both of them. Indeed, such double realizations occur. Scalise (1988) gives the example in (50a,b); similarly, *carta carbone* marginally allows (50c) as a plural.

(50) a. mezza notte
middle night
'the middle of the night'
b. mezz-e nott-i
middle-PL *night*-PL
c. ?cart-e carbon-i
paper-PL *carbon*-PL

However, given that the pattern in (50) is not the only one attested, there must also be a mapping principle that is violated by multiple phonological realization of a single affix. This is stated in (51) (which is equivalent to Noyer's (1993) *Uniqueness principle*):

(51) *Quantitative Correspondence*
No element in the morpho-syntax is spelled out more than once.

Quantitative Correspondence is independently motivated by the simple fact that, in the absence of conflicting requirements, affixes are not normally spelled out more than once. Thus, [/read/ /able/ /able/] does not exist alongside [/read/ /able/].

Although the above data are suggestive of an OT treatment, they also present a challenge to the framework. This is because one and the same morphosyntactic input (PLURAL) is realized differently depending on the specific compound it is attached to (compare *mezza notte* with double plural marking versus *carte regalo* with plural affix only on the head). In order to capture such a pattern, one would have to assume a different ranking of the constraints for different pluralized compounds. The possibility that constraint rankings can vary for individual words and morphemes has been explored in optimality-theoretic implementations of lexical phonology, but the disadvantages of the approach are clear. In its extreme form, it would lead to rote learning.

The problem repeats itself in a more severe form in English. Subject names derived from particle verbs can surface in three ways, each of them violating one of the mapping principles discussed above (see Yip 1978 and Sproat 1985):[11]

(52) a. truck filler upper
b. passer by
c. comeouter

For more discussion on the interplay between the various mapping constraints, see Ackema & Neeleman (2004).

5. CONCLUSION

It does not seem too much to say that one of the core phenomena of morphology, and perhaps of grammar in general, is that one form can compete with, and hence block, others. The classical cases of such competition involve inflectional morphology as regulated by the Elsewhere Principle. In this contribution, we have argued that there are many more examples of competition, which differ from the classical case in terms of the nature of the candidates and the selecting constraints. It seems to us that OT is the natural framework within which to explore morphological competition, although, as we have seen, there are some recalcitrant data.

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[11] There is a clear statistical difference between the three patterns: the first is more frequent than the second, while the third only occurs sporadically.

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REFERENCES

Ackema, Peter and Neeleman, Ad. 2004. *Beyond Morphology*. Oxford: Oxford University Press.
Aissen, Judith. 1999. "Markedness and Subject Choice in Optimality Theory." *Natural Language and Linguistic Theory* 17, 673-711.
Anderson, Stephen R. 1968. *West Scandinavian Vowel Systems and the Ordering of Phonological Rules*. Ph.D. dissertation, MIT.
Baker, Mark C. 1985. "The Mirror Principle and Morphosyntactic Explanation." *Linguistic Inquiry* 16, 373–416.
Beard, Robert. 1995. *Lexeme Morpheme Base Morphology*. Albany: SUNY Press.
Bobaljik, Jonathan D. 2000. "Adverbs: The Hierarchy Paradox." *Glot International* 4.9/10, 27–8.
Bonet, Eulalia. 1991. *Morphology after Syntax: Pronominal Clitics in Romance*. Ph.D. dissertation, MIT.
Bonet, Eulalia. 1995. "Feature Structure of Romance Clitics." *Natural Language and Linguistic Theory* 13, 607-47.
Bresnan, Joan W. 1999. "Explaining Morphosyntactic Competition." In: M. Baltin and C. Collins (eds.), *The Handbook of Contemporary Syntactic Theory*. Oxford: Blackwell, 11-44.
Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, Mass.: MIT Press.
De Lacy, Paul V. 1999. "Haplology and Correspondence." In: P. de Lacy and A. Nowak (eds.), *University of Massachusetts Occasional Papers in Linguistics* 23. Amherst: GLSA.
Grimshaw, Jane. 1997. "The Best Clitic." In: L. Haegeman (ed.), *Elements of Grammar*. London: Longman, 169-196.
Halle, Morris and Marantz, Alec P. 1993. "Distributed Morphology and the Pieces of Inflection." In: K. Hale and S. J. Keyser (eds.), *The View from Building 20*. Cambridge, MA: MIT Press, 111-176.
Harley, Heidi and Noyer, Rolf. 2003. "Distributed Morphology." In: L. Cheng and R. Sybesma (eds.), *The Second GLOT International State-of-the-Article Book*. Berlin: Mouton de Gruyter.
Hoeksema, Jacob. 1984. *Categorial Morphology*. Ph.D dissertation, University of Groningen.
Hyman, Larry M. 2003. "Suffix Ordering in Bantu: A Morphocentric Approach." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 2002*. Dordrecht: Kluwer, 245-281.
Hyman, Larry M. and Mchombo, Sam A. 1992. "Morphotactic Constraints in the Chichewa Verb Stem." *Berkeley Linguistic Society* 18, 350–364.
Kager, Rene. 1999. *Optimality Theory*. Cambridge: Cambridge University Press.
Kiparsky, Paul. 1973. "'Elsewhere' in Phonology." In: S. Anderson and P. Kiparsky (eds.), *A Festschrift for Morris Halle*. New York: Holt, Rinehart and Winston, 93-106.
Menn, Lise and MacWhinney, Brian. 1984. "The Repeated Morph Constraint: Towards an Explanation." *Language* 60, 519-541.
Marantz, Alec P. 1984. *On the Nature of Grammatical Relations*. Cambridge, Mass.: MIT Press.
Noyer, Rolf. 1993. *Optimal Words: Towards a Declarative Theory of Word Formation*. Ms., Princeton University.
Perlmutter, David. 1971. *Deep and Surface Constraints in Syntax*. New York: Holt, Rinehart & Winston.
Prince, Alan and Smolensky, Paul. 1993. *Optimality Theory*. Ms. Rutgers University / Johns Hopkins University. Published 2004 by Blackwell, Oxford.
Sadock, Jerrold M. 1991. *Autolexical Syntax*. Chicago: University of Chicago Press.
Scalise, Sergio. 1988. "The Notion of 'Head' in Morphology." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1988*. Dordrecht: Foris, 229-245.
Silverstein, Michael. 1976. "Hierarchy of Features and Ergativity." In: R. Dixon (ed.), *Grammatical Categories in Australian Languages*. New Jersey: Humanities Press, 112-171.
Smolensky, Paul. 1995. *On the Internal Structure of the Constraint Component Con of UG*. Handout of talk given at University of Arizona.
Spencer, Andrew. 1991. *Morphological Theory*. Oxford: Blackwell.
Sproat, Richard W. 1985. *On Deriving the Lexicon*. Ph.D. dissertation, MIT.
Trommer. Jochen. 2004. "Hierarchy-based Competition and Emergence of Two-Argument Agreement in Dumi." To appear in *Linguistics.*

Williams, Edwin. 1997. "Blocking and Anaphora." *Linguistic Inquiry* 28, 577–628.
Williams, Edwin. 2003. *Representation Theory*. Cambridge, Mass.: MIT Press.
Woolford, Ellen. 1997. "Four-way Case Systems: Ergative, Nominative, Objective and Accusative." *Natural Language and Linguistic Theory* 15, 181-227.
Yip, Moira. 1978. The Integrity of Lexical Nodes. Ms., MIT.
Yip, Moira. 1998. "Identity Avoidance in Phonology and Morphology." In: S. Lapointe, D Brentari and P. Farrell (eds.), *Morphology and its Relation to Phonology and Syntax*. Stanford: CSLI
Zwicky, Arnold M. and Pullum, Geoffrey K. 1983. "Cliticization vs. Inflection: English *n't*." *Language* 59, 502-513.

PRODUCTIVITY: THEORIES

LAURIE BAUER

1. INTRODUCTION

The productivity of a morphological process (whether inflectional or derivational) has to do with how much (or, in the limiting case, whether) it is used in the creation of forms which are not listed in the lexicon. For example, the affix *-en* found in the word *oxen* is not used very often by anyone in the formation of new words, and is correspondingly felt to be of
suffix *-s* is frequently used in the formation of many plurals by many people, and is thus felt to be of high productivity. Note that this formulation leaves a great deal open. The term 'lexicon' can be interpreted as meaning some concrete dictionary or the presumed mental dictionary of the individual or the presumed ideal lexicon of some fictional speaker. The formulation given above is in terms of production, and we might want to ask whether comprehension is just as important. The words 'not very often' and 'many' in the example seem to be extremely vague, and we might want to know whether or how such notions can be made precise. In particular, we might want to know whether any word-formation process can ever be said to be totally unproductive and what maximal productivity consists of. Then we might want to know, if the lexicon is intended to be the lexicon of the individual, how this reflects or is reflected by the vocabulary of the speech community. All of these are good questions, and it must be admitted at the outset that we do not have very satisfactory answers to all of them.

Part of the reason for this is that the study of productivity as a phenomenon is relatively recent. People have known that some word-formation processes are used a lot and that others are not, that some affixes appear to die off, although they also appear to be resurrected from time to time (see e.g. Wentworth 1941), but no theory of productivity has been built upon such observations. If we want to know what people made of this in earlier years, we have to read between the lines and interpret what they say. The observation has also be made that lexical word-formation processes do not appear to be as 'regular' (a term we need to take care in interpreting) as, say, syntactic processes are. Thus lack of productivity in morphology is equated to lexical word-formation, productivity to inflectional morphology. This in turn has been challenged. The claim was made overtly in an important paper by Chomsky (1970), in which the issue was brought to the attention of modern linguistics. Since then, morphologists have struggled with the notion of productivity, trying to understand it and refine it and model it within modern theories. No new orthodoxy has yet emerged from the discussion, so the theories we are dealing with are still developing, and developing fast. The chances are that by the time you read this chapter it will be out of date, in ways that cannot be predicted

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 315—334.

at the time of writing. This makes it both a frustrating and an exciting area to deal with.

As a terminological note, 'morphological process' should be understood as including not only affixation but non-concatenative processes such as ablaut (consider *rise* and *raise*), conversion (*to empty* from *empty*), back-formation (*seduct* from *seduction*) and the formation type illustrated by *tittle-tattle*. Since affixal processes are by far the most common in English derivational word-formation, they form the bulk of the examples presented here. In principle, though, the same points hold true for non-affixal word-formation. The study of productivity in compounding presents further problems which will not be specifically addressed here, since they are not specifically addressed in the theoretical literature. For some authors compounding in English is so productive that it should be treated as syntax rather than as word-formation; for others compounding is split between syntax and word-formation; for a third group, it is purely word-formation and the same aspects of productivity apply to compounding as to derivation (see Bauer 1998 and references there for some discussion of the wider problem of the status of compounds, and Kuiper 1999 for an argument that productivity is not relevant in compounding seen as syntax). Compounds will not be overtly discussed in this presentation, but if compounding is simply another means of word-formation on a par with derivation, all the discussion here should equally apply to compounds.

This presentation begins with a historical approach to ideas about productivity, going through the ways in which the idea has developed over the last half-century or so, and considering the different approaches to productivity that have been taken.

2. PRE-GENERATIVE THEORIES OF PRODUCTIVITY

It is not clear to what extent there were theories about productivity in the pre-generative era. Certainly productivity was recognised and discussed within morphology, but the terminology is not always consistent and neither the status nor the precise nature of productivity is made particularly clear. Good statements about productivity seem to arise particularly in the historical study of English.

Thus we find the following comment in Quirk and Wrenn (1957: 104): "… it is often impossible for us to distinguish processes that were active and flourishing during the OE period from those which had ceased to be formative before the Anglo-Saxons left the continent of Europe…"

Kruisinga (1932: 22) talks of 'living' suffixes being recognisable by the fact that they are productive, and adds 'The treatment of *dead* or *unproductive* suffixes is the province of historical grammar.'

Jespersen (1942) notes patterns, including those that are frequently used and those that are never used. For example he speaks (1942: 466) of some adjectives which do not take *un-,* though it may not be clear why not. This is a matter of productivity, but not called that.

Looking back over earlier discussions of word-formation, Aronoff (1976: 36) says that an elementary intuition about productivity is that it is the same as the number of words produced by the use of a particular morphological process:

productivity equals type frequency (though see now Bauer 2001: 47-51). To some extent this idea is set up as a straw man by Aronoff (see below), but it is in any case hard to find linguists or grammarians from this earlier period using the term productivity in this simple way.

Despite these comments, there are two fundamentally pre-generative theoreticians who deserve special mention, Schultink and Zimmer, and their work is considered in the next sections. Although both present their theories following the publication of Chomsky's *Syntactic Structures* (1957), of which they must have been aware (indeed, Zimmer cites Chomsky overtly and mentions transformations), their presentations rely on earlier theoretical models and they are not influenced by the formalism of generative theories in the way that Lees (1963) was, although he was writing at about the same time.

3. SCHULTINK (1961)

Schultink's definition of productivity has had a profound influence on a whole generation of morphologists, particularly those who have been trained in the Netherlands. Because of Schultink, Dutch linguists have taken productivity much more seriously than linguists of other nations, and have had a more coherent view of it.

Schultink (1961: 113) defines productivity as follows:

> Onder productiviteit als mofologisch fenomeen verstaan we dan de voor taalgebruikers bestaande mogelijkheid door middel van het morfologisch procédé dat aan de vorm-betekniscorrespondentie van sommige hun bekende woorden ten grondslag ligt, onopzettelijk een in principe niet telbaar aantal nieuwe formaties te formen. [By productivity as a morphological phenomenon we understand the possibility for language-users, by means of a morphological process which underpins a form-meaning correspondence in some words they know, to coin, unintentionally, a number of new formations which is in principle infinite. [My translation – LB; cf. Booij 1977: 4; Van Marle 1985: 45.]

Some interpretation of this may be required. The morphological process is equivalent to what others call a Word Formation Rule (whether that is a rule of affixation or some other kind of word-formation). The infinite number of possible formations is determined by the fact that the class of bases is in principle open, and so cannot be pre-determined; in practice the number of possible formations may be relatively constrained and the number of actual formations very small (consider, for example, derivatives with the prefix *step-* such as *step-mother*, *step-son*, *step-relationship*). The controversial part of this definition, at least in the eyes of current theorists, is the notion that productivity concerns only the coining of words which is done unintentionally or unconsciously. Although it is well-known that speakers break the normal rules of word-formation when they deliberately coin new words (e.g. for poetic reasons, see under Bauer below), it is less clear how the analyst is to recognize an unintentional as opposed to an intentional coinage, and thus how the analyst can judge what is relevant data. Bearing this question in mind, however, Schultink's definition can be taken as one which is widely accepted and indicative of the interpretation that productivity is given in morphology. Among many others,

Marchand (1969) cites Schultink, and Marchand's view of productivity is compatible with that espoused by Schultink (see Kastovsky 1999: 33-34).

4. ZIMMER (1964)

Zimmer's views can be found echoed by later researchers, even those who are apparently unaware of his work. He assumes that his readers know what productivity is, and argues that it is a psychologically real phenomenon (Zimmer 1964: 20), which is more semantic or pragmatic in nature than it is formal (1964: 18). The following brief passage from a footnote (1964: 85, fn 2) is of interest in showing early awareness of issues which are current in the early twenty-first century: "It appears on the whole that what we might term "item-familiarity" is less important in the evaluation of *non-* derivatives, possibly partly because *non-* forms are of relatively low frequency…"

The references to a relationship between frequency and productivity are, to be sure, not original in Zimmer's work, and can be traced much further back (see, for example, Schultink 1992). They can nevertheless be seen as sowing seeds for later work in the area, by bringing this relationship into the open in a forum where it was considered by later American (and American-influenced) linguists.

Zimmer attempts to relate productivity to a hierarchy of fundamentally semantic restrictions, which, in cumulation, have the effect of making a coinage unacceptable. He is not successful in setting up such a system for creating a statement of acceptability of English negative adjectives beginning with *un-*: he points out, for example (1964: 84, fn 2), that *unwell* ought not to exist given its synonyms *sick* and *ill*. Nonetheless, by attempting to formulate *restrictions on productivity* he becomes one of the first to show how difficult a task this is, how subtle the linguistic judgements involved are, and how complex the notion of productivity is in itself.

5. ARONOFF

Aronoff's reaction to the view that the productivity of an affix is a direct reflection of the number of times it has been used to create words in the dictionary is that 'it isn't fair' (Aronoff 1976: 36). It isn't fair because it fails to take into account how many words are possible with a particular affix.

The notion of a *possible word* is an interesting one, and one that has worried linguists for some time. Aronoff also puts this in context for us.

> Just as the simplest goal of a syntax is the enumeration of the class of possible sentences of a language, so the simplest task of a morphology, the least we demand of it, is the enumeration of the class of possible words of the language. The greatest difference between the syntax and morphology with respect to his enumeration is that in derivational morphology there is a distinction to be made between the classes of possible words and actual words. (Aronoff 1976: 17-18)

This is a particularly good formulation, making clear, as it does, the similarities and differences between morphological and syntactic views of grammar. Aronoff

(1976: 19) goes on to state explicitly that (just as there are syntactic rules for the creation of sentences) there must be rules for the creation of new words, rules which he terms 'Word Formation Rules' or 'WFRs'. We might want to argue with the details of what Aronoff says in the passage cited, but it does not make any crucial difference from the morphological point of view. Something like *Too many cooks spoil the broth* could be seen as an actual sentence of our language just as *kingdom* is an actual word (both can be attested in corpora and the like), and something like *How do you do?* might be an impossible but actual sentence, just as *length* is an impossible but actual word (neither could be created in the present state of the language system, but both can be attested).

It is worth pointing out here that the focus on possible words in morphological study, though not original to Aronoff, is one which has often been ignored in the subsequent literature. Much of level-ordering theory, for instance, is concerned with actual words, and frequently with impossible actual words (a class which is called 'lexicalized' by other scholars, e.g. Bauer 1983: 42-61).

Returning to Aronoff's view of productivity, we find he views productivity as a relationship between possible words and actual words (Aronoff 1976: 36). The important point that he makes about this is that no affix can be said to be absolutely more productive than any other affix (or morphological process); productivity has to be tied to particular base types. This approach is later discussed in terms of limiting productivity to specific 'domains' (Van Marle 1985). Aronoff here, in common with other linguists of the period, considers the affix as choosing the bases to which it may be added. In more recent linguistic theories (see e.g. Giegerich 1999) this is often turned round, and linguists have started speaking in terms of bases selecting the affixes which can occur on them. Williams (1981: 250) uses the term 'potentiation' in this sense: if a base undergoes some morphological process, it gains the potential subsequently to undergo some other specific process. Alternatively, we find discussions of output constraints (e.g. Plag 1999) according to which it is the well-formedness of the final word which is the crucial factor in determining which processes may apply to the output of other processes. All of these approaches are ways of attempting to determine what is or is not a permissible sequence of morphological processes, and this is seen as part of what determines the productivity of certain processes.

While Aronoff's view of productivity as the rate at which a particular morphological process is exploited with a particular base-type seems reasonable as an idealized definition, in practical terms it is not possible to use it to provide the index of productivity which Aronoff foresees unless we make a large number of extra assumptions. For example, although the notion of an 'actual word' appears not only unobjectionable but even theoretically necessary, we have no accurate way of deciding at what point a possible word becomes an actual word. Counting something such as whether the relevant word appears in a particular dictionary is only a substitute measure for a word having become actual. As Aronoff (1976: 37) himself points out, though, the outputs of the most productive morphological processes tend not to be listed – either in our mental dictionaries, or in paper dictionaries. Thus any dictionary-based measure is likely to underestimate the productivity of a synchronically extremely productive process, while giving a much better measure of

a process which has ceased to be productive. Baayen and Lieber (1991: 804) go so far as to say that any measure based on Aronoff's notion is 'applicable to unproductive word formation rules only'.

Even the notion of a possible word is slightly hazy in practice. Matthews (1974: 221-2) uses the example of *-ness* suffixed to colour words to show that there is not necessarily a definite cut-off between possible and impossible words. *Whiteness*, he suggests is clearly part of English, *purpleness* is, in his word, 'insecure' and *magentaness* is even worse. The implication is that there is more to the productivity of a particular affix than a particular domain of application. Bauer (2001: 172-177) considers such examples in a small-scale experimental study, and suggests that some of the difference may be due to factors such as the length and status of the base (derived versus monomorphemic) which are, at least in principle, available in deciding what is or is not an appropriate base for this type of formation. Since nobody has ever done a study in which factors such as these are systematically observed, we have no way of determining precisely what a possible word may be. If these factors are not sufficient to determine uniquely a set of bases (which is more or less what Matthews suggests), the situation is even worse.

In a series of articles based on a number of psycholinguistic experiments (Aronoff & Schvaneveldt 1978; Aronoff 1980; Anshen & Aronoff 1981; Aronoff 1983), Aronoff and his colleagues show that speakers behave differently with respect to words containing the same suffix in different contexts. Thus speakers prefer to form nouns in *-iveness* from adjectives ending in *-ive* rather than nouns in *-ivity*, despite models for both in their mental lexicons. When it comes to adjectives in *-ible*, however, speakers prefer to form nouns in *-ibility* rather than in *-ibleness*. Aronoff concludes that speakers react to productivity as a linguistic variable, and that such productivity can be different in different domains (determined by the base to which the affix is to be attached). Moreover, productivity cannot simply be reduced to a matter of phonological transparency, otherwise *-ness* would be the preferred suffix in all cases. He sees productivity as being related to *frequency*, more frequent derivatives tending to be the ones created with less productive morphology. This notion is developed later by Baayen. Aronoff also notes the relative frequency of the base and the derived form as being something of interest for productivity, a measure which is later picked up by Hay (see below).

In another experiment, based on *The Oxford English Dictionary*, Anshen and Aronoff (1997) show that very productive patterns may give rise to forms which are not lexically listed. They consider the fate of verbs of the form preposition + verb like modern *outplay* and *underanalyze*. They show that some forms with the preposition *with* are retained in modern English (*withdraw, withhold*), though the formation is no longer used in the creation of new verbs. But there are no current verbs on this pattern using *at* or *of* (*atblow* and *ofask*, for example, were used at an earlier stage of English). This is not because such words were not created in earlier periods of English: they were common in the fourteenth century. But apparently, when the pattern ceased to be used, all the verbs created on this pattern also disappeared. This suggests that the relevant words were not well-established in the mental lexicon when the pattern ceased to be productive, and thus supports the claim

earlier made by Aronoff (1976) that the most productive formation-types are never listed in the mental lexicon, but are processed in real time.

6. NATURAL MORPHOLOGY

Natural Morphology[1] is a theory of morphology in which morphological behaviour is seen as being contingent on cognitive behaviour and general semiotic principles. Natural morphological phenomena are those which are common cross-linguistically, which resist erosion either diachronically or in aphasias, and which are easily acquired both by children learning their first language and in the development of creoles. Various general semiotic principles govern morphological systems, among them the principle of *constructional iconicity* (more meaning is most naturally reflected in more form) and principles of *transparency* (the clarity of the semantic and phonological identity of forms, bases and affixes); generally the more constructionally iconic a word is, the more natural it is and the more transparent the morphology, the more natural the word is. Thus *sheep* as a plural form is not constructionally iconic (compare *ewe·s* where the extra meaning of 'plural' is reflected by an extra morph), and *dividedness* is more transparent than *division* because the phonological integrity of *divide* is maintained in *dividedness*, but not in *division*.

The basic approach to productivity within Natural Morphology is that it is a by-product of naturalness (Mayerthaler 1981: 124-140). If this is true we would expect word-formation by internal modification to be less productive in English than word-formation by affixation (since internal modification which links *sing* to *song*, *rise* to *raise* and *believe* to *belief*) is less constructionally iconic than affixation is. This is certainly true. The cited examples of word-formation by internal modification in English are rare and synchronically unproductive. Even the status of stress-shift (which links the noun *'import* to the verb *im'port*) is unclear in current English. It also suggests that processes of word-formation which cause less morphophonemic variation for the base should be more productive than those which cause more. This is probably also true, though less obviously so. Smith (1912: 60), for instance, comments that 'by far the most active of our affixes are Greek in origin.' These include *-ic*, *-ist* and *-ize*, which cause velar softening in the base, so that *itali[k]* becomes *itali[s]ize*, for example. While more recent tallies suggest that these affixes are less productive than Smith suggests, they are nevertheless still productive in contemporary English, despite having competitors such as *-ish*, *-er* and conversion respectively which do not have these effects.

Certainly these effects are not obvious if they are considered in particular domains. For example, *-ity*, which changes the stress of any base to which it is attached, and thus reduces the transparency (and so the naturalness) of any formation in which it appears, is virtually universal on bases ending in *-able* (*profitability* is much more likely that *profitableness*). If we simply consider the domain of *-able-*

[1] Cf. W. Dressler's chapter in this volume for the details of the treatment of WF within the framework of Natural Morphology.

adjectives, therefore, *-ity* will appear to be productive beyond its naturalness, whereas if we consider the language as a whole, *-ness*, which is more natural than *-ity*, is also more productive.

The structure of the individual language can also play a role in what counts as natural for that language. In the case of English derivation, we can see that class-changing morphology is overwhelmingly suffixal (or, in another terminology, English morphology is right-headed) and so the use of prefixes to create denominal verbs is unnatural in the system of English and correspondingly restricted in its use. Examples such as *dethrone*, *disthrone*, *enthrone* and *unthrone* have all been used at different periods of English (some of them still persisting), but the pattern in *enthrone* is now no longer available, the pattern shown in *hospitalize* being used instead. Something which appears to be developing in the wrong direction is the apparently left-headed pattern of modifiers such as *oestrogen-only (pill), fruit-only (jam)*, which are frequent – at least in journalistic texts – though apparently never institutionalized enough to make it into dictionaries. These go against the very general principle for English compounds to be right-headed (Bauer & Renouf 2001).

As well as productivity being influenced by transparency and constructional iconicity, Dressler and Ladányi (2000) suggest that base-type plays a role. For example, a base which is a new loan is more likely to be used productively in a coinage than a base which is an abbreviation.

7. KIPARSKY (1982)

Kiparsky (1982) presents what was then the new field of *lexical phonology* in some detail. In the course of doing this, since lexical phonology is concerned with the interplay between morphology and phonology, he inevitably discusses morphology to a large extent. It is here assumed that the reader has a basic familiarity with lexical phonology.

Because of the way in which a *level-ordered morphology* works, individual words cannot be blocked by words created with affixes on a later level: that is, a word containing a level 2 affix such as *-er* cannot block a level 1 process such as verb → noun conversion; on the other hand, the presence of $cook_N$ can block *cooker* with the same meaning (note that *cooker* as an established word is an instrument – or an apple – not a person). This is part of the Elsewhere Condition on rule-ordering. Kiparsky (1982: 8) explains that

> From this it follows in turn that among processes in a blocking relationship, those with restricted applicability have to be ordered before those with general applicability. This explains why processes at later levels are also typically more productive than functionally related processes at earlier levels.

Part of this productivity is because idiosyncrasy tends to develop at the lower-numbered levels in a level-ordered system. This does not preclude idiosyncrasy at level 2 or above (for example, *highness* is not synonymous with *height* but is a term of address), but means that forms created by processes at higher levels are more likely to be easily interpretable. This draws a connection between semantic

transparency and productivity which has already been seen in Natural Morphology, but attempts to explain it by the form of the model. One of the corollaries of this lack of idiosyncrasy at higher levels is that once affixes have been added, subsequent affixation tends to be more regular than is affixation to simple bases. We cannot predict in any linguistic way that we should have *exposure, imposition, proposal* rather than some other mixture of base and suffix, but once we have *-ize* creating the verb, we can predict what the nominalization of that verb will be.

8. VAN MARLE (1985)

Van Marle's theory of productivity is firmly based in the Schultink tradition of Dutch scholarship. However, Van Marle is not content with the one-affix-at-a-time approach that typifies the majority of scholarship on word-formation. He sees affixes and other word-formation processes as being in competition with each other in ways determined by the structure of the derivational paradigms in which they occur. For Van Marle, morphological productivity is a subset of *morphological creativity*, creativity including much that is beyond the normal rules or morphological structure. Interestingly, Van Marle includes affix substitution in this class. Affix-substitution is arguably rather more common in Dutch than in English. In English we can illustrate with forms like those in Table 1 where the relationship seems to arise through the substitution of one affix for another rather than by the compositional application of affix-meaning to base-meaning.

capitalism	capitalist	capitalistic
humanism	humanist	humanistic
nationalism	nationalist	nationalistic
perfectionism	perfectionist	perfectionistic
pluralism	pluralist	pluralistic
positivism	positivist	positivistic
sadism	sadist	sadistic

Table 1 *English words created by suffix-substitution*

Contrast the examples in (1) with *impressionistic*, which in current usage does not refer to *impressionism*, (the adjective in this sense is *impressionist*), and *Baptist* which is not directly related to *baptism* in the same kind of way (*baptism* and *baptize* are probably related by affix-substitution, as are *magnetism* and *magnetize*). The implication for Van Marle is that such forms are to be excluded from the field of productive relationships by definition. They show the importance of paradigmatic structure, and they show morphological creativity, but not, by definition for Van Marle, productivity.

Equally, as far as Van Marle (1985: 59) is concerned, any formation which involves non-native morphology is intentionally formed, and thus not productive morphology. This too is controversial, perhaps even more so in English than in

Dutch (where native and non-native affixes tend to be rather more restricted to bases of equivalent status than is the case in English). If we consider patterns of word-formation with non-native affixes in English (non-affixal methods of formation can probably all be seen as native), we have to include prefixes such as *ex-*, *in-* (negative), *inter-*, *mal-*, *post-*, *pre-*, *re-* and suffixes such as *-al*]$_{A}$, *-al*]$_{N}$, *-an*, *-ar*, *-ation* (and *-ition, -ution*), *-esque*, *-ess*, *-ette*, *-ic*, *-ify*, *-ism*, *-ist*, *-ize*, *-ity*, *-ment*, *-ous* and so on. While there is no doubt some significance in the fact that so many of these suffixes are vowel-initial (Raffelsiefen 1999), the conclusion that they are all unproductive because they can only be used deliberately is not only counter-intuitive, but seems to be contrary to the findings of scholars like Aronoff and Schvaneveldt (1978), Anshen and Aronoff (1981), Baayen and Lieber (1981). At the very least, we seem to be dealing with a different underlying concept of what productivity is all about if we accept Van Marle's position here.

9. CORBIN (1987)

Corbin (1987) is not primarily concerned with productivity as a phenomenon, but makes a very important distinction and provides a useful terminology: that between *disponibilité* (translated by Carstairs-McCarthy 1992 as 'availability') and *rentabilité* (translated as 'profitability'). A morphological process is *disponible* if the speaker is able to use it in the construction of a neologism, filling a lexical gap (Corbin 1987: 177). It is *rentable* if it is actually used to produce a large number of such words. Thus on the evidence of Barnhart, Steinmetz & Barnhart (1990), which lists *awhir* and *aclutter*, amongst others, as neologisms, we might say that the non-negative prefix *a-* is available in English (or was in the period they cover). Nevertheless, the prefix *a-* has never been profitable, and the number of words created by it remains small.

Although this distinction, and the terminology that goes along with it, is credited here to Corbin, what I interpret as fundamentally the same distinction was independently drawn by Kastovsky (1986). Kastovsky's distinction, though, is phrased as having all matters that can be seen as matters of competence determining what Kastovsky calls 'rule scope' and, opposed to that 'application rate' which is a performance factor measured in terms of number of outputs from a particular pattern.

10. BAAYEN

Baayen is more concerned with the development of a *measure of productivity* than he is with theorizing the notion. Nevertheless, any measure has behind it an implicit theory of what it is that is being measured, and Baayen also makes reference to earlier studies of productivity. He points out (1992: 109-10), for example, that the productivity of various morphological processes may differ according to socio-pragmatic environment such as register, or whether the recorded language is written

or spoken, as well as according to linguistic reasons such as the transparency of the process involved.

Baayen attempts to measure the productivity of morphological processes on the basis of a large parsed *corpus* of natural language. In Baayen and Renouf (1996: 69), it is argued that '[d]ictionaries, unfortunately, are not a reliable source for studying morphological productivity' because of the commercial and practical aims of real dictionaries and because of the fact noted by Aronoff (1976) that dictionaries do not note words formed by the most productive morphological processes. Baayen and Renouf comment specifically on the suffix *-ly*]$_{\text{ADV}}$, which shows few new forms in dictionaries of neologisms, but which is used widely in a corpus.

Because even a very large corpus of texts (Baayen is typically operating with a corpus of around 20 million running words) cannot have every single word ever used with every affix in it, the corpus has to be seen as a sample of the language as a whole. Baayen argues that a guide to the number of new forms we would expect to find in the language as a whole is the number of relevant *hapax legomena* (usually just called 'hapaxes', that is words which occur only once in the corpus) which are found in the sample. If there are very few words formed with a particular affix, for example, and it is never used to produce new words, then we might expect to find most of those which do exist in a large corpus. But if the affix under consideration can be used freely to make new words, we would expect to find many different words in our sample, and we would expect to find more of them occurring only once. In this view, it does not matter if the words which occur only once are actually familiar words or not: they represent the rate at which new words are being coined in the language as a whole. Baayen thus creates measures which centre round the number of hapaxes in a corpus. His notion of productivity is rather similar to that put forward by Aronoff, but operationalized so that we count hapaxes rather than possible words and types in the corpus rather than actual words. Although Baayen provides a number of different formulae for the measurement of productivity in his work (e.g. Baayen 1989, 1992, 1993), the one which has most frequently been discussed in subsequent work is the one given in (1992), namely

$$\mathrm{P} = \frac{n_1}{N}$$

where P is the productivity of a particular morphological process in a given corpus, n_1 is the number of hapaxes formed by that process in the same corpus, and N is the total number of tokens formed in the same corpus by the same process. Note that while Baayen's measurement allows comparative measures of productivity to be given for two morphological processes in the same corpus, it does not allow different corpora to be compared (and thus, for instance, does not allow comparisons of the productivity of English *-er*, German *-er* and Dutch *-er*).

An adjustment can then be made to take absolute frequencies into account, since part of the reason we think some morphological operations more productive than others is that they produce a great many words. For instance, the prefix *step-* (as in *step-mother*) does not produce very many words, and is probably not considered to be particularly productive, while the agentive *-er* (as in *murderer*) is thought to be

much more productive partly because we meet more words containing the suffix. It should be noted, parenthetically, that we do not necessarily know whether *step-*, if there are no more possible bases it could ever apply to, is 100% productive or unproductive. If we conclude that it is 100% productive over the available bases, this is still not very important as far as English is concerned because of the low number of bases involved.

The formula which Baayen (1993: 193) proposes as providing a better way of ranking processes in terms of their comparative productivity is the measure he labels P*, called 'the hapax-conditioned degree of productivity'. This measure is given in the following formula:

$$P^* = \frac{n_{1,E,t}}{h_t}$$

In this formula, n_1 is still the number of hapaxes formed by the relevant process attested in the corpus, E indicates the relevant morphological category and t indicates the number of tokens in the corpus, while h_t is the total number of hapaxes of all types in the corpus. This formula can thus be read as 'the hapax-conditioned degree of productivity of a given process in a corpus can be defined as the number of words of the appropriate morphological category appearing just once in the corpus divided by the total number of hapaxes appearing in the corpus'. In other words, this measure asks 'What proportion of hapaxes in the corpus are formed using this particular morphological process?', while the first measure asks 'What proportion of words formed by this particular process are hapaxes?'. In both cases, the hapaxes are an indirect representation of the use of the morphological process in the coining of new words. Here we might say we are viewing two different aspects of profitability, two which need not coincide. The measure P considers how frequently the words we meet in a particular morphological category are new words; the measure P* considers what proportion of new words are created by the process in which we are interested. This suggests that Corbin's 'profitability' might need to be further subdivided.

11. PLAG (1999)

There are two aspects to Plag's (1999) discussion of productivity which are of particular interest. The first of these is that Plag argues that a *dictionary* search, or, more specifically, a dictionary search using *The Oxford English Dictionary*, can provide solid evidence on the productivity of particular morphological processes in different periods of history. In this, he argues directly counter to the view taken by Baayen (e.g. in Baayen and Renouf 1996: 69). Secondly, for Plag, implicitly at any rate, productivity is related to *domains*, but to rather larger domains than those envisaged by Aronoff (1976).

In regard to the use of the *OED* as a database, Plag (1999: 96-100) argues that unlike smaller dictionaries, the *OED* does make some attempt at universal coverage (though he admits that words in *-ness* appear to have been missed by readers for the

OED). He also argues that because the *OED* gives dates of first citation, we can see the periods during which a particular morphological process has been productive, and we can look away from the many words that are or have been used in the language which are lexicalized and do not represent productive processes. And finally, while agreeing that the database on which the *OED* is founded is very vaguely defined, he points out that it is many times larger than the kind of corpus that is employed in corpus-based studies.

Although Plag does consider the morphological processes he covers individually, at a more general level he is concerned with all processes which give rise to derived verbs in modern English. Thus he is able to look at the way in which this wide domain is divided up among the available morphological processes. To some extent, there seems to be a semantic factor at work here. He argues, for instance, that *-ate* when it is added as a verb-creating affix, is used productively only in words denoting chemical processes (*fluorinate/fluoridate, metalate*), which distinguishes this affix from *-ify* and *-ize*. These latter two suffixes, however, are synonymous, and which is used is determined by the phonological structure of the complex word in which they might occur. Plag uses *Optimality Theory* to prioritize the various factors which influence the form of the finished words, and shows that basically *-ify* and *-ize* are in complementary distribution. Where they are not (e.g. in *dandyize* or *dandify*) it is because the phonological requirements do not distinguish between the two possible outputs, and both are found. So for Plag the *relative productivity* of these two is determined by the phonological requirements on English words and the phonological structures of the words which are potentially bases for each of the processes. The productivity of *-ate*, in contrast, is determined by the need for a particular type of technical derivative.

Relative productivity, in this view, is the result of heterogeneous causes. It can be measured in any particular period by the numbers of relevant forms listed by a dictionary such as the *OED*. Since the *OED* has probably to be seen as a unique lexicographical resource, it is not clear how far such measures can be used in other languages (though Bolozky 1999 argues that dictionary measures are useful even in languages with a less rich lexicographic tradition).

12. HAY (2000)

Some of the findings of Hay (2000) have been published in more accessible form as Hay (2001). Others are still in the pipeline.

Hay attributes productivity to the interaction of two factors: *relative frequency* of derived word and base and *phonotactic patterns* at morph boundaries. Each of these will be dealt with in turn.

According to Hay, what is important in frequency terms is not the absolute frequency of individual affixes or words, but the relative frequency of the base and the derivative. There are instances where the base is more frequent than the derivative (*taste* is a far more commonly used word than *tasteless*, for example) and instances where the derived word is more common than its base (*exactly* is far more common that *exact*). Where we find affixes whose base is regularly more common

than the affixed form, we are likely to have productive affixes, and where we have affixes which regularly produce words which are commoner than their bases, the affix is likely to be non-productive, Hay claims.

This feature also correlates with the second feature. Hay considers the phonotactics which arise over morph boundaries. A consonant sequence like /nh/ does not occur within a morpheme, and thus the sequence /nh/, when it occurs in words like *inhuman*, is a major sign that there is a morphemic boundary between the /n/ and the /h/. On the other hand /mp/ occurs frequently inside morphemes, as in *lamp, ampere* etc, so that the /mp/ which occurs in *improper* is not a good signal that there is a morpheme boundary at that point. Hay claims that affixes which tend to cause boundaries which are phonotactically signalled, are more productive than affixes which in general do not signal a morphological boundary in this way. She claims that this is related to the facts which have been discussed under the heading of Level Ordering. Consonant-initial suffixes are more likely to provide phonotactic boundary signals than vowel-initial ones, and overwhelmingly consonant-initial suffixes make up the suffixes at Level 2 (the more productive level) in a level-ordered description of English.

What Hay does here, and it is the great strength of her approach, is that she provides a perceptual basis for judgements about how decomposable or analyzable words (and *a fortiori* the affixes which are used to make up those words) are. Hay is also concerned to link this analyzability to things like the order in which affixes appear in words. The psycholinguistic foundation of Hay's theory makes it particularly appealing to many linguists. The disadvantage of the theory is that it fails to account for all of the facts. One of the repeated findings of people who look at productivity diachronically (e.g. Anderson 2000; Bauer, 2001, forthcoming; Cowie, 1999) is that productivity of the same affix can change over time. The phonotactics probably remain the same over fairly long periods of time. All that can change is the relative frequency of the derivatives and their bases. Hay would have to demonstrate that such changes over time correlate with the productivity changes. While this would be a very useful step, it would seem to downplay the phonotactic principle which seems so appropriate in the model as it stands.

13. BAUER (2001)

Bauer (2001) does not present a thorough theory of productivity. Rather there is a discussion of the various factors which go towards productivity and have sometimes been confused with it.

Bauer presents a careful analysis where he shows that productivity cannot be seen as directly equivalent to frequency, transparency, regularity, naturalness or default, although each of these notions may be implicated in productivity.

Productivity cannot be equivalent to *frequency* because there are processes which continue to produce new words but at a very low rate (Bauer 2001: 48 cites formations such as *aclutter* and *awhir*), while, on the other hand, there are processes

which can be attested frequently in a dictionary but which do not appear to be used in the coining of new forms (Bauer cites *-ment*).

That productivity and *transparency* cannot be equated is illustrated by Aronoff (1983) in his discussion of nouns in *-ibility* (see above), and again by *-ment*, which has become non-productive despite remaining transparent. We can also consider the case of semantic transparency. Lack of semantic transparency in an individual word is often taken as a signal of lexicalization of that work. This seems to imply that all productive word-formation is semantically transparent and compositional (as Aronoff 1976: 45 remarks, 'productivity goes hand in hand with semantic coherence'). The problem is that much non-productive morphology is also semantically coherent. Again *-ment* springs to mind. A form such as *derailment* may not be creatable in the present stage of the language system, but its meaning is perfectly clear. It is even arguable that not all productive morphology need be semantically coherent. Without a context, it may not be clear whether a *choker* (in the sense in which it listed as a new word by Knowles 1997) is a person, instrument or location. Only in context does it become clear that it is an instrument used to choke (or slow down) traffic in suburban neighbourhoods. Thus we can argue that *-er* suffixation, productive though it clearly is, is not very semantically coherent.

Regularity is difficult to distinguish from productivity, if only because the term is used differently by different authors, and it is not clear what it really means. For some authors, though, something is irregular if it is not the majority pattern. Yet minority patterns are not necessarily unproductive, as is shown by Dutch plurals in *-s,* which remain freely coinable (for instance the plurals of newly coined diminutives take *-s*), even if the *-en* marker is the one found in the majority of cases. Some authors appear to use the term 'regular' to mean 'productive', and then, of course, distinctions can no longer be made.

Similarly, although there is considerable argumentation in the literature that the default plural on German nouns is *-s* (since this occurs in places where the noun system makes no predictions, such as on acronyms like *UFOs*, phonologically strange formations like *Autos* – strange in that this word ends in an unstressed /o/ – and prepositions or conjunctions used as nouns like *Abers* 'buts' – compare English 'but me no buts'), yet this is not the only plural suffix in German which can be used for new nouns (new feminine nouns regularly take *-(e)n*). A default must be productive, but not all productive morphological processes must be defaults.

Naturalness is partly a matter of transparency and other factors mentioned here, and to the extent that they do not equate with productivity, naturalness does not equate with it either. The *-ibility* example certainly shows that processes which are not maximally natural can nevertheless be productive.

Bauer also distinguishes between 'productivity' and 'creativity'. The distinction is not original, though the precise definition and terminology may be. Although Bauer's analysis differs from the earlier work in many ways, the debt to Aronoff (1976) and Van Marle (1985) is clear. Although 'productivity' and 'creativity' are synonyms for some authors, we can take the *creative* in *creativity* literally, and use this term to refer to the less automatic creations, those which are clearly deliberate and independent of the system. These may be the words of poetry and headline-ese

referred to above, or they may be cases which have the power to begin new paradigms, such as the reanalysis of *alcoholic* found in formations like *chocoholic*. This leaves the term 'productivity' for use with those formations which are clearly part of the system, namely those parts of word-formation which are rule-governed. This is in the spirit of Schultink's (1961) definition of productivity, but avoids the objectionable reference to inadvertent coinage. Bauer (2001: 66-71) argues against Schultink (1961) and Van Marle (1985), that conscious formation, including formations involving foreign word-formation elements, are to be excluded from the domain of productively formed words. Bauer argues that 'conscious' in this formulation cannot be practically interpreted, and that if foreign elements are excluded on the grounds that recognising them involves a certain metalinguistic facility, the same metalinguistic facility must be employed in the recognition of native (non-foreign) elements, and the same reasoning should exclude both. Since the conclusion is absurd, we have to assume that foreign elements in word-formation can indeed be used productively.

This distinction between productivity and creativity means that we need to know when attestation of new forms (usually taken as the *sine qua non* of productivity) may not indicate productivity at all. Bauer (2001: 57-8) provides the following list:

- words which occur only in poetry or highly literary texts do not necessarily indicate the productivity of their elements.
- words which occur only in newspaper headlines do not necessarily indicate the productivity of their elements.
- playful formations, where the meaning of a morpheme is apparently disregarded in the creation of a new word, do not necessarily indicate the productivity of their elements.
- words which occur in the production of a single individual do not necessarily indicate the productivity of their elements.
- new technical terms do not necessarily indicate the productivity of the elements used to construct them.
- a single new word apparently showing the use of a particular morpheme is not sufficient to guarantee that the morpheme is productive.

14. SOME THREADS

Running through this whole discussion of productivity are various threads which we can now attempt to disentangle.

One of these is whether productivity is a gradable/scalar phenomenon or not. For Schultink (1961) it is not: either you have the ability to create an infinite number of words according to some pattern or you do not. Yet for many other scholars there is at least a gradable aspect to productivity (see, among many others, Bauer 1992). Corbin (1987) brings this distinction to the fore, provides a terminological distinction, and settles the matter by pointing out that there are two distinct questions involved here. Although Corbin's terminology is not widely used at the moment, it can be applied to subsequent discussion. For example, most of the work of Baayen is

concerned with degrees of profitability rather than with the question of availability, although he treats availability as the extreme end of a scale of profitability.

Another thread which runs through discussions of productivity is the importance of limitations on productivity. The existence of principled *restrictions on productivity* is acknowledged in Zimmer (1964), although Zimmer leaves many restrictions unformulated. Booij (1977: 5) however, states clearly that "the degree of productivity of a WF-rule can be seen as inversely proportional to the amount of competence restrictions on that WF-rule."

The existence of restrictions on productivity is not questioned (although how far these are inevitably matters of competence is considered in Bauer 2001, and the validity of Booij's equation above is queried for inflectional morphology by Dressler 1997). Statements such as, for example, that English nominal *-al* is added only to verbal bases which are stressed finally (*arrival*, *referral*; *burial* is etymologically unrelated) are commonplace in the literature; see, for example, Bauer (1983: 84-99, 1994: 3356 and sources cited there). One matter treated in Bauer (1983) as a restriction on productivity is the question of *blocking*, which Kiparsky attempts to build in to Lexical Morphology as a matter of rule-ordering, although that is almost certainly too restrictive (Bauer, forthcoming). Further, the domains in which word-formation rules can apply (see Aronoff, Van Marle, Plag) can be seen as some of these competence restrictions. While not underestimating the importance of such restrictions, Bauer (1992, 2001) does suggest that competence restrictions cannot be the only things influencing apparent profitability. The fact that productivity can vary depending on social environment and style (Plag et al. 1999) also seems to indicate that formal constraints are not all that is involved.

A distinction between creativity and productivity has been discussed here mainly in reference to Bauer (2001), but similar notions are already there in Schultink (1961), Booij (1977), Van Marle (1983) and, as Booij points out, in Chomsky's (1964: 22) *rule-governed creativity* and *rule-changing creativity*.

All this can be taken at a slightly more abstract level, and we can ask how much of productivity is a matter of competence and how much a matter of performance (or how much is a matter of grammar and how much is a matter of use). We might say that anyone who has tried to specify any Word Formation Rule in any detail (i.e. beyond a basic schema of the $V + er \rightarrow N$ type) is attempting to account for the limited productivity of that rule. But such approaches assume that limited productivity is part of our competence, that is, it is part of the grammar of English. Many authors explicitly or implicitly see productivity of morphological processes as being nothing to do with the grammatical system, but rather an epiphenomenon of the historical exploitation of the grammatical system. This can be linked to the earlier question of whether productivity is or is not a matter of degree. For example, in Štekauer's onomasiological theory of word-formation, there are a number of possible different ways of forming a suitable naming unit to correspond to a given need, and one happens to be chosen. The result, according to Štekauer (e.g. 2000: 3) is that all word-formation rules are fully productive, they may simply not be used on a given occasion. This is a view of productivity as *availability*. While this is a perfectly coherent point of view, it simply ignores the question of profitability. Presumably, within this approach profitability would not be seen as anything to do

with the competence of speakers. The alternative view would ask how speakers choose between the alternatives on any given occasion, and thus why some word-formation rules appear to be given priority at some periods of history and not at others. It may be that this is entirely a social phenomenon unaffected by linguistic factors, but there is a lot of evidence that linguistic factors are often more important than they appear on the surface in such instances. The precise mixture of linguistic and non-linguistic factors has not been established or even widely discussed.

Another thread is the notion that productivity indicates *probability*. This work is clearly aimed at the *profitability* side of productivity. We have seen this most clearly in the work of Baayen, but the idea goes back a lot further, at least to Harris (1951: 374-5) (see also Aronoff 1983: 163fn, 'In word formation, the code word for probability is *productivity'*). Frequency also ties into probability, in that the more frequent a particular affix is, the more likely we are to meet a type containing that affix which has not occurred previously in a particular corpus (whether that corpus is an electronic entity, a dictionary, or a life experience). Thus it is not necessarily clear to what extent talking of productivity in terms of probability is a different approach from talking about in terms of the number of outputs formed, or, indeed, in terms of the possibility of creating new outputs (see Rainer 1987). The focus is no doubt different; the phenomenon may well be the same. Some authors, though, like Dressler and Ladányi (2000), explictly deny the feasibility of deriving measures of productivity from frequency data.

It should be noted that nearly all the work on morphological productivity has been carried out within formal approaches. Work based on a separationist view of morphology such as that espoused by Beard (e.g. 1998) has not made a deep impression on studies of productivity, although some of Plag's (1999) work can be viewed in this light. Again Dressler and Ladányi (2000) explicitly rule out any separationist account of productivity. Accordingly, despite a call for this in Kastovsky (1986), we have few studies of productivity which consider how, for example, adjectivalizations of verbs are formed and relatively many which consider how words using the suffix *-ee* are formed or how conversion works. It is not clear how much of a difference this makes, although Plag (1999) suggests that the formation of verbs is rather more regular than might be supposed if individual affixes were considered in isolation, and Bauer (2001) makes a similar suggestion concerning nominalizations of verbs.

15. CONCLUSION

What perhaps stands out most clearly in all of this is the way in which morphological productivity is being taken more seriously as a part of linguistic theorizing than it used to be. Productivity may an epiphenomenon of something more basic (as in Natural Morphology and in Hay's theory), it may be two separate phenomena, availability and profitability, it may be a matter of grammar or it may not, but it is no longer being ignored. This is progress.

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REFERENCES

Anderson Karen Elizabeth. 2000. *Productivity in English nominal and adjectival derivation, 1100-2000*. Unpublished PhD dissertation, University of Western Australia.

Anshen, Frank and Aronoff, Mark. 1981. "Morphological productivity and phonological transparency." *Canadian Journal of Linguistics/Revue Canadienne de Linguistique* 26, 63-72.

Anshen, Frank and Aronoff, Mark. 1997. "Morphology in real time." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1996*. Dordrecht: Kluwer, 9-12.

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. Cambridge, Mass.: MIT Press.

Aronoff, Mark. 1980. "The relevance of productivity in a synchronic description of word formation." In: J. Fisiak (ed.) *Historical Morphology*. The Hague: Mouton, 71-82.

Aronoff, Mark. 1983. "Potential Words, Actual Words, Productivity and Frequency." *Preprints of the Plenary Session Papers of the XIIIth International Congress of Linguists*. Tokyo, 163-170.

Aronoff, Mark and Schvaneveldt, Roger. 1978. "Testing morphological hypotheses." *Annals of the New York Academy of Science* 318, 106-114.

Baayen Harald. 1989. *A Corpus-Based Approach to Morphological Productivity*. Doctoral dissertation, Free University of Amsterdam.

Baayen, Harald 1992. "Quantitative aspects of morphological productivity." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1991*. Dordrecht: Kluwer, 109-149.

Baayen, Harald. 1993. "On frequency, transparency and productivity." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1992*. Dordrecht: Kluwer, 181-208.

Baayen, Harald and Lieber, Rochelle. 1991. "Productivity and English derivation: a corpus-based study." *Linguistics* 29, 801-843.

Baayen, Harald and Renouf, Antoinette. 1996. "Chronicling *The Times*: productive lexical innovations in an English newspaper." *Language* 72, 69-96.

Barnhart, Robert K.; Steinmetz, Sol; and Barnhart, Clarence L. 1990. *Third Barnhart Dictionary of New English*. n.p.: H. W. Wilson.

Bauer, Laurie. 1983. *English Word-formation*. Cambridge: Cambridge University Press.

Bauer, Laurie. 1992. "Scalar productivity and *-lily* adverbs." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1991*. Dordrecht: Kluwer, 185-91.

Bauer, Laurie. 1994. "Productivity." In: R.E. Asher (ed.), *The Encyclopedia of Language and Linguistics*, Oxford: Pergamon, 3354-7.

Bauer, Laurie. 1998. "When is a sequence of two nouns a compound in English?" *English Language and Linguistics* 2, 65-86.

Bauer, Laurie 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.

Bauer, Laurie. (forthcoming). "Competition in word-formation." In: A. van Kemenade and B. Los (eds.), *The Handbook of the History of English*. Oxford and Malden, Mass.: Blackwell.

Bauer, Laurie and Renouf, Antoinette. 2001. „A corpus-based study of compounding in English." *Journal of English Linguistics* 29, 101-123.

Beard, Robert. 1998. "Derivation." In: A. Spencer and A. M. Zwicky (eds.), *The Handbook of Morphology*. Oxford and Malden, Mass.: Blackwell, 44-65.

Booij, Geert E. 1977. *Dutch Morphology*. Lisse: De Ridder and Dordrecht: Foris.

Bolozky, Shmuel 1999. *Measuring Productivity in Word Formation*. Leiden: Brill.

Carstairs-McCarthy, Andrew. 1992. *Current Morphology*. London and New York: Routledge.

Chomsky, Noam. 1957. *Syntactic Structures*. The Hague and Paris: Mouton.
Chomsky, Noam. 1964. *Current Issues in Linguistic Theory*. The Hague and Paris: Mouton.
Chomsky, Noam. 1970. "Remarks on nominalization." In: R. A. Jacobs and P. S. Rosenbaum (eds), *Readings in English Transformational Grammar*. Waltham, Mass.: Ginn, 184-221.
Corbin, Danielle 1987. *Morphologie dérivationelle et structuration du lexique*. 2 vols. Tübingen: Niemeyer.
Cowie, Claire. 1999. *Diachronic word-formation: a corpus-based study of derived nominalizations in the history of English.* Unpublished PhD thesis, University of Cambridge.
Dressler, Wolfgang U. 1997. *On productivity and potentiality in inflectional morphology*. *Clasnet Working Papers* 7 (Montreal).
Dressler, Wolfgang U. and Ladányi, Mária. 2000. "Productivity in word formation: a morphological approach." *Acta Linguistica Hungarica* 47, 103-144.
Giegerich, Heinz J. 1999. *Lexical Strata in English*. Cambridge: Cambridge University Press.
Harris, Zellig. 1951. *[Methods in] Structural Linguistics*. Chicago and London: University of Chicago Press.
Hay, Jennifer B. 2000. *Causes and Consequences of Word Structure*. Unpublished PhD dissertation, Northwestern University.
Hay, Jennifer B. 2001. "Lexical frequency in morphology: is everything relative?" *Linguistics* 39, 1041-1070.
Jespersen, Otto. 1942. *A Modern English Grammar on Historical Principles. Part VI: Morphology*. London: George Allen and Unwin, Copenhagen: Munksgaard.
Kastovsky, Dieter 1986. "The problem of productivity in word formation." *Linguistics* 24, 585-600.
Kastovsky, Dieter. 1999. "Hans Marchand's theory of word-formation." In: U. Carls and P. Lucko (eds.), *Form, Function and Variation in English*, Frankfurt-Main: Lang, 29-39.
Kiparsky, Paul. 1982. "Lexical morphology and phonology." In: The Linguistic Society of Korea (ed.), *Linguistics in the Morning Calm*, Seoul: Hanshin, 3-91.
Knowles, Elisabeth 1997. *The Oxford Dictionary of New Words*. Oxford: Oxford University Press.
Kruisinga, Etsko. 1932. *A Handbook of Present-Day English*. 5th edition, Vol 3. Groningen: Noordhoff.
Kuiper, Koenraad. 1999. "Compounding by adjunction and its empirical consequences." *Language Sciences* 21, 407-422.
Lees, Robert B. 1963. *The Grammar of English Nominalizations*. The Hague: Mouton and Bloomington: Indiana University.
Marchand, Hans. 1969. *The Categories and Types of Present-Day English Word-Formation*. 2nd edn. Munich: Beck.
Marle, Jaap van. 1985. *On the Paradigmatic Dimension of Morphological Creativity*. Dordrecht: Foris.
Matthews, P.H. 1974. *Morphology*. Cambridge: Cambridge University Press.
Mayerthaler, Willi. 1981. *Morphologische Natürlichkeit*. Wiesbaden: Athenaion.
Plag, Ingo. 1999. *Morphological Productivity. Structural constraints in English derivation*. Berlin and New York: Mouton de Gruyter.
Plag, Ingo; Dalton-Puffer, Christiane; and Baayen, Harald. 1999. Morphological productivity across speech and writing. *English Language and Linguistics* 3, 209-228.
Quirk, Randolph and Wrenn, C. L. 1957. *An Old English Grammar*. London: Methuen.
Raffelsiefen, Renate. 1999. "Phonological constraints on English word-formation." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1998*. Dordrecht: Kluwer, 225-287.
Rainer, Franz. 1987. "Produktivitätsbegriffe in der Wortbildungstheorie." In: W. Dietrich, H-M. Gauger and H. Geckeler (eds.), *Grammatik und Wortbildung romanischer Sprachen*, Tübingen: Narr, 187-202.
Schultink, Henk. 1961. "Produktiviteit als morfologisch fenomeen." *Forum der Letteren* 2: 110-125.
Schultink, Henk. 1992. "Herkomst en groei van het begrip 'produktiviteit' als morfologisch fenomeen." In: M. Klein (ed.), *Nieuwe eskapades in de neerlandistiek*, Groningen: Wolters-Noordhoff, 187-201.
Smith, Logan P. 1912. *The English Language*. Reset, 1944. London: Oxford University Press.
Štekauer, Pavol. 2000. *English Word-Formation. A History of Research (1960-1995)*. Tübingen: Narr.
Wentworth, Harold. 1941. "The allegedly dead suffix -DOM in modern English." *Publications of the Modern Language Association* 56: 280-306.
Williams, Edwin. 1981. "On the notions 'lexically related' and 'head of a word'." *Linguistic Inquiry* 12, 245-274.
Zimmer, Karl E. 1964. Affixal Negation in English and Other Languages. Supplement to Word 20.

CONSTRAINTS ON PRODUCTIVITY

FRANZ RAINER

1. INTRODUCTION

A pattern of word formation can never apply to just any word of a language, but only to some subset of words. This subset of possible bases is called the pattern's *domain*. In the case of unproductive patterns the domain can only be defined extensionally, i.e. by enumerating one by one all the actually used bases, while the domain of productive patterns must be defined intensionally, i.e. by indicating one or more features that any potential base must or should possess as well as additional factors from outside the pattern itself that may be relevant. These features and factors which serve to delimit a pattern's domain are generally referred to in the literature as *constraints* (or *restrictions*, when they are pattern-specific). The exact delimitation of the domain of particular patterns or, to put it the other way round, the identification of the constraints on those patterns is one of the most important and at the same time difficult descriptive tasks students of word formation have to cope with. The present chapter is intended to present a typology of constraints valid for natural languages in general, though illustrated mainly with examples from English.

2. UNIVERSAL CONSTRAINTS

Constraints on patterns of word formation may be either universal or language-specific. We will start our discussion with universal constraints, of which again two types can be distinguished, constraints supposedly located at UG (Universal Grammar in Chomsky's sense) and processing constraints.

2.1 Constraints supposedly located at UG

From the end of the sixties onwards, generative syntax was characterised by an endeavour to reduce the number of rules, placing at the same time powerful universal constraints on them in order to avoid *overgeneration*. This research style was taken over by generative morphologists when word formation once again became a respectable branch in generative grammar at the beginning of the seventies. Over the next years, more than half a dozen such constraints were proposed, and generally baptised with somewhat pompous names (for exhaustive catalogues, see Scalise 1984: 137-165 and, in a more sceptic vein, Rainer 1993: 98-116): the *Word Based Hypothesis* at the heart of Aronoff (1976) and its corollary, the *No Phrase Constraint* – whose prohibition of phrasal constituents ironically was already contradicted by the very name of this constraint! –, the *Binary Branching Condition* (Aronoff 1976: 89 and 94; "one affix, one rule"), a reformulation of the

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 335—352.

structuralist dogma of binarism, the *Unitary Base Hypothesis* (Aronoff 1976: 48), which banned any disjunction from the syntacticosemantic characterisation of the domain of rules of word formation, later supplemented by Scalise (1984: 137) with an analogous *Unitary Output Hypothesis*, the *Adjacency Condition* (Siegel 1977) and the *Atom Condition* (Williams 1981), which were designed to restrict the power of rules to refer to constituents of the bases, to name just the most important proposals. The most thorough analysis carried out in this research style by a generative morphologist was Botha's (1988: 22-33) analysis of reduplication in Afrikaans. Most of these constraints were flawed from the beginning by an insufficient empirical underpinning, and when the conditions-on-rules approach went out of fashion in generative grammar, they met the quiet death they deserved, which is not to say that some insights have not been integrated into later theories.

2.2 Processing constraints

While generative grammar up to the present day has limited itself essentially to the study of competence – as opposed to performance – and hence continues to profess a thoroughly idealised and static conception of the lexicon, since the end of the seventies we have been witnessing the powerful development of psycholinguistic studies about the mental lexicon (for a recent overview, see Baayen & Schreuder 2003). While at the beginning morphologists and psycholinguists used to stand back to back, one may observe more and more mutually fruitful cross-fertilisation over the last years, especially between psycholinguists and non-generative morphologists. With respect to our topic, some aspects of blocking (2.2.1.), affix order (2.2.2.) and choice of the base(s) (2.2.3.) can only be fruitfully tackled from a processing perspective.

2.2.1 Blocking

Morphologists speak of *blocking* when the unacceptability of a morphologically complex word is not due to the failure to meet some requirement of the relevant pattern of word formation but to the existence of either a synonymous word or a synonymous pattern. In Rainer (1988) it was proposed to refer to the first of these two cases as *token blocking* and to the second one as *type blocking*.

Token blocking

In the case of token blocking, as we have already mentioned, the unacceptability of one morphologically complex word is due to the existence of some synonymous word in the language. The classic example is the unacceptability of *stealer* as a consequence of the existence of *thief*. The requirement that a synonymous word exist "in the language" is somewhat imprecise, because what really matters is the existence of an established synonym in the mental lexicon of the speaker or writer in question, not in the language as a social institution (de Saussure's *langue*). In fact, it can readily be observed that children, non-native speakers or other people with an insufficient command of the language produce complex words of the *stealer* type as

long as they have not yet internalised the established synonym. Even adult native speakers with a full command of their own language sometimes produce complex words of the *stealer* type when they momentarily fail to retrieve the established term. This last observation makes it clear that blocking has to do with processing: under normal circumstances, lexical access privileges established words, while word formation is only resorted to when no established word is available or if the speaker or writer wants to avoid this established word for some stylistic purpose. The blocking word need not be a simplex as in the case of *thief*, but may itself be a regular complex word (*cf.* Malicka-Kleparsky 1985), provided that it is frequent enough to be stored in the speaker's or writer's mental lexicon. Frequency is a decisive conditioning factor for token blocking: the higher the frequency of the blocking word, the stronger the blocking effect. In the case of low frequency words, doublets are readily tolerated.

What is the status of the blocked word? It is clear that it must be well-formed in principle according to some productive pattern of word formation of the language, otherwise it would not make sense to say that it has been blocked. Nevertheless blocked words should not simply be put on the same footing as possible words, i.e. complex words that are not yet established but readily acceptable to native speakers. *Rainerian*, for example, a relational adjective derived from the name of the author of these lines, would be such a possible but hitherto non-existent word. And since possible words may serve as input for further derivation, nothing could prevent us from coining *Rainerianism* should I ever become responsible of establishing some new political, philosophical or other trend. Now, we observe that blocked words, though morphologically well-formed, behave quite differently in this respect from possible words: *thief*, for example, does not only block synonymous *stealer*, but also any further conceivable derivation thereof. *Stealerless*, for example, is just as odd as *stealer* itself, even though there is no established synonym *thiefless* to token-block it, and well-formedness is guaranteed by the acceptability of *leaderless*, *teacherless* and similar formations. The same holds true for compounds: *piano thief* vs. **piano stealer*, etc. It might thus be useful to replace the traditional dichotomy *possible* vs. *established* – or *actual* – *word* by the trichotomy *potential* vs. *possible* vs. *established word*. According to this terminology, blocked words would be potential, but not possible words, in our sense of words which are not only well-formed but also readily acceptable under normal linguistic circumstances. This conceptual distinction allows us to formulate the following general constraint on word formation (in the seventies it would have been called *Possible Base Constraint*): The bases of patterns of word formation must be possible words; or, put the other way round: merely potential – as opposed to possible – words are excluded as bases of patterns of word formation.

Type blocking

In the case of type blocking, the unacceptability of a complex word is not due to the blocking force exerted by an established synonymous *word*, but to the fact that a synonymous *pattern* takes precedence. Type blocking may thus apply even when no actual blocking word formed according to the rival pattern exists. It will be

illustrated here with the rivalry between the synonymous abstract suffixes *-heit*, *-ität* and *-ie* in German after adjectives ending in *-il* (*cf.* Rainer 1988: 180-181).

[+final stress]	*-heit*
[+final stress] & [+learnèd] & /-il/	*-ität*
[+final stress] & [+learnèd] & [+ *-phil*]	*-ie*

Schema 1 *Type blocking with German quality nouns in* -heit, -ität *and* -ie

German adjectives with final stress fall into the domain of the suffix *-heit*, which is fully productive and may even apply to non-native words with final stress, as is shown by *akut* 'acute' → *Akutheit* 'acuteness', *galant* 'gallant' → *Galantheit* 'gallantery', *grottesk* 'grotesque' → *Grotteskheit* 'grotesqueness', etc. The domain of *-heit*, however, is systematically curtailed by the rival suffix *-ität* after learnèd[1] bases in *-il*, which all have final stress, as shown by *labil* 'unstable' → *Labilität* 'instability', *steril* 'sterile' → *Sterilität* 'sterility', etc. It is important to note that even where no quality noun is attested in dictionaries, native speakers will clearly prefer *-ität* to *-heit* if the adjective has a learnèd flavour, such as *merkantil* 'mercantile', *monofil* 'made of one thread', etc. Only with some adjectives that have become part of a more colloquial register may one observe occasionally that *-heit* is also tolerated: *debil* 'stupid' → *Debilheit* 'stupidity', beside established *Debilität*, *skurril* 'droll' → *Skurrilheit* 'drollery', beside established *Skurrilität*, etc. We may thus conclude that with learnèd adjectives with final stress *-ität* effectively type-blocks *-heit*. Now, it is interesting to observe that the domain of *-ität* is again curtailed by the even more specific domain of *-ie* with adjectives ending in the suffix *-phil* '-phile', which is of Greek origin. Adjectives in *-phil* should fall into the domain of *-ität* since they are learnèd, end in *-il* and have final stress, but nevertheless they consistently take *-ie*: *bibliophil* 'book-loving' → *Bibliophilie* 'bibliophily', *anglophil* 'anglophile (adj.)' → *Anglophilie* 'anglophilia', etc. The same would also be true of any neologism in *-phil*. On the Internet, one may only find some scattered formations with *-ität*, such as *Frankophilität* 'francophilia' or *Xenophilität* 'xenophilia', which are probably best attributed to a lack of acquaintance with the learnèd vocabulary on the part of the coiners, but nevertheless prove that *-phil* would fall in the domain of *-ität* if this suffix were not type-blocked by *-ie*.

A crucial question with respect to type blocking is whether it is predictable when it applies. Van Marle (1986) ventured the hypothesis that it should always apply if the rivalry obtains between a pattern with a relatively unbounded domain and a pattern with a more restricted domain which is a subset of the larger domain. Unfortunately this generalisation is both too strong and too weak. It is too weak, since German *-ität* shows that an affix need not be a general case (a default) in order to be exposed to type blocking: even special cases may be further type-blocked by other more special cases. On the other hand, it is too strong, since, as pointed out in

[1] Note that [±learnèd] is a stylistic feature and not an etymological or morphological one like English [±Latinate].

Rainer (2002: 119), one may also observe free variation between a more general and a more specific pattern: in the case of Spanish relational adjectives, for example, the general pattern *Xiano* and the more specific pattern *Xeano* are in free variation with foreign names ending in *-e*, which is the specific domain of *-eano*. So, for example, from *Sartre* we may form both *sartriano* and *sartreano*, from *de Saussure*, *saussuriano* and *saussureano*, etc. It is also easy to imagine that one day, due to an ever more deficient mastery of learnèd vocabulary on the part of younger generations, *-ität* might come to be in free variation with *-ie* after bases in *-phil*. The exact nature of the relationship between rival patterns therefore seems to have to be learned in every single case. This is another fundamental difference with respect to token blocking, where the positive correlation between the blocking force and the frequency of the blocking word seems to be language-independent. Strictly speaking, type blocking should therefore be classified under 3. in the present chapter.

2.2.2 Complexity Based Ordering

An important processing constraint affecting the order of affixes, dubbed *Complexity Based Ordering* by Plag (2002), has been proposed recently by Hay (2002). It says that "an affix that can be easily parsed out should not occur inside an affix that cannot" (p. 528). This processing constraint, according to Hay, explains most stacking restrictions attributed to level ordering in Lexical Phonology (*cf.* 3.1.), such as the impossibility of attaching *-ity* to adjectives in *-less*: **home-less-ity* vs. *home-less-ness*, etc. According to Hay's constraint, this is simply due to the fact that *-less* is more easily parsable than *-ity* and hence should not occur inside the latter affix. The degree of parsability depends, among other factors, on the relative frequency of base and derivative: the higher the relative frequency of the base with respect to that of the derivative, the higher the suffix's parsability.[2] According to this measure of parsability, *-ment* is more easily parsable in *improvement* than in *government*, since *improve* is more frequent than *improvement*, while *government* is more frequent than *govern*. This means that the degree of parsability of an affix may vary from derivative to derivative. As Hay (2002: 549) shows convincingly, this difference in parsability explains why of our two words in *-ment* only the minimally decomposable derivative *government* may take the suffix *-al*, which is sensitive to the presence of internal structure: *governmental* vs. **improvemental*. This ability of Hay's constraint to predict even intra-affixal variability is certainly a remarkable achievement.

Now, is Hay's constraint so powerful that we may dispense not only with level ordering but also with affix-specific restrictions? The answer to this question, according to Hay & Plag (in press), is negative: Hay's processing constraint would still allow a substantial number of combinations which are in fact unacceptable. These can only be ruled out by the means of affix-specific restrictions. Hence, Hay

[2] According to Hay & Baayen (2002), there is a positive correlation between parsability and productivity. That means that more productive suffixes tend to be located outside less productive ones.

and Plag conclude, "both selectional restrictions and processing constraints are instrumental in determining suffix ordering" (p. 28).

2.2.3 Productivity, frequency and length of bases

In general descriptive practice the domain of patterns of word formation is described by indicating some salient features such as the word class of a potential base, its semantic category, prosodic features, or whatever may be relevant in a particular case (*cf.* 3.2.). As Krott, Schreuder, and Baayen (1999) have found out, there are regularities beyond these combinatorial specifications, totally unexpected on the background of current models of word formation. They show that not every word with the required specifications has the same chance of becoming a base for further derivation or of entering into a compound as a constituent. The probability in fact is positively correlated with the frequency of a word, but negatively with its length and, in the case of a derivative, also with the productivity of the affix: more frequent words are preferred to less frequent ones, short ones over long ones, and words formed according to a less productive pattern over ones formed according to a more productive pattern. In view of the categories involved and the fact that the constraint cuts across all patterns of word formation it is quite plausible to assume that these constraints are a consequence of general processing mechanisms.

3. LANGUAGE-SPECIFIC CONSTRAINTS

With respect to language-specific constraints, one fundamental question is whether the stacking up of affixes is constrained only by *selectional restrictions* of individual affixes – the null hypothesis – or whether some more general principles are involved. This hotly debated issue will be taken up in 3.1. The second question that we will address is the nature (3.2) and typology (3.2.1-6) of affix-specific restrictions.

3.1 Level ordering

Massive borrowing of complex words may lead to a situation where the word formation patterns of a particular language are divided into two more or less tightly separated blocks, a foreign and a native one. Many scholars have argued that this is exactly what has happened in English due to the massive influx of Romance and Latin words during the Middle English period. From a synchronic perspective, it has long been observed that affixes of Latin or Romance origin generally occur inside affixes of Germanic origin: *persuas-ive-ness* vs. **home-less-ity*, etc. The two types of affixes also tend to differ in their phonological behaviour: affixes of Romance or Latin origin trigger more phonological changes in their bases (*cf. persuade* / *persuas-ive* above) and affect stress (*cf. átom* / *atómic* / *atomícity*), while Germanic affixes are stress-neutral (*cf. hóme* / *hóme-less* / *hóme-less-ness*). These correlations have led Siegel (1979) to propose an organisation of English word formation in blocks of rules in such a way that, roughly speaking, Latin and Romance affixes

were located in a first stratum together with the corresponding phonological rules, while the Germanic affixes were located in a second stratum, extrinsically ordered after the first one. By locating, for example, the stress shifting rule at the first stratum, this theory was able to predict the correlation between affix order and stress that we observed in the examples given above. Siegel's theory became quite popular and was integrated in a slightly modified form into the highly influential theory of Lexical Phonology of Kiparsky (1982). Nevertheless it was also soon pointed out that the predictions of the theory are not entirely correct. Strauss (1982) noted that Germanic prefixes could regularly occur inside Latin suffixes (*cf.* [[*un-gramatical*]-*ity*]), while Aronoff & Sridhar (1983: 4ff.) showed that stress-neutral affixes may occasionally occur inside stress-shifting ones (*cf. X-able* vs. *X-abíl-ity*, *X-ise* vs. *X-is-átion*, *X-ist* vs. *X-íst-ic*). Finally, Fabb (1988) pointed out that level ordering also failed to rule out many impossible affix sequences inside the two strata. The theory of level ordering, in other words, turned out to be both too strong and too weak. As a consequence of these serious empirical flaws, in the nineties (*cf.* Goldsmith 1990: 259-273, among many others) level ordering was either totally abandoned or thoroughly revised (*cf.* Giegerich 1999). Today, in the light of the evidence accumulated, it therefore seems preferable to adopt the null hypothesis that affix order in English is constrained by selectional restrictions only, except for the general processing constraints outlined in 2.

3.2 Affix-specific restrictions

Before turning to the question of what properties of bases or complex words may be relevant in defining selectional restrictions of affixes, it is worth dwelling on some general problems concerning the nature of selectional restrictions.

The first one concerns the locus where selectional restrictions are to be encoded. In rule-based theories of word formation such as Aronoff (1976), where a rule of word formation is conceived of as a function that takes a base as its input and transforms it into a more complex word as its output, restrictions are normally defined over the input, thus narrowing the domain of application of the rule. In theories, such as Lieber (1981), where affixes are given lexical entries just like words and stems, their combinatorial potential is encoded in *subcategorisation frames*. In order to express the generalisation that the suffix *-able* in productive use may only be attached to transitive verbs, one would say in the first kind of framework that the application of the word formation rule introducing *-able* is restricted to transitive verbal bases, while in a Lieber-style framework one would say that the lexical entry *-able* carries a subcategorisation frame V_{tr} _. The empirical result is exactly the same in this case. When we look at other patterns of word formation, however, it turns out that the two ways of encoding selectional restrictions are not mere notational variants. Spanish, for example, has a rule of compounding that forms exocentric possessive adjectives out of a noun and an adjective, linked by the vowel *-i-*: *pelo* 'hair', *rojo* 'red' → *pelirrojo* 'redhaired, lit. hairred', etc. The adjective semantically determines the noun, but it agrees with the head noun of the noun phrase and not with the first constituent of the compound:

una niña pelirroja / **pelirrojo* 'a redhaired girl' (*pelo* is masculine, *niña* feminine, *-o* is the agreement marker for the masculine, *-a* for the feminine). This kind of compounding is productive, but severely restricted (*cf.* Rainer 1993: 289): in fact, the noun may only designate some part of the body, human or animal (*cf.* **puertirrojo* 'with a red door'; *puerta* 'door'), and must be bisyllabic (cf. **barriguigordo*, beside the well-formed phrase *barriga gorda* 'fat belly'). Now, this kind of restriction may be encoded neither in the lexical entries of the respective nouns nor in those of the adjectives, because outside this type of compound *rojo* and other adjectives show no analogous restrictions as to semantic class or length of the nouns they may determine. The locus where we have to state this restriction is clearly the pattern as such, and not one of its constituents. The same is also true for the requirement of placing a linking vowel *-i-* between noun and adjective. What this and numerous analogous examples show is that restrictions on patterns of word formation are best located at the level of the pattern (or rule, if one prefers) itself. Theories of word formation with only lexical entries and general mechanisms of combining them, but without patterns or rules, do not seem to be viable.

The second general problem to be addressed is whether restrictions are to be defined on the input or on the output. Traditionally, restrictions in word formation used to be defined on the input, but since the nineties, partly in the wake of Optimality Theory (*cf.* Raffelsiefen 1999, Plag 1999), output restrictions have received more and more attention. In a pattern-based theory of word formation, we would expect both kinds of restrictions to occur, since both may easily be encoded on a pattern. The prosodic restriction (bisyllabicity) on the nominal constituent of our Spanish compound type, for example, has clearly to be stated as an input restriction, since the adjectival constituent shows no prosodic restriction, which means that the total number of syllables of these compounds is variable. The situation is less clear with respect to the semantic restriction to parts of the human or animal body: this could be encoded either as an input restriction on the nominal constituent, or alternatively as an output restriction on the pattern as a whole, stating that this kind of adjective may only refer to physical properties of persons or animals. A clearer example of an output condition would be Plag's (1999: 145-194) analysis of English *-ise*, which says essentially that this suffix in productive use tends to favour outputs with a dactylic contour (*cf. rándomìse*, *dándyìse*, etc.). If the base does not fit this prosodic schema, it is either avoided (**kárstìze*, etc.) or adapted in a pertinent way (*cf. feminine* → *féminìse*, *patina* → *pátinìse*, etc.).

A third general problem is whether restrictions should be encoded on the base or on the affix. Traditionally, restrictions have been encoded on the rule, the pattern, or the affix itself, if this is provided with a separate lexical entry. Quite recently, however, Plag – following Giegerich (*cf.* Giegerich 1999) – has proposed to encode restrictions in the base rather than in the affix. According to him, restrictions are 'base-driven', not 'affix-driven'. Instead of saying that the suffix *-ation* selects verbs in *-ise*, one should say that *-ise* selects *-ation*. Does that make any difference? Plag (1996: 777) argues that it does. The advantage, according to him, would be that we need not state separately that verbs in *-ise* do not take the rival abstract suffixes *-age*, *-al*, *-ance*, *-ment*, or *-y*. Now, this result is only obtained if the *base-driven restriction* states that *-ise* ONLY selects *-ation*. The – equally base-driven –

statement that *-ise* selects *-ation* would not preclude the possibility that this suffix is also compatible with other abstract suffixes. Therefore we can see that it is not base-drivenness *per se* which achieves the desired result, but the tacit introduction of two kinds of restrictions, one kind which simply states that a certain affix or base may select a certain affix, and a stronger variety which states that a certain affix or base may *only* select a certain affix. Now, the same result could be achieved by introducing two analogous types of *affix-driven restrictions*: *-ation* selects *-ise* vs. *-ation* is the only affix to select *-ise*. The exclusive variant, both in its base-driven and in its affix-driven wording, seems to contain a disguised paradigmatic statement, since it implicitly compares *-ation* with rival affixes. Such paradigmatic statements, according to what we have said in 2.2.1, are the job of type blocking, the mechanism Plag wanted to get rid of by the introduction of base-driven restrictions (*cf.* also Plag 2003: 66-67). But in reality, as we can see, in Plag's account the paradigmatic dimension simply creeps back through the back door in the form of a new type of restriction with exclusive rights: but a restriction with exclusive rights is strictly equivalent to a normal restriction + type blocking. Whether we do it the one way or the other seems to be a matter of taste. The important thing is that there is no way of avoiding explicit statements about the paradigmatic relationship between rival patterns.[3]

The fourth general problem is intimately tied to the last one. If the domain of one general affix is curtailed by another affix, as is the domain of *-heit* by *-ität* with bases in *-il*, this fact must be stated twice, *viz*. as a positive restriction on *-ität* – it attaches, among other adjectives, to ones in *-il* – and at the same time as a negative restriction on *-heit* – it attaches to any kind of adjective with final stress except those in *-il* (this simplified statement will do for our purposes). This way of putting things seems somewhat awkward because it does not state explicitly that the negative restriction is somehow a consequence of the positive one. Van Marle's (1986) *Domain Hypothesis* was specifically designed to avoid this conceptual awkwardness by postulating a general principle according to which special domains curtail rival general domains. Under this hypothesis, the negative restriction would no longer be necessary, but unfortunately, as we have already seen in 2.2.1, the Domain Hypothesis is untenable. Whether a special domain curtails a general domain or not, is not predictable but must be stated case by case, either through a combination of positive restriction + type blocking or through a restriction with exclusive rights, which, as we have seen, amounts to the same. In this way we can avoid the explicit statement of negative restrictions, something that we would like to avoid for principled reasons. As is well-known (*cf.* Sokolov & Snow 1994 for a good review of the literature), language learners can only rely on positive evidence: they first learn single instances of complex words and then proceed by making – generally very conservative – generalisations on this ground (*cf.* Bowerman 1982: 324-328, Pinker 1989). We would thus expect to find no negative affix-specific restrictions in

[3] In the case at hand, it is not clear whether we need type blocking or a restriction with exclusive rights at all, since none of the rival suffixes is a general case (except *-ing*, which may not really be synonymous). If one states the restrictions on the rival suffixes properly, it may turn out that verbs in *-ise* do not fall in their domains, so that no paradigmatic statement would be needed.

natural languages, except the ones attributable to type blocking or to some other independent cause.

Up to now, the reader may have gained the impression that restrictions in word formation are a question of all or nothing, i.e. that a certain base is either included in the domain of a particular pattern, or excluded. In reality, membership in a certain domain is just as much of a gradual nature as membership in linguistic categories in general (*cf.* Bauer 1983: 98-99). We often find a set of prototypical members surrounded by more marginal ones, more acceptable to some speakers than to others. This is the case, for example, of the Italian suffix *-issimo* (*cf.* Rainer 2004), which expresses emphatic intensification and consequently is most compatible with adjectival bases that may be used in highly emotional predications, such as *bello* 'beautiful', *caro* 'expensive', etc., but less so with adjectives that involve a more weighing attitude, such as *simile* 'similar', *significativo* 'significant', etc. There is a clear positive correlation, in this case, between degree of membership in the domain of *-issimo* on the one hand and the number of attested forms in *-issimo* and acceptability to native speakers on the other. In other cases, the relation between the different subdomains of a domain is better characterised by the notion of family resemblance, i.e. the subdomains are all somehow related, but no necessary and sufficient conditions can be formulated that would cover all the possible bases and only those. This situation is particularly frequent with less productive patterns, where the forces of analogy generally are still very apparent. Good illustrations of such cases may be found in Adams' (1973: Chapter 13) analyses of *-arian*, *-ster*, *-eer*, *-nik* and many other patterns (*cf.* also Rainer 2003).

Now that we have discussed the main general problems involved in the notion of affix-specific restriction, we may turn our attention to the single factors that may be relevant for defining the applicability of a pattern of word formation.

3.2.1 Phonology

All aspects of the phonology of words may be relevant for defining the applicability of a certain pattern of word-formation. The most common type of phonological restriction is the sensitivity of a suffix to the presence of certain phonemes in the base, especially at the right edge. So, for example, the suffix *-eer* (*cf.* Adams 1973: 175-178) shows a preference for bases ending in [t]: *musketeer*, *profiteer*, *racketeer*, etc. At the same time, a clear preference for bisyllabic trocaic bases may be observed, which would be an example of a prosodic restriction (*cf. cameleer* vs. **giraffeer*, *profiteer* vs. **gaineer*, *racketeer* vs. **fraudeer*, etc.; Raffelsiefen 1999: 231). Note that this latter restriction could equally well be formulated as an output restriction (avoidance of stress clash). Many other cases of phonological output restrictions may be found in Raffelsiefen (1999) and Plag (1999), both couched in the framework of Optimality Theory. An oft-quoted example of a suffix sensitive to final stress of the base is the deverbal abstract suffix *-al* of *arrival*, *referral*, *retrieval*, *survival*, etc. According to Malicka-Kleparska's (1992: 437) analysis of this pattern, however, this would be a spurious generalisation: final stress is said not to be relevant *per se*, but a mere side effect of

the fact that *-al* preferably attaches to Latinate prefix-root verbs, which all happen to have final stress.

Raffelsiefen, in her in-depth study of phonological restrictions in English word formation, concludes that "phonological restrictions in word-formation are affix-specific and are in principle independent of the restrictions which characterize the language as a whole" (199: 235). An apparent exception to this statement seems to be constituted by *haplology*, i.e. the avoidance of identical phonetic sequences in immediate neighbourship at a morpheme boundary. Haplological effects in derivation have first been noted by Dressler (1977) and have later been elaborated on by Stemberger (1981), Menn & MacWhinney (1984) and, in more recent times, by scholars working within the framework of Optimality Theory, among them Plag (1998a) and Yip (1998). Haplological effects in morphology are found over and over again in the languages of the world, which seems to indicate that some very general cognitive mechanism is at work here, but at the same time it has been shown that the exact conditions under which it operates are highly language-specific. In his account of contrasts such as *strychninize* / **strychnize*, *classicize* / **classize* vs. **femininize* / *feminize*, **metathesisize* / *metathesize*, for example, Plag (1998a: 202) concludes that "the operation of OCP (onset)[4] needs to be restricted to those cases in which a base with two unstressed syllables precedes *-ize*." Independently of whether this is the correct account or not, it serves the purpose of illustrating the bicephalous nature of haplology as a universal tendency with language-specific manifestations.

3.2.2 Morphology

Patterns of word formation may also be sensitive to the presence of certain morphemes in the base or more generally to the morphological structure of the base. This is no trivial matter, since several theories have denied rules of word formation access to the internal structure of the base, most radically the framework of *a-morphous morphology* of Anderson (1992). Now, this position is certainly too radical. The processing constraints presented in 2.2.2. and 2.2.3., for example, are clearly sensitive to the morphological structure of words. Another clear case of sensitivity to the internal make-up of the base which we have already seen is the mutual attraction between *-ation* and bases in *-ise*: that it is *-ise qua* morpheme which is relevant here is shown be the fact that verbs in *-ise* where this is a mere ending and not a morpheme do not automatically take *-ation* (cf. *surmise* / **surmisation*, etc.).

Restrictions that limit the domain of a pattern to monomorphemic words are also relevant here, since they oblige speakers to carry out a morphological analysis of the base. Extensive use of this kind of restriction has been made by Fabb (1988: 532-534), who claimed to have identified a whole range of English suffixes requiring monomorphemic bases. More recently, Fabb's observation has been taken up in Aronoff & Fuhrhop (2002: 469-485), where it is called the *Monosuffix Constraint* and given the following content: "Suffixes that select Germanic bases select unsuffixed bases" (2002: 473). The only exception to this constraint, according to

[4] OCP = Obligatory Contour Principle, an anti-haplological output constraint.

Aronoff and Fuhrhop, would be *-ness*, which is commonly attached to adjectives ending in *-less* (*cf. home-less-ness*, etc.). In reality, however, exceptions are far more numerous, as Hay and Plag (in press) have pointed out, even among neologisms: *flattener*, *flattenee*, *childhoodless*, *princessly*, etc. Hay and Plag therefore conclude that "[t]he monosuffix constraint is empirically inadequate and theoretically superfluous". The Monosuffix Constraint thus seems to have good prospects of being the most short-lived constraint ever proposed in word formation.

But the principle of opacity of complex words is also challenged by another type of morphological restriction, *viz.* the supposed existence of so-called *closing morphemes*. This concept goes back to Nida (1949: 85), who pointed out that "[c]ertain morphemes 'close' the construction to further formation." In more recent times it has been taken up again by van Marle (1985: 234-238) for Dutch and Aronoff and Fuhrhop (2002: 454-468) for German. In both works the closing property is viewed as an idiosyncratic feature of certain morphemes that prohibits further derivation. The effect of a closing morpheme would be, just as in the case of type blocking, the curtailing of the domain of a more general rival domain. One notorious example from German is the puzzling unacceptability of the suffix sequence *X-ling-in*. The suffix *-ling* forms personal nouns (*cf. feig* 'cowardly' → *Feig-ling* 'coward', etc.), and *-in* is a suffix forming female personal nouns from masculine bases (*cf. Lehrer* 'teacher' → *Lehrerin* 'female teacher', etc.). Since the domain of *-in* is normally described as very general and unrestricted, derivatives in *-ling* should be expected to be found among the possible bases, but speakers find words such as *Feig-ling-in* somehow awkward. The explanation Aronoff and Fuhrhop give for the unacceptability of such words is that *-ling* is a closing morpheme, i.e. bears a diacritic that prohibits further derivation. This looks like a brute force solution that one would like to avoid as much as possible. First because of our prejudice against negative restrictions. Second, because closing morphemes such as *-ling* only prohibit further derivation, but not further inflection (*cf. Feigling-e* 'cowards'): this would mean that all morphemes would have to bear a diacritic [+derivational] or [+inflectional], or presupposes some model of Split Morphology, where derivation and inflection would be neatly separated. Both consequences are likely not to be acceptable to many morphologists. Appeal to closing morphemes should thus constitute only a last resort, when all alternative analyses fail. In our present case, for example, one might wonder whether the oddness of *-ling-in* is not a consequence of a semantic restriction on *-in*, which seems to dislike derogatory nouns. *Esel* 'ass' has a female counterpart, *Esel-in* 'she-ass', but when the word is used as an insult, it remains invariable: even a woman would refer to herself as an *Esel*, and not as an *Eselin*. Since words in *-ling* tend to have a negative connotation, it might be worthwhile to investigate whether the oddness of *-ling-in* could not be subsumed under this semantic restriction. Another possibility that one might take into consideration would be that the domain of *-in* after all is not so general as is thought in the literature (*cf. *Gästin* 'female guest', from *Gast* 'guest', etc.). But this is not the place for a thorough reanalysis of the data presented in Aronoff and Fuhrhop (2002). It may suffice here to have pointed out that analyses involving closing morphemes are just as good as the analysis of the corresponding sector of word formation that they crucially presuppose. Clearly more evidence is needed

before we can adopt the notion of closing morpheme as an indispensable tool of morphological analysis.

Another feature, widely used in studies of English word formation, is [±Latinate], introduced by Aronoff (1976: 51). According to Plag (1996: 778), for example, the following 'Latinate Constraint' would be operative in English word formation: "Bases and affixes may combine only if their etymological features are compatible." According to this constraint, a base marked [+Latinate] could only be combined with an affix marked [+Latinate] or [±Latinate], a base marked [–Latinate] only with an affix marked [–Latinate] or [±Latinate]. Since speakers cannot be supposed to know the etymology of words, this would be a diacritic feature attached to morphemes. According to Plag, speakers have to learn this feature of morphemes by observing their combinatorial behaviour. But if they have to learn the combinatorial behaviour of affixes and bases anyway, is there any further need for the Latinate Constraint? I know of no really convincing demonstration of its indispensability. On *a priori* grounds, it would be desirable to be able to dispense with this constraint, which is not a constraint on single affixes – only the features would be located in concrete morphemes, not the constraint itself – but a supra-affixal constraint on English word formation as a whole. If it really turned out to be necessary, it would contradict the null hypothesis according to which English word formation is constrained by affix-specific restrictions and processing constraints only.

3.2.3 Syntax

Word classes – or syntactic categories, as they are also called – have always been considered of prime importance for the delimitation of the domain of patterns of word formation. The frequent use of terms such as *denominal*, *deverbal* or *deadjectival* is sufficient to prove this point. In the generative literature, it is common practice to use syntactic category features instead of syntactic categories, which allows, for example, to characterise as [+N] the domain of an affix that attaches to both nouns and adjectives, and so, it is argued, to preserve a generalisation missed by the alternative characterisation relying only on word classes. This advantage, however, could be more apparent than real. Normally, an affix that attaches to both nouns and adjectives does not attach to all members of those word classes indistinctly, but only to some subset. Now, if the denominal and deadjectival subset may be characterised by one common feature X, it is this common feature X which will be relevant for the characterisation of the domain of our affix. A case in point would be the Italian abstract suffix *-aggine*, which, roughly speaking, attaches to both adjectives (*cf. stupido* 'stupid' → *stupidaggine* 'stupidity') and nouns (*cf. asino* 'ass' → *asinaggine* 'stupidity') referring to negative human qualities. The common denominator here is semantic – negative human quality –, while the word class of the base does not seem to be directly relevant (*cf.* Rainer 1989: 46-48). If, on the other hand, no common denominator could be found between the denominal and deadjectival subsets, the feature [+N] would not be of any use either, since it could at most serve to disguise the fact that we have to do, at least synchronically, with two separate patterns.

That the importance of word classes in the delimitation of domains of patterns of word formation tends to be overestimated had already been pointed out by Plank (1981), and also by Adams (1973), who, in her analysis of *-ster*, arrived at the conclusion "that the word-class of the stem and its paraphrasable relation to the affix are perhaps less important in determining the way a group develops than those of sound and meaning" (p. 175). More recently, in Plag (1998b), a study aiming at a unitary semantic analysis of the suffix *-ise*, it has even been ventured "that with any given productive affix, the syntactic category of potential base words is only a by-product of the semantics of the process" (p. 237). Future research will show to what extent the job of word classes may be taken over by semantics in the delimitation of the domain of patterns of word formation.

A similar situation may also be found with respect to other syntactic features relevant in word formation. In many characterisations of domains of patterns of word formation use is made, for example, of the feature [±transitive]. The suffix *-able*, among others, is commonly said to be sensitive to the transitivity of the base: *visitable* vs. **goable*, *observable* vs. **lookable*, etc. Just as with word classes, one might argue here that in reality transitivity is a semantic, not a syntactic feature. The typology of restrictions one arrives at is thus to a high degree theory-dependent, especially on the borderline between syntax and semantics.

3.2.4 Argument structure

The decision about what restrictions may count as referring to argument structure is, of course, also highly theory-dependent: according to the theory one subscribes to, one and the same restriction may end up under the chapter Argument structure or under Semantics. In this chapter we will adopt a view of argument structure as it is common in studies of syntax, i.e. definable as the set of those highly abstract aspects of semantic structure that are most relevant to syntax, including notions such as external argument, internal argument, etc. It may suffice here to present one analysis, Levin & Rappaport (1988), where crucial use is made in the delimitation of the domain of the suffix *-er* of the notion of *external argument*. Complex words formed with this suffix are traditionally referred to as agent nouns, but Levin and Rappaport argue that the correct definition of its domain should not refer to the semantic role Agent but rather to the notion of external argument: "*-er* nominals are only derived from verbs that have external arguments, and they always refer to the external argument" (1988: 1068). This generalisation, according to the autors, allows one to account, among other things, for the fact that *-er* nouns may also denote instruments, but only if the instrument is able to occupy the position of the external argument of the base verb (*cf. Doug opened the can with the new gadget* / *The new gadget opened the can* / *the opener* vs. *Bill ate the meat with the fork* / **The fork ate the meat* / **the eater* 'fork', etc.), or that only the unergative subclass of intransitive verbs may take our suffix (*cf. speaker*, *jumper*, etc. vs. **disappearer*, **exister*, **collapser*, etc.), since only the verbs of this subclass have an external argument. On the basis of their analysis of *-er* Levin and Rappaport even venture the more general hypothesis "that productive morphological processes do not refer to semantic-role labels but rather to notions defined over argument structure" (1988: 1080). Whether

syntactic argument structure is really relevant for the delimitation of the domains of patterns of word formation, however, is a question that may not be considered as being definitively settled. Ryder (1999), for example, questions the empirical predictions of Levin and Rappaport (1988) and proposes an alternative, purely semantic account.

3.2.5 Semantics

The next analysis to be presented here, Barker's (1998) study of the suffix *-ee*, is considered by the author himself as involving argument structure, in a more semantically oriented conception, but most scholars would probably view the same facts as semantic *tout court*. His analysis resembles Plag's analysis of *-ise* that we alluded to in 3.2.3, in that it tries to give a unified account of what had hitherto been considered a fragmented rule, and in its focus on the output rather than the input. Complex words in *-ee*, at first sight, seem to constitute a rather heterogeneous set, since they may refer to the direct object associated with the verb (*cf. employee*), to the indirect object (*cf. addressee*), to the object of a governed preposition (*cf. laughee*), to the subject (*cf. escapee*), to a referent with no argument relation to the verb (*cf. amputee*), and in a small group the base is even nominal (*cf. festschriftee*). It is hard to see how these various uses could be subsumed under a unified account using syntactic argument structure. Barker therefore shifts the analysis to semantics and proposes a unified account that imposes the following three semantic restrictions on possible words in *-ee*: the referent of the *-ee* noun must be sentient, have participated in an event of the type corresponding to the base, and lack volitional control over the event.

Semantic restrictions, however, may also relate to the input: a case in point would be the Spanish relational suffix *-uno*, which is attached almost exlusively to nouns referring to animals (*cf. vaca* 'cow' → *vacuno* 'relating to cows', etc.). It may commonly be observed in word formation that words of the same semantic category tend to choose the same affix.

3.2.6 Pragmatics and Sociolinguistics

Just as single words, also patterns of word formation may be subjected to all kinds of pragmatic and sociolinguistic restrictions. Some patterns are confined to informal situations, others are neutral, still others stilted, etc. Competent speakers know in which situations to use which patterns. Beside such output conditions, one may also observe, though less frequently, pragmatic or sociolinguistic restrictions on the input. Learnèd affixes, for example, are often limited to learnèd bases, and when they are applied to ordinary words, jocular effects may arise.

4. FINAL REMARKS

Constraints on patterns of word formation constitute an intriguing field of research where much has already been done but still more lies ahead of us. As a

comparison with the last state-of-the-art report (Rainer 2000)[5] shows, it is a field in continuous movement which appears to be highly dependent on linguistic fashions and innovations. Some of the problems that dominated the discussion in the seventies and the eighties, *viz.* the search for constraints located at UG and level ordering, seem to have gone out of fashion during the last decade. Other very promising issues have come to the fore only recently, especially the investigation of the influence of processing, which is a consequence of the great progress made in psycholinguistics. Theoretical innovations like the theory of argument structure in the eighties or Optimality Theory in the nineties, could not fail to leave their traces also in our field. The first of these has led to finer analyses of the constraints on deverbal formations, while the latter has boosted research on phonological conditioning. Since both of these theories are characterised by a dynamic evolution, analyses here are bound to evolve at the pace of the general theoretical discussion. Positive side effects on our field of study are also due to the renewed interest in semantics (and cognition) in linguistics. And last but not least, our field of research has also greatly benefited from technological progress, which has made available masses of data unimaginable even two decades ago, such as electronic dictionaries, large corpora of spoken and written language or the Internet. No field of linguistics can draw more profit from these new tools than the study of word formation.

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REFERENCES

Adams, Valerie. 1973. *An Introduction to Modern English Word-Formation*. London: Longman.
Anderson, Stephen R. 1992. *A-Morphous Morphology*. Cambridge: Cambridge University Press.
Aronoff, Mark .1976. *Word-Formation in Generative Grammar*. Cambridge, Mass.: MIT Press.
Aronoff, Mark and Fuhrhop, Nanna. 2002. "Restricting suffix combinations in German and English: Closing suffixes and the monosuffix constraint." *Natural Language & Linguistic Theory* 20, 451-490.
Aronoff, Mark and Sridhar, S. N. 1983. "Morphological levels in English and Kannada or Atarizing Reagan." In: *Papers from the Parasession on the Interplay of Phonology, Morphology and Syntax*. Chicago Linguistic Society, 3-16.
Baayen, Harald and Schreuder, Robert. 2003. *Morphological Structure in Language Processing*. Berlin/New York: Mouton de Gruyter.
Barker, Chris. 1998. "Episodic -ee in English: A thematic role constraint on new word formation." *Language* 74, 695-727.
Bauer, Laurie. 1983. *English Word-Formation*. Cambridge: Cambridge University Press.
Botha, Rudolf P. 1988. *Form and Meaning in Word Formation. A Study of Afrikaans Reduplication*. Cambridge: Cambridge University Press.

[5] Which was actually written in 1992.

Bowerman, Melissa. 1982. "Reorganizational processes in lexical and syntactic development." In: E. Wanner and L. R. Gleitman (eds.), *Language Acquisition. The State of the Art*. Cambridge: Cambridge University Press, 319-346.
Dressler, Wolfgang U. 1977. "Phono-morphological dissimilation." In: W. U. Dressler and O. Pfeiffer (eds.), *Phonologica 1976*. Innsbruck: Institut für Sprachwissenschaft, 41-48.
Fabb, Nigel. 1988. "English Suffixation is Constrained only by selectional restrictions." *Natural Language & Linguistic Theory* 6, 527-539.
Giegerich, Heinz J. 1999. *Lexical Strata in English*. Cambridge: Cambridge University Press.
Goldsmith, John. 1990. *Autosegmental and Metrical Phonology*. Oxford: Blackwell.
Hay, Jennifer. 2002. "From speech perception to morphology: Affix-ordering revisited." *Language* 78, 527-555.
Hay, Jennifer and Baayen, Harald. 2002. "Parsing and productivity." In: G. E. Booij and J van Marle (eds.), *Yearbook of morphology 2001*. Dordrecht: Kluwer, 203-255.
Hay, Jennifer and Plag, Ingo. (in press). "What constrains possible suffix combinations? On the interaction of grammatical and processing restrictions in derivational morphology." *Natural Language & Linguistic Theory*.
Kiparsky, Paul. 1982. "Lexical morphology and phonology." In: *Linguistics in the Morning Calm*. Seoul: Hanskin, 3-91.
Krott, Andrea; Schreuder, Robert; and Baayen, Harald. 1999. "Complex words in complex words." *Linguistics* 37, 905-926.
Levin, Beth and Rappaport, Malka. 1988. "Nonevent *-er* nominals: a probe into argument structure." *Linguistics* 26, 1067-1083.
Lieber, Rochelle. 1981. *On the Organization of the Lexicon*. Ph.D. MIT
Malicka-Kleparska, Anna. 1985. "Parallel derivation and lexicalist morphology: The case of Polish diminutivization." In: E. Gussmann (ed.), *Phono-Morphology*. Lublin: Redakcja Wydawnictw KUL, 95-112.
Malicka-Kleparska, Anna. 1992. "Against phonological conditioning of WFRs." In: J. Fisiak, Jacek and S. Puppel (eds.), *Phonological Investigations*. Amsterdam/Philadelphia: John Benjamins, 423-442.
Marle, Jaap van. 1985. *On the Paradigmatic Dimension of Morphological Productivity*. Dordrecht: Foris.
Marle, Jaap van. 1986. "The Domain Hypothesis: The study of rival morphological processes." *Linguistics* 24, 601-627.
Menn, Lisa and Mac Whinney, Brian. 1984. "The Repeated Morph Constraint: Toward an explanation." *Language* 60, 519-541.
Pinker, Steven. 1989. *Learnability and Cognition*. Cambridge, Mass.: MIT Press.
Plag, Ingo. 1996. "Selectional restrictions in English suffixation revisited. A reply to Fabb (1988)." *Linguistics* 34, 769-798.
Plag, Ingo. 1998a. "Morphological haplology in a constraint-based morpho-phonology." In: W. Kehrein and R. Wiese (eds.), *Phonology and Morphology of the Germanic Languages*. Tübingen: Niemeyer, 199-215.
Plag, Ingo. 1998b. "The polysemy of *-ize* derivatives: On the role of semantics in word formation". In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1997*. Dordrecht: Kluwer, 219-242.
Plag, Ingo. 1999. *Morphological Productivity. Structural Constraints in English Derivation*. Berlin/New York: Mouton de Gruyter.
Plag, Ingo. 2002 "The role of selectional restrictions, phonotactics and parsing in constraining suffix ordering in English." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 2001*. Dordrecht: Kluwer, 285-314.
Plag, Ingo. 2003. *Word-Formation in English*. Cambridge: Cambridge University Press.
Plank, Frans. 1981. *Morphologische (Ir-)Regularitäten. Aspekte der Wortstrukturtheorie*. Tübingen: Narr.
Raffelsiefen, Renate. 1999. "Phonological constraints on English word formation." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1998*. Dordrecht: Kluwer, 225-287.
Rainer, Franz. 1988. "Towards a theory of blocking: The case of Italian and German quality nouns." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1988*. Dordrecht: Foris, 155-185.
Rainer, Franz. 1989. *I nomi di qualità nell'italiano contemporaneo*. Vienna: Braumüller.
Rainer, Franz. 1993. *Spanische Wortbildungslehre*. Tübingen: Niemeyer.
Rainer, Franz. 2000. "Produktivitätsbeschränkungen." G. Booij, Ch. Lehmann, and J. Mugdan (eds.), *Morphology. An International Handbbok on Inflection and Word-Formation*. *Volume 1*. Berlin/New York: Walter de Gruyter, 877-885.

Rainer, Franz. 2002. "Zum Problem der Suffixwahl im Bereich der Relationsadjektive zu spanischen Schriftstellernamen." In: D. Kremer (ed.), *Onomastik. Band V: Onomastik und Lexikographie, Deonomastik*. Tübingen: Niemeyer, 115-127.

Rainer, Franz. 2003. "Semantic fragmentation in word-formation: The case of Spanish *-azo*." In: R. Singh and S. Starosta (eds.), *Explorations in Seamless Morphology*. New Dehli/Thousand Oaks/London: SAGE, 197-211.

Rainer, Franz. 2004. "Studying restrictions on patterns of word-formation by means of the Internet." *Italian Journal of Linguistics* 15, 131-139.

Ryder, Mary E. 1999. "Bankers and blue-chippers: An account of -er formations in Present-day English." *English Language and Linguistics* 3, 269-297.

Scalise, Sergio. 1984. *Generative Morphology*. Dordrecht: Foris.

Siegel, Dorothy. 1977. "The Adjacency Condition and the theory of morphology." In: M. Stein (ed.), *Proceedings of the Eighth Annual Meeting of the North East Linguistic Society*. Amherst, Mass., 189-197.

Siegel, Dorothy. 1979. *Topics in English Morphology*. New York: Garland Press.

Sokolov, Jeffrey L. and Snow, Catherine E. 1994 "The changing role of negative evidence in theories of language." In: C. Gallaway and B. Richards (eds.), *Input and Interaction in Language Acquistion*. Cambridge: Cambridge University Press, 38-55.

Stemberger, Joseph. 1981. "Morphological haplology", *Language* 57, 791-817.

Strauss, Steven L. 1982. "On relatedness paradoxes and related paradoxes", *Linguistic Inquiry* 13, 694-700.

Williams, Edwin. 1981. "On the notions 'lexically related' and 'head of a word'." *Linguistic Inquiry* 12, 245-274.

Yip, Moira. 1998. "Identity avoidance in phonology and morphology." In: S. Lapointe, D. Brentari and P. Farrell (eds.), *Morphology and Its Relation to Phonology and Syntax*. Stanford, Cal.: CSLI Publications, 216-246.

LEXICALIZATION AND INSTITUTIONALIZATION

PETER HOHENHAUS

1. INTRODUCTION

Both terms in the main title of this chapter usually refer to what can happen to words during the course of their 'life' *after* they have been formed. Despite the implication of 'after' and 'life', this does not mean that they are relevant *only* as purely diachronic concepts. Even though many usages of *lexicalization* do in fact primarily revolve around diachronic phenomena, such as formal *demotivation* or *semantic idiomatization*, the more interesting questions about lexicalization and *institutionalization* relating to word-formation theories involve important synchronic issues. These include: the nature of the lexicon, the extent to which complex forms need or need not/must not be listed in it, what facilitates/prevents the listing of new complex formations, and the balance of idealization vs. sociological and psychological reality.

2. LEXICALIZATION

Of the two, this is the more widespread term. However, there isn't complete consensus about (the scope of) its meaning. In the following I outline the main readings of the term.[1]

2.1 Lexicalization in a diachronic sense

The least controversial and fairly well understood aspect of lexicalization is certainly the fact that vocabulary items tend to change over time. While, as Welte (1996: 79) points out, the terminology in early descriptions in the 19th and early 20th century varied even more than it does today, the phenomena as such are hardly recent discoveries:

Formal changes that complex words can undergo include phonological phenomena such as vowel reductions as in [mæn] > [mən], e.g. in *policeman*. A step

[1] There are usages of the term that go beyond the focus of this chapter. In NLP ('Natural Language Processing', in Computer Linguistics), for instance, 'lexicalization' is used in a basically onomasiological sense, as the filling with lexical material of more abstract conceptual structures at intermediate stages of processing. Lipka (2002: 111) mentions similar uses of the term within Generative Semantics. In some diachronic language studies, 'lexicalization' is used as a kind of

quite so simple, namely in that grammaticalization presupposes prior lexicalization of the item/construction in question.

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 353—373.

up from such minor changes are cases such as *breakfast* [breik fɑ:st] > [brekfəst], or changes resulting from stress shift, e.g. *admire* [əd'maiə] – *admirable* ['ædmərəbl].

A textbook example of extreme formal lexicalization is *fo'c'sle*, from *forecastle*, pronounced [fəʊksl], 'sleeping quarters under the front deck of a ship', where the abbreviated spelling reflecting the pronunciation practically makes it an unanalysable simplex even in the written form (cf. Lipka 1977, 2002: 113). Curiously, though, such lexicalized forms sometimes become remotivated in so-called spelling pronunciations such as [weistkəʊt] instead of the older pronunciation of *waistcoat* as [weskət] (cf. Bauer 1983: 52f).

Formal lexicalization phenomena are not limited to phonological ones. Welte (1996: 80) mentions e.g. the dropping of the otherwise obligatory plural morpheme of words such as *trousers* or *pyjamas* when part of a compound: *trouserpocket*, *pyjama top*, while in Swedish we find a reverse phenomenon: the plural of *en liten stad* 'a small town' is *små städer* – and the latter also has to be selected in compounds (in the singular!): *en småstad* (cf. German *eine Kleinstadt*) or *småkaka* 'small cake', 'biscuit'. Furthermore, in lexicalized words we find structures that would be ungrammatical as a freely constructed syntagma: (*to score an*) *own-goal*, but e.g. **to have an own house*. (Cf. also lexicalized *forget-me-not* vs. **forget me not – don't forget me.*)[2]

Many discussions of lexicalization focus on demotivation and/or loss or addition of semantic features – and alternative terms have been used by different scholars, including *fossilization* (Lyons 1977: 547), *petrification* (Leech 1974: 226), and in particular *idiomatization*.

Kastovsky (1982a) makes the additional distinction between *systematic lexicalization*, such as in the regular addition of very general features such as [+ PROFESSIONAL] in derivations by means of *-er* (*lecturer*, *reporter*, *writer*), and non-systematic, i.e. truly idiomatic semantic lexicalization.

Aronoff (1976: 19, 43) frequently uses the term *semantic drift* here. A famous example of his is *transmission* not as a regular action nominalization but as the technical term for a part of a car – namely the one that transmits the power of the engine to the wheels.[3] So this semantic specialization can be described as addition of semantic information (regarding object, source and goal of the verb).

Bauer (1983: 55ff) finds accounts of semantic lexicalization as additional semantic information problematic, partly because criteria can be mixed, e.g. Lipka's (1977) distinction between *language-internal changes* as opposed to *extralinguistic changes* in cultural background. Examples for the former are *mincemeat* or *sweetmeat* (which *are* suitable for vegetarians) where the second element goes back to an older broader meaning, 'food in general', but which has later narrowed to its

[2] Bauer (1983) makes a few further distinctions regarding, for instance, the so-called combining forms (German 'Fugen') in Danish and German compounds, the isolation of learned roots such as in English *edible*, or that of 'syntactic' patterns such as 'verb-object', now unproductive, in compounds like *pickpocket*.

[3] I.e. the verbal part of the formation *is* motivated; some morphologists would analyse this as a zero-headed construction

current meaning. An example for the latter is *watchmaker* – a profession that these days typically no longer includes the making of watches, only repairs.

Bauer (1983: 57f) also sees a problem in specifying what amount of semantic information may be lexicalized. One of his examples is the exocentric compound *redskin*. This has two established meanings, although not all speakers may be familiar with both: a) a person (now a rather politically incorrect term) and b) a type of potato. This in itself shouldn't be such a problem as it is far from unusual for one form to have more than one meaning and thus more than one lexical entry (polysemy and homonymy are all over the place in the lexicon anyway). However, Bauer (1983: 58) also claims that the relevant additional semantic information is rather down to context than to specializing lexicalization, since *redskin* can be reinterpreted with ease as in the following context: [4]

(1) Granny Smith was rude to all lesser breeds, but particularly to Mr Mackintosh. "You redskins", she would sniff, "You're all alike: no firmness of character."

What Bauer fails to acknowledge here, however, is that this instance of word-play – a case of a "nonce-use" (cf. Hohenhaus 1996: 133ff) – relies on the deviation from the lexicalized, conventionally fixed sense of *redskin* (presumably rather the 'person' reading), otherwise we would not recognize it as such. Consider also the more recent example *warhead*. Normally this is lexicalized as 'the explosive front end of a missile'. In news coverage of the 2003/2004 demonstrations against the Iraq war, however, banners could be seen that had a picture of George W. Bush or Tony Blair next to this word, clearly prompting a different, nonce reinterpretation.

Addition or loss[5] of semantic information through lexicalization, and demotivation, is often referred to as idiomatization, to cover the general aspect of lack of compositionality, which such lexicalized words indeed share with idioms proper such as *to be over the moon* 'to be very happy'.

It is important to note, however, that idiomatization is only one aspect of lexicalization, which is why the two terms should not be used interchangeably (as is sometimes the case). Rather 'lexicalization' has to be regarded as the cover term for a range of phenomena, semantic and non-semantic. Bauer (1983: 49) also emphasizes that "opacity is not a necessary pre-requisite for lexicalization" since "[s]ome lexicalized forms […] may remain perfectly transparent", e.g. *warmth* – which must be considered lexicalized because "the suffix *-th* cannot be added synchronically to an adjective to provide a noun".

Finally, the various subtypes of diachronic lexicalization phenomena are not neatly separated issues but frequently overlap, e.g. *holiday* is not only phonologically different from *holy day* but also semantically specialized: of the second constituent only a feature like [PERIOD OF TIME] remains, while an "inferential feature […] of the first constituent, namely [NO WORK] has become an

[4] The exact source is not given, but it is linked to an advertisement for an apple orchard.

[5] An oft-quoted extreme example of loss of features is *understand*, where both constituents have practically lost all the semantic components of *under* and *stand* as free forms.

obligatory feature of the whole lexeme" (Lipka 2002: 114). A similar example from derivation is *infamous*, phonologically lexicalized as ['ɪnfəməs] and semantically lexicalized in that it doesn't mean 'not famous' but 'famous in a negative sense'.

Lexicalization in the diachronic sense is clearly a gradual affair, both diachronically (proceeding in successive stages over time) and in the synchronic description of the results of such processes (cf. Lipka 2002: 113). Thus we have a cline ranging from complete formal and semantic opacity, with the results becoming similar in status to unanalysable simplex words (e.g. *gospel*), via partial idiomatization/demotivation, and minor vowel reductions, to even fully transparent forms such as *warmth* (despite the synchronically non-productive suffix).

But why do words undergo diachronic lexicalization in the first place? One obvious and immediately intuitively plausible explanation is frequency of use. Lipka (1981, 2002: 111) has repeatedly stated this as the main reason. However, Lipka (1977: 155,161) also points out that the phenomenon of *hypostatization*[6] can be a reason for lexicalization initially.[7] Hypostatization is a side-effect of the naming-function of word-formation, whereby the existence of a word seems to imply for speakers the existence in the real world of a single corresponding 'thing' or clearly delimited concept.[8] Indeed, this could help trigger semantic specialization: making one out of several readings of a potentially ambiguous formation become fixed, the word thus becoming a sign in its own right, losing its character of a syntagma – which is the general default characteristic of lexicalization in the diachronic sense (Lipka 1977: 156).

2.2 Lexicalization in a synchronic sense: listing/listedness

The term is itself potentially ambiguous, as *lexicalize* + *-ation*, can be interpreted as a) an action nominalization or b) a result nominalization. In a synchronic sense, then, the term would correspond to *the process of listing* (the entering of a word in the lexicon) in a), while b) corresponds to (the state of) *listedness*, i.e. the property of a word of having a lexical entry in the language.

The synchronic relevance of lexicalization in sense b) has frequently been pointed out on various grounds, e.g. by Mark Aronoff in connection with the phenomenon of blocking (e.g. of *stealer* by *thief*). He uses it as an argument to refute Di Sciullo & Williams' (1987) claim that the lexicon was only about the

[6] This term is originally taken from Ernst Leisi, but Lipka uses it in a wider sense.

[7] Another cautionary point can be made here: the general assumption that lexemes only acquire 'idiosyncrasies' through *diachronic drift*, is not necessarily quite such a straightforward truism. Herbermann (1981: 334) contests this assumption, claiming that some idiosyncrasies are typically there from the start as part of the coining process, i.e. before an item is listed, so that if it is listed it will have to be listed complete with these features already being present.

[8] In fictional contexts, the hypostatization effect can even be exploited to create 'reality' in a fictional setting, say, in a science fiction novel, where various non-existent objects are named (cf. Hohenhaus 1996: 319ff). Here, of course, the hypostatization effect does not normally trigger proper lexicalization *outside* the fictional context (although a few such words have made it into common vocabulary through the fame of their sources, despite the non-existence of their denotata in the real world, e.g. *time-machine*, *warp speed*, *beam me up* – cf. sections 4.4 and 4.5).

'lawless' (and thus 'boring') and their strong hypothesis that listedness is thus totally irrelevant to word-formation theory. In this context, Aronoff (1988: 767) stresses the asymmetry of the blocking relation "in that the blocking item is in the lexicon" (and the blocked item isn't and couldn't be), i.e. without listedness the phenomenon of blocking cannot be captured, irrespective of whether the listeme is in any way idiosyncratic or not. (Cf. also the example of lexicalized but fully analysable *warmth* above.)

Lexicalization in the sense of listing/listedness overlaps with 'institutionalization' and will be discussed further in conjunction with that concept in section 3.

2.3 The lexicon and theories of word-formation

While it is a fairly uncontroversial commonly held belief that unpredictable idiosyncrasies resulting from lexicalization in the diachronic sense cannot and should not be generated by general rules, but have to be captured piecemeal by lexical entries, the wider role of lexicalization in the synchronic sense and the nature of the lexicon are issues of acrimonious debate. Proposals in word-formation theory generally fall somewhere between two extreme poles; a): a maximally rich lexicon, in the sense of: *all* established/existing/etc. words are listed in the lexicon – versus b): a minimal lexicon listing as little as possible. The former has been dubbed the *full-entry model*, the latter the *impoverished-entry model* by Jackendoff (1975).
The assumption that only as little as possible should 'be in' the lexicon, namely only what is so idiosyncratic that it cannot be captured by any rules expressing general regularities, is a view that is especially commonplace within 'lexicalist' and 'word-syntactic' generative frameworks such as Lieber's (1980), (1992), Selkirk's (1982) or Di Sciullo & Williams' (1987) – see Scalise and Guevara in this volume. This assumption is usually argued for on the grounds of 'conceptual simplicity' of the overall theoretical model, but is also a theoretical necessity for any morpheme-based model (cf. Aronoff 1988: 768). Occasionally an argument in favour of the impoverished-entry model is put forward which is of a psycholinguistic nature, namely that listing non-idiosyncratic formations alongside idiosyncratic items "would only encumber the speaker's memory" (Selkirk 1982: 127). While the former is indeed largely a theory-internal assumption, ultimately down to "choices [made] in terms of the priorities of the linguist" (Bauer 1983: 200), the psycholinguistic argument has to be judged against actual psychological evidence (see below).

However, the central argument for an impoverished-entry model has also always been contested, e.g. by Jackendoff (1997: 124), who points out that its internal logic is less convincing than it may seem: "A fairly standard assumption amongst linguists is that the impoverished entry theory is ultimately correct. […] However, […] although 'conceptual necessity' requires that the lexicon encode what is not predictable, it does not require that the lexicon encode *only* what is not predictable."

Word-based theories (in the wake of Aronoff 1976) should be expected to lean more towards a full-entry model. Aronoff himself remained somewhat undecided on

this theoretical issue (cf. Hohenhaus 1996: 159f); however, he offers a practical argument, namely that a dictionary "is the closest we can come to the lexicon of a native speaker's language" (Aronoff 1976: 116). Herbermann (1981: e.g. 179) also argues that dictionaries have always listed more than just the idiosyncratic minimum. Still, 'large' dictionaries (such as the OED) certainly list a good deal more than can be expected to reflect an average individual's *mental lexicon*.[9] On the other hand, as Bauer (2001: 35f) points out, dictionaries a) represent the *norm*, i.e. the established words of a speech community, rather than an individual's mental lexicon, and b) any reference work is necessarily outdated, lagging behind the rate of new formations. So reference to lexicographic lists of lexical entries can at best serve as a working hypothesis (cf. also Hohenhaus 1996: 362). It does, however, seem to cast some doubt on extremely minimalist (morpheme-based) impoverished entry models.

Such models become particularly doubtful, as Jackendoff (1997: 124) points out, if "we are talking about the mental lexicon, not some mathematically optimal abstract object, so psycholinguistic evidence is absolutely relevant." Indeed, the view that a full-entry model is to be preferred is typically based on the adequacy condition of psychological reality (cf. also Meys 1985, Hohenhaus 1998).

Integrating a refined version of the full-entry model, Jackendoff (1997) develops a highly intriguing, heavily psycholinguistically informed theory of *tripartite lexical licensing* (instead of late 'lexical insertion'). It aims to model parallel processing of phonological, syntactic and conceptual structure, linked by correspondence rules (for interfacing). The 'lexicon' is thus conceived of not as a simple list, but as "a collection of stored associations among fragments of disparate representations" (Jackendoff 1997: 108), which is in line with what is known about other mental processes/representations, only that "the lexicon may be unique in its size and utter arbitrariness" (compared e.g. to visual representations). In my view, Jackendoff's is one of the currently most promising-looking approaches unifying lexicalist generative theory and a broader psychological picture. We will return to psycholinguistic issues, as relevant to our topic, in section 4.3.

Štekauer (2000: 3) takes an onomasiological approach rather than a psycholinguistic one, but by separating a word-formation component from a lexical component (and making them contingent on the speech community and its naming needs as the starting point) he also manages to allow full-entry listing, while still assuming that word-formation as such is 100% regular and productive (see Štekauer, this volume).

A final point that can be made here is that without assuming a full-entry model it would be difficult for a theory to capture certain crucial conceptional distinctions, notably those between *existing words* vs. *possible words* vs. *nonce-formations* – see sections 3.2 and 4.1.

[9] While Pinker (1994: 150f) in this context rather flippantly suggests that the number of entries in a commercial dictionary may be deliberately inflated due to publishers' marketing considerations, he still emphasizes: "[t]he brain seems to be reserving an especially capacious storage space […] for the mental dictionary."

3. INSTITUTIONALIZATION

While 'lexicalization' (in one sense or the other) forms part of the terminology of most scholars concerned with word-formation, the term 'institutionalization' is still less commonly employed, although it has gained a certain currency over the last 25-30 years. Broadly speaking, it refers to the stage in the life of a word at (or from) the transitional point between the status of ex-nonce-formation-turned-neologism (cf. section 4.1) and that of generally available vocabulary item, i.e. a formation that is listed but not (necessarily) lexicalized in the diachronic sense yet.

3.1 Terminology

Over two decades ago Bauer (1983: 45) lamented "very confused terminology" in this area. In an attempt to alleviate this confusion, Bauer (1983: 50) suggested we use 'established' as a hyperonym for lexicalization in the diachronic sense, to which he restricts the use of that term, and institutionalization, thus keeping the latter two terms strictly distinct. Laudable as this clarification may have been, it has not become universally shared (we have to bear in mind that we are dealing with notational terms here[10]). Neither is the restriction of 'lexicalization' to its diachronic sense generally accepted (cf. section 2.2), nor is that of 'institutionalization' to fully transparent lexemes only. Often 'institutionalized' and 'established' are used synonymously.

Lipka (2002: 112) adds a different facet of distinction when he says that he adopts the term 'institutionalization' to "stress the sociolinguistic aspects of words" (see next section). By implication, then, a synchronic sense of 'lexicalization' can be retained, but with a focus on lexicological, theoretical aspects – while 'established' may still serve as a cover term for both.

Both Bauer (1983) and Lipka (2002) also employ another (competing) set of terms, introduced by Meys (1975, 1985), namely the dichotomy 'type-familiar vs. item-familiar'. As part of a plea for a full-entry model, this places the emphasis on the individual psycholinguistic aspects involved: a formation is *item-familiar* to a speaker if it is recognized as a particular lexeme, i.e. as one which is not new but already part of the speaker's lexicon, whereas new (regular) formations are only recognized as *type-familiar* but not as listemes in his/her individual mental lexicon (and are therefore analysed, i.e. morphologically processed).

The terminological confusion does not end at the competing definitions already mentioned. Various further terms remain in use, e.g.: 'existing', 'actual' (vs. 'possible'), 'occurring', 'received', 'in use', 'coinage', etc. – all more or less vaguely equivalent to 'item-familiar', 'institutionalized' or 'established'. Whatever notational terms one finally settles for, it is important to relate these to several perspectives.

[10] Cf. Lipka 2002, who makes this point frequently, also with regard to various other terms involved, i.e. notational terms do not have a single 'correct' definition, but "can be defined differently in different frameworks" (Lipka 2002: 13).

3.2 Ideal and real speakers and the speech community

Bauer (2001: 34) emphasizes that a category of *existing words* is crucial for a notion of productivity "concerned with the potentiality of new formations" – in order to know what would be new, we have to know what is not new. But he also observes that this entails severe theoretical problems, in particular the question: "existing for whom or what?"

One could argue that an *ideal speaker*'s lexicon contains *all* words of the language in the broadest sense, i.e. also including all potential words since, according to Bauer (2001: 35), it is "unclear how such a construct [as 'the ideal speaker'] could be unfamiliar with a possible word". This is why he rejects the notion of "existing word" as 'existing for the ideal speaker'. I find that rejection a bit too sweeping. How the ideal speaker's mental lexicon is conceived of rather seems to depend on the theory making that idealization. Thus both a minimal impoverished-entry model and a full-entry model are ultimately compatible with the notion of an ideal speaker. For the former, the ideal speaker does not list anything that is predictable by rule, for the latter the ideal speaker memorizes all words, including compositional ones, that represent the permanent vocabulary of a language at any given (i.e. equally idealized) point in time. What is more important is to ask: 'existing/possible *as* what?' – are we talking about potential vs. actual listemes, i.e. the lexicon, or about the output of word-formation processes, independent of whether or not these later enter the lexicon as well? These two perspectives should be kept separate – see section 4.2.

But what about real speakers in real speech communities? The vocabularies of individuals, their lexical idiolects, will vary quite considerably (beyond a certain common core), which is one of the reasons why Bauer (2001: 34), like "most of linguistic theory" (but unlike most psychological studies), rejects "the knowledge of the individual as an irrelevancy."

Lipka (2002: 112), drawing on earlier work by Eugenio Coseriu (1967),[11] suggests that we adopt the notion of *norm* as an intermediate level between *langue* and *parole* – the former of these Saussurian concepts being understood as the 'system' of language, the latter as its individual concrete realizations. 'Norm', on the other hand, is understood as the "collective realization of the language system" (Lipka 2002: 112), and it is this that accounts for, for instance, established choices between systematic alternatives such as *to nationalize* rather than **to nationalify/to national*, or 'habitual disambiguation' of e.g. *sleeping pill* and *headache pill* ('for' vs. 'against').

What is obviously crucial for successful communication is shared vocabulary in speech communities – the latter deliberately put in the plural here, because what is and what isn't shared vocabulary will vary according to different groups of interlocutors which can be collectively taken to constitute speech communities (I assume 'community' to imply a good degree of stability, not just any grouping of speakers). The smaller the speech community, the more it can differ from the

[11] Cf. also Kastovsky (1982a: 33, 205).

generally shared vocabulary,[12] along various parameters, on a scale of *idiolect – dialect – language*, cf.. Lipka (2002: 22), where 'dialect' is understood in the broadest sense of the language of any subclass of a speech community.

The smallest setting of a speech community, the subclass just above the idiolect, is that of a couple. Here, intimacy can foster extreme idiosyncrasies – however, due to that very intimacy of such a setting, robust empirical data are hard to obtain. Only very occasionally do such examples surface outside their intimate domain (but readers are invited to use introspection here). A few anecdotal cases are described in Hohenhaus (2005b), e.g. the highly idiosyncratic 'back-formation' of a singular **shoop* from *sheep* – originally a deliberate jocular deviation, which did however become established in the couple's micro-dialect.

The next larger 'community' will be that of the family or other such more or less stable small group (close work colleagues, band members, small teams of explorers on an expedition, etc., etc.). Heringer (1984: 9) mentions the phenomenon of *episodic compounds* for such small groups – a potential example he constructs is German *Mäusebibel* 'mice bible', which is useable by family members who all know about a past incident in which a bible showing teeth marks of mice (who had apparently nibbled at it) was found by the family in a barn. It is thus only on the basis of the common episodic knowledge that the compound can be institutionalized in that meaning within this family's small-group dialect.

At the next higher level lie the special vocabularies of technical jargon, slang etc. – our own context here provides plenty of examples. Acronyms usually make this particularly clear: 'lay' people outside linguistics would hardly be able to decode *NP*, *LFG*, *GB*, *HPSG*, or *OT* (more than one meaning here!). Likewise, acronyms such as *ADSR*, *VCA* or *LFO* (from synthesizer technology) will probably leave most of the readers of this book baffled. Many of the emerging conventions, including more or less institutionalized acronyms, in the new 'e-language varieties' such as Internet chat pose similar decoding difficulties to outsiders or 'newbies', e.g. *lol*, *o4u*, *cul8r*, *cfv*, *imho*, etc. (cf. section 4.4).

Of course, if we want to approach any degree of linguistic generality we have to look at larger settings, ultimately at *the* speech community of *a language* at large, i.e. all its speakers. As the edges of this concept are necessarily fuzzy, this is naturally an idealized entity itself.

At any of these levels, however, *genericness* – based on shared knowledge – seems to be of crucial importance (cf. Heringer 1984, Hohenhaus 1998). The more generic the meaning-form pairing in a word-formation is, the wider its institutionalization potential. The less generic, more context-dependent or individually episodic, the narrower the institutionalization range (cf. section 4.2.).

In short, what institutionalization actually amounts to hinges on what sort of 'institution' we are talking about, ranging from couples and micro-group settings via intermediately-sized groups of jargon speakers to 'the' speech community at large. But such is the sociolinguistic nature of the concept. It is precisely this which makes

[12] Cf. McWorter (2001) who repeatedly stresses that the same principle applies generally to languages in a wider diachronic sense: the smaller and more isolated a speech community is, the more 'exotic' features its language tends to develop.

the term a useful addition to our other terminology. It also means that ideally we should always use the term together with its specification 'institutionalized in *X*, *Y* or *Z*'.

3.3 De-Institutionalization: the end of a word's life

We also have to mention briefly that the results of lexicalization and institutionalization are not necessarily permanent states. Obviously enough, words do not just enter a language, they can also 'exit', become obsolete, die out. Lipka (2002: 53) predicts such a fate for e.g. *millennium bug* (correctly, it can be assumed, esp. given that it caused so much less damage than was feared before the turn of the millennium). However, because words, once institutionalized in written varieties, leave a permanent record, they may not completely vanish into oblivion. This may have a distorting effect especially for corpus-based studies, unless frequency is overtly linked with specific time-spans.

Consider another pair of examples of acronyms:[13] *WMD* vs. *IDS*. The former is probably one of the highest frequency acronyms in politics of recent years[14] (although one hopes it will eventually drop out of use together with its referents, but for the foreseeable future this is firmly institutionalized). The latter, on the other hand, was used in a British context[15] for a few years with considerable frequency (esp. in the tabloids) to refer to the leader of the Conservative Party *Ian Duncan Smith*. Since his resignation, the acronym has also notably decreased in frequency and is likely to slowly fall out of use altogether.[16]

The fact that words become obsolete is of course not a new observation. However, it is often assumed that the (English) vocabulary is constantly enjoying 'growth' (cf. e.g. Hughes 2000). While this is certainly true for the *records* that lexicographers keep accumulating, it is unlikely that the mental lexicon, capacious as it may be, can enjoy similarly endless 'growth'. *De-lexicalization*, shrinking or deleting of lexical entries in the mind must therefore also be an important psycholinguistic factor.

[13] Lipka (2002: xviii,110, 146) rightly stresses the importance of acronymy as a powerfully productive means of creating new lexemes, even though it poses problems for many word-formation theories in that its morphological status is unclear, since the process is at best only partly rule-governed.

[14] Standing for *Weapons of Mass Destruction* – a Google Internet search on 28 June 2004 returned 768,000 hits in English, a search restricted to sites under a year old still returned 705,000 hits, corroborating the assumption of highly increased current frequency. Sampling and refined searches within results confirm that the majority did indeed include this very acronym – although there were also a few in which it stood for something else, including, curiously, the name of the organization *World Movement for Democracy*.

[15] Of course, for Germanist linguists, the same acronym still stands for the renowned *Institut für Deutsche Sprache*.

[16] It is still to be found, of course. For instance, it was dug out in June 2004 in a BBC Television programme comparing the results of the Tories under their respective leaders in the last few European elections. Empirically assessing the frequency of this word is difficult, a) because the height of its currency and its subsequent decline are too recent to be covered by the available standard corpora, and b) web-searches reveal countless other readings for the letters *IDS*, so that even a time-span-refined search query would require disproportionate filtering efforts.

4. PROBLEMS

As we have already seen, there is considerable disagreement about the terminology and the concepts revolving around the issues under consideration here. Partly, these derive from different theoretical priorities and decisions, but they can also be related to particular empirical and further conceptual problems, whose handling must affect such decisions.

4.1 Nonce-formations and neologisms

The terminological confusion already noted above is perhaps at its worst here. Frequently, the two terms in the title of this section are used almost synonymously.[17] Sometimes 'nonce-formation' is restricted to linguistically irrelevant, quirky stylistic 'novelties',[18] sometimes it is seen as fully representative of the system of word-formation defining 'possible words'.

Along the scale of (tacitly or overtly) suggested meanings for *nonce-formation* I prefer a compromise, similar to Bauer's (1983: 45), covering both perfectly regular outputs of productive rules as well as stylistically (or otherwise) more marked, creative, even deviant 'playful' formations.

Accordingly, in Hohenhaus (1996) I proposed a scalar definition along a set of criteria, including context-dependency and various types of deviation. This is *not* to say that I consider the most deviant, highly context-dependent nonce-formations to be the most typical ones in a quantitative sense (as 'the type most frequently encountered'), *nor* that they should be treated in the same manner as well-formed formations in a theory of word-formation. On the contrary: those nonce-formations that display the most features are in fact the rarest; and deliberate deviation of course has to be separated from regular outputs of rules. The latter distinction is these days often associated with a difference between *productivity* vs. *creativity* – cf. Bauer (2001: 62ff). An example (from *Time* Magazine 08/10/1990, p.90) appears in the following context:

(2) It's an oid-y world out there. Tabloids run factoids about humanoids on steroids. In a world gone synthetic, why should movies offer something as organic as a hero? Welcome, then, to the age of the heroid.

[17] As far as the sheer number of competing terms equivalent to Engl. 'nonce-formation' is concerned, the situation is even worse in German linguistics. But *Ad-hoc-Bildung*, *Augenblicksbildung* and *Okkasionalismus* seem to be the most frequent choices (cf. Hohenhaus 1996: 17-20)

[18] E.g. Lieber (1988: 206) seems to have such a notion of 'nonce' when she remarks that some productively formed items "do not sound like nonce forms" – this narrow concept of 'nonce' would equate it with 'creative coinings' that are perceived as 'odd'. Even more extreme uses of 'nonce word' can be encountered in psycholinguistic papers (cf. e.g. <www.speech.psychol.ucl.ac.uk/sr.savagelieven.final.doc>) where it is equivalent to 'non-word' or 'nonsense word'. This is of course most unfortunate from our perspective, but we can only note that we have to remain aware of the great variation in notational terminology here.

Unlike the formation *heroid*, which the text is commenting on (overtly as an innovation), the jocular *oid-y* lacks a proper base: suffix + suffix is not a regularly available morphological pattern in English. Of course, the formation makes *sense* – the semantic function of *-y*-suffixation does apply here: 'characterized by/full of X(es)', here in a meta-communicative variety of that function. Morphologically, however, the formation is rather the result of so-called *rule-changing creativity*. (*Heroid*, in contrast, *can* be taken to represent regular nonce word-formation.)

Similarly, Bauer (2001: 206) mentions the formation of *greenth* by Walpole some 150 years after *-th*-suffixation ceased to be a productive (available) pattern, and he comments that such individual, irregular "innovations are viewed as creating their effect precisely because they are not standardly regular morphology."

However, such creatively deviant formations are comparatively rare (cf. the table in Hohenhaus 1996, appendix II). Far more often encountered are non-deviant but context-dependent nonce-formations, such as the famous example *apple-juice seat* used by Downing (1977) – cf. section 4.2.

The one feature that applies to all nonce-formations, i.e. the necessary (but not necessarily sufficient) condition for 'nonce-ness' as such, is that the formation is 'new' – more precisely: 'new' in a psycholinguistic sense, i.e. formed actively (by whatever means) by a speaker – as opposed to retrieved ready-made from his/her storage of already existing listemes in the lexicon.

This sets nonce-formations apart from neologisms. Neologisms are not new in the absolute sense that nonce-formations are. Rather, the status of neologism is the *next* stage in the life of a word, namely when it begins to be recognized as item-familiar and catches on in the usage of other speakers. Neologisms are thus only new in a relative sense, diachronically, from the point of view of the lexicon. They should therefore rather be described as 'young listemes'.[19]

The problem posed by nonce-formations and neologisms for the concepts of lexicalization and institutionalization are thus linked to the ones they pose for the concept of 'possible word'. Nonce-formations are somewhat 'in between' actual words and possible words: once attested, i.e. having (had) physical reality, they are clearly not (or no longer) merely possible, but nor do they 'exist' in the sense of being part of the lexicon – which is the usual understanding of the notion of 'actual word'. In fact, their existence is typically maximally short-lived: limited to a single

[19] Again, this terminological distinction is ultimately of a notational nature. Bauer (2001: 38f), however, sees a 'more fundamental' problem in it, namely that it is "not possible to tell at the point when a word is coined whether it will turn out to be a nonce word or a neologism" – so that "a term is required which is neutral with regard to the diachronic implications that these terms have," and he proposes we use 'coinage' as such a term. I choose to differ here, on two counts: a) 'coinage' to me is not free from diachronic implications either, due to its connotations of intended permanence (a coin, once 'minted', doesn't suddenly drop out of existence again, whereas nonce-formations typically do – see below); and b) I'd say that at the point when a word is formed it *is* a nonce-formation *per definitionem*, the question is only what happens next. If we need a neutral cover term, why not simply speak of 'new formation' for both (with systematic ambiguity): absolutely new (nonce) and relatively new diachronically (neologism). The latter *is*, after all, a fuzzy concept. Admittedly, though, Bauer (2001) only rejects the nonce vs. neologism distinction as one irrelevant to the notions of productivity and morphological structure – which is probably justified. For the notions of lexicalization and institutionalization, however, the distinction is crucial.

occurrence only. 'Nonce' *can* be the first stage in a longer life-span of a word but need not be – and mostly it is also the last stage.

Neologisms are also awkward because they have to be considered a transitional phenomenon – no longer a nonce-formation, but not yet a fully institutionalized member of the lexicon either.

Similar distinctions of perspective have to be observed here to the ones regarding 'established' words in section 3.2 (type-familiar vs. item-familiar, institutionalized, lexicalized). A formation may be institutionalized in the language of one speaker's (subset of a) speech community, but may be perceived by an 'outsider' listener as a nonce-formation, even though it wasn't one from the speaker's point of view – and vice versa, i.e. a speaker may form a nonce-formation (from his/her perspective) but it may already be part of a listener's lexicon.

Such uncertainties may apply mostly to nonce-formations which have only begun the transition to the status of neologism. A large proportion of nonce-formations, however, never even make it this far.

4.2 (Non-)Lexicalizability

Quite frequently the assumption can be encountered that any new word-formation is potentially lexicalizable, e.g. Kastovsky (1993: 6): "The output of word-formation processes consist of lexical items. These are […] potentially listable and are in fact more often than not integrated into the permanent vocabulary of a speech community […]."

However, this common assumption is not really supported by the evidence available. While all words that are in the lexicon are positive evidence of words becoming listed (they must have started out as new words at some point), evidence of words that may have been formed at some point but never were listed is hardly quantifiable. We simply haven't got sufficient records of all the words that never made it into the lexicon. To test Kastovsky's assumption that new words "more often than not" end up in permanent vocabulary, however, we may, as a first approximation, attempt to keep track of 'new words' collected in dictionaries of neologisms by checking how many of these end up in standard dictionaries some years later. Kjellmer (2000: 226) summarizes the outcome of such studies as follows: "It appears that neologisms due to semantic change have in general a much better chance of survival than other neologisms, but that in other cases only half or less than half of them stay on in the language."

Half or less is not 'more often than not' – not even for (also formally) new words that were at least temporarily already institutionalized to a degree as neologisms. As regards wholly new formations that didn't even make it to the neologism status, i.e. proper nonce-formations, these are by their very nature even more elusive. Specific studies of this area of word-formation like Hohenhaus (1996), (2000), (2004) suggest that it is far more typical of such new formations not to become lexicalized, not even temporarily as neologisms. Again, hindsight corroborates this: out of the ca. 600 nonce-formations collected as the empirical basis of Hohenhaus (1996), virtually none have been adopted as current permanent vocabulary items.

It is thus worthwhile and sensible to ask whether there are any generalizations possible about formations that can (and do) enter the lexicon and those which apparently don't, and whether there may be systematic reasons for this, rather than assuming that all words are intended for the lexicon (like e.g. Motsch 1977 holds) and ascribing it to historical accident alone if they don't make it there.

Downing (1977) provided an early challenge to this view, exploring characteristics of new nominal compounds, including ones that have a systematic impact on lexicalizability – in particular: permanence or fortuitousness of the underlying relationship between the constituents. Her well-known example of a compound lacking a suitable lexicalizable underlying relationship is *apple-juice seat* – used to refer to a seat in front of which a glass of apple juice was placed at a particular social event ('refer' in the sense of single out, not designate). This is why Downing (1977: 819) speaks of 'deictic compounds' in such cases. And it seems to be the context-dependency of such forms that make them non-lexicalizable.[20]

This was further explored in Hohenhaus (1996), (1998), (2005b) and a general theory of (non-)lexicalizability proposed. It entails an important conceptual distinction between *potential listeme* (i.e. a possible word purely from the point of view of the lexicon) and *possible word* in the sense of a word that can be formed and used in performance (as an X^0, in generative terminology) irrespective of whether or not it could also be listed. Genericness of meaning vs. individual (local) context-dependency seems to be a crucial factor, but there are also whole productive patterns of formation that only yield non-lexicalizable, though perfectly regular, formations, i.e. ones that have no counterpart in the lexicon at all:

For instance, Bauer (1983: 90) remarks on so-called *expletive infixation* (such as *abso-bloody-lutely*) that "words produced by such infixing never seem to become established." Other such types include what I have dubbed *dummy compounds* and *identical constituent compounds*. The former are a type of highly productive text-deictic compounds employing *thing* or *business* as virtually empty pro-forms in head position – such as *vacation thing*, *greengages business*, used to refer back to stretches of previous co(n)text in which something was said about vacations and greengages, respectively (for contexts and extensive discussion see Hohenhaus

[20] Note that in such cases we are talking about particular pairings of form and meaning. So when we speak about the non-lexicalization of a given form, this is really shorthand for saying: non-lexicalization of this particular form with this particular meaning. It is not necessarily to say that the form as such (paired with perhaps quite a different meaning) is in principle non-lexicalizable. We also have to observe the difference between naming and referring here. The fact that normally *apple-juice seat* is non-existent in extra-linguistic reality (see Štekauer 2002: 110) is not so crucial alone. In its specific context such an object *did* 'exist' (temporarily!) – the point is rather that it didn't exist as a generally 'name-worthy CATEGORY' (Downing 1977: 823, emphasis in the original). While the permanent lexicon contains permanent names, it is not the case that words are formed exclusively to fill naming needs. Nonce word-formation in particular can fulfil a range of functions quite different from naming, including purely fortuitously deictic and meta-communicative ones that have nothing to do with permanent categories and are thus much more syntactic in function (cf. also Kastovsky's 1982b distinction between naming and 'syntactic recategorization'). Such functional considerations, however, are beyond the scope of this chapter (but see Hohenhaus 1996, chapter 5).

2000, 1996: 281ff).[21] The latter consist of repeated identical constituents, e.g. *instant-instant* or *pain-pain*, as in the following contexts:

(3) Felix: Tim! I'd be careful. That's instant glue you're using.
Tim: It's not like instant-instant.[22]

Adam: [referring to his partner who is undergoing fertility treatment] … that she's going through all this pain. I mean not just emotional pain, but pain-pain.[23]

Again, these serve a meta-communicative function by regularly prompting a 'prototype-type' interpretation: '(an) XX = (a) proper/real X' (for nouns, for adjectives and verbs: 'XX = properly/absolutely/completely X'). In a corpus-based study (Hohenhaus 2004), it was confirmed that, while the type is productive, its products, the individual compounds themselves, are hapaxes. If none are established, the pattern has to be regarded as being exclusively a nonce type.[24]

What is important to stress here overall is: some new formations, even if productively formed and used in an X^0 position in performance, are not necessarily potential listemes at the same time. What is possible 'for keeps' in the lexicon is not identical to what is possible as a formation.

The concept of non-lexicalizability is obviously at odds with models in which all outputs of word-formation first have to enter the lexicon before being usable in syntax (as in Halle 1973 or Štekauer 2002). In my model (Hohenhaus 1996: 249) word-formation can feed directly into syntax, bypassing the lexicon altogether, which is more in line with e.g. Aronoff & Anshen's (1998: 237) emphasizing that, interdependent as morphology and the lexicon may be, they constitute two different sources of words. A theory of word-formation should reflect this.

4.3 What is in the (mental) lexicon and how does it get there?

As we have seen above, the question of what ends up in the lexicon can be approached by 'negative elimination', as it were, by trying to identify what cannot enter the lexicon. While this is still an advancement over approaches that leave this basically to historical chance alone, it still does not describe how items that *are* potential listemes do become actual listemes.

Herbermann (1981: 325ff) addresses this question more directly, by proposing specific procedures by which a newly created complex lexical item can then be promoted to the status of 'lexeme' via successive stages of introduction, reiteration,

[21] Context-dependency is clearly at work here as well: e.g. *vacation thing* 'means' in its context: 'what you told me at a given time/place about (a particular) vacation'. The deictic specificity of reference of different sorts (personal, temporal, spatial) makes this a non-generic form-meaning pairing, and thus a non-lexicalizable one in any case.

[22] From the television series *Home Improvement*, episode 69; a transcript can be found at: <http://www.hiarchive.co.uk/script.php?s=3&e=20>

[23] From the television series *Cold Feet*, third series, episode 3, ITV, aired on 26 November 2000.

[24] See, however, Hohenhaus (2005b) for some caveats regarding the equivalent phenomenon in German.

transposition to other 'texts' etc.; but while Herbermann's considerations may be plausible enough in themselves, they do not go very far in explaining what happens to an individual speaker's mental lexicon. They are rather speculations on how a new formation may *spread* as a new lexeme from the original speaker to a smaller or larger speech community, i.e. they concern institutionalization of neologisms. But if words enter a collective lexicon, they have to enter the individuals' lexicons. How is this achieved? Is there a specific 'operation' that creates new lexical entries? This is sometimes implied (cf. e.g. Toman 1983: 4f, 38f, Lieber 1992: 159). However, psycholinguistically more flexible approaches may be preferable; cf. for instance Meys' (1985: 77) speculations about "mental traces left by productive/interpretative occurrences" which would gradually facilitate listing according to frequency. Especially if we conceive of the mental lexicon as a (neural) network (cf. Aitchison 1994: 228), this seems quite plausible, as higher frequency could be understood as strengthening the links between nodes.[25]

And if there is *gradual listing*, we would of course expect to find degrees of (semi-)listedness. This would also be in line with Jackendoff (1997: 231, note 11): "[There needn't be] a strict cutoff in frequency between stored forms and forms generated on-line. Rather I would expect a cline in accessibility for stored forms, including the usual differential between recognition (better) and recall (worse)."

Assessing psychological reality empirically, however, has always been a problem. Word recognition tests and other psycholinguistic experiments may inform us about whether or not, or to what degree, complex words are stored in individuals' mental lexicons and whether they are stored as whole-form entries or with morphological structure/decomposition playing a role. However, the experimental evidence, as McQueen & Cutler (1998) or Bauer (2001: chapter 4) summarize it, is still somewhat mixed.

Overall, theoretical models that focus on conceptual simplicity and thus allowing only for an impoverished-entry lexicon of minimal signs appear least corroborated by the psycholinguistic findings so far, while *full(er)-entry models*, especially *network* models (cf. also Lipka 2002: 197ff) seem to fare better. Clearly, psycholinguistics still has a long way to go until we get a fuller understanding of the real nature of the mental lexicon, but there is an emerging thread: both simple and a sizeable subset of complex words and word-forms, even including regular ones (e.g. high-frequency past tense forms), are mentally stored. And whether or not a word-formation is stored depends on a complex balance of factors other than (or in addition to) idiosyncrasy, including, apart from meaning and morphological make-up, indeed frequency (see above), but also aspects such as *family size effects* (word recognition tends to be better if the word shares a constituent with many other words in the lexicon; cf. De Jong, Schreuder & Baayen 2000).

A particularly compelling argument for storage rather than rule-governed on-line composition comes from language acquisition, namely from the so-called *critical-mass hypothesis*: "acquirers need a large number of words at their command before they can generalize over them" (Bauer 2001: 114). Thus a word such as *orange juice* is likely to be learned (stored) as a whole before it is even felt to be transparent (see

[25] But further factors have to be considered – cf. Hohenhaus (1998), Kjellmer (2000)

Bauer 2001: 122). That is to say lexicalization (in the synchronic sense) precedes the emergence of the means for on-line composition. The question then is whether words once stored should later become 'unlisted' again. Given that word-memory has to continue through life in any case (new acronyms, new loan words, new terminology, new names, etc.), it seems unlikely that 'unlisting' and switching to on-line (de-)composition should automatically be preferable or more economical, although for words learned in later stages the role of morphological rules in lexical access does seem to increase (cf. Bauer 2001: 212).

4.4 Unpredictable & playful formations, analogy, fads, and new developments

As so often, the devil is the details of concrete cases – and just a few shall be mentioned briefly here:

Recall the cases of 'creative' deviant formations such as *oid-y* or *greenth*. It could be assumed that such cases remain individual 'quirks' or one-offs. Consider, however, a case such as German *unkaputtbar* (literally 'un-broken-able'), which is clearly morphologically deviant because *un-* + A + *-bar* is not an available pattern (like for English *-able*, the base for suffixation by *-bar* has to be a transitive verb). Nevertheless, the word sprung into almost instantaneous currency through an advertising campaign in Germany in 1990 by a big American soft-drinks corporation (of brown fizzy liquid fame) showing one of the then newly introduced plastic bottles (of this brand) together with the single word *unkaputtbar*.[26] Apparently this was sufficent to institutionalize the formation enough to become usable outside its context.[27] On the other hand, in widespread use as it may be, it is not fully accepted – in fact it is a regular target for purist criticism,[28] in particular on the grounds that a perfectly regular word for the concept already existed: *unzerbrechlich*. Thus even though its validity is contested, the deviant formation has to be taken to be established, due to, at least initially, media power rather than normal spread through a speech community. Rather it was 'artificially' institutionalized rapidly and despite lacking acceptance.

Another problematic case for the conception of normal institutionalization and lexicalization as gradual enrichment of vocabulary are sudden bursts of morphological 'fads'. One such case is/was the craze in Germany around the year 2000 of forming more and more complex words roughly in analogy to the initial model of *Warmduscher* (literally 'warm-shower-er') such as *Auf-dem-Schrank-Staubwischer* ('on-top-of-the-wardrobe-duster') or *Bei-Mami-Wäscher* ('laundry-at-Mom's-doer'). They are all intended to mean ultimately the same (i.e. naming needs play hardly any role here): something between 'wimp', 'pathetically conventional or

[26] Cf. <http: //www.slogans.de/>; Apparently there was also a television clip in which such a bottle was shown tumbling down a staircase without suffering damage.

[27] An Internet search engine returned over 14,000 hits (in July 2004); the word is now also used in all manner of contexts in the sense of 'unbreakable' – including the title of a recent CD by a German pop singer!

[28] Cf. for instance <http: //uleuschner.bei.t-online.de/rezensionen/ri9610szymanski.htm>, or the relevant discussion thread in the chat forum of the purist association VDS: <http: //www.vds-ev.de/forum/>.

pedantic person' or 'do-gooder'. Some specimens clearly overstretch the limits of wellformedness (e.g. *Hochzeitstagdrandenker* 'anniversary-remember-it-er' – containing the object of the verb simultaneously in lexical and pronominal form internal to the compound!). However, many will have been institutionalized for a sizeable speech-community (much larger than the small-group intimate varieties referred to in section 3.2 as more likely domains for such phenomena) – there were clubs and popular dedicated websites indulging in this particular exercise in word-play. Ultimately, few speakers will have escaped contact with the phenomenon. A few years on, though, the fad has largely ebbed away and hardly any products of it survive (perhaps only the original *Warmduscher*), i.e. the 'vocabulary' has not been enriched in any permanent sense at all. De-institutionalization followed institutionalization rapidly.[29]

Finally, consider all those new phenomena in computer-mediated language (cf. Crystal 2001, Hohenhaus 2005a), such as *reduplications* like *nodnod* or *wavewave* used as so-called *emotes* in certain genres. These seem to be formed productively, but at least a certain subset will have conventionalized to the degree of full institutionalization. In chat and text messaging (SMS), where brevity is imperative, acronyms and other methods of shortening are thriving, giving rise to a mix of conventionalized forms such as *lol* (for 'laugh out loud') or *CU l8r* (for 'see you later') and generally applicable technique (non-lexicalized, rule-governed) – e.g. the replacement of any homophone syllable by numbers (esp. *1*, *2*, *4*, *8* and *9*). Furthermore there is the use of iconic signs, the best known example being the *emoticon* : –) but again there is a fuzzy cline of institutionalization: ;–) for 'wink' and : –(for 'unhappy' are probably known to most e-language users, but rarer constructions such as :–@ for 'screaming' are probably only familiar to comparatively fewer, seasoned 'netties', where they may even become in-group identifiers. These are still volatile areas of language where standardization may just be setting in and which need to be observed more to see what influence they may exert on general word-formation and the lexicon.

4.5 Lexicalization beyond words

So far we have only considered lexicalization and institutionalization as applying to words – as is appropriate in a handbook of *word-formation*. However, a few brief remarks are in place about the question whether there are units other than words in the lexicon as well. And indeed there are good arguments for such an assumption.

Early approaches, notably Weinreich (1969), proposed the integration of a separate list of idioms *alongside* the (word-)lexicon proper. Furthermore, the fact that larger-than-word objects can also play a role in word-formation, in particular in phrasal compounds, lead to various approaches of integrating this, either wholesale

[29] Admittedly, this is not easy to prove empirically, as the products remain accessible in written records of the fad. Also, quite a few items in such lists (e.g. <http: //www.ablachen.de/weichei.htm>) are actually normal words, such as *Fahrschüler* 'learner driver', that have long been established in their primary, neutral meaning, but were given a connotational twist simply by inclusion in such a list alongside genuinely new formations.

(e.g. Lieber 1988, 1992, Bauer 1983) or by isolating the scope of this apparently syntactic element within word-formation proper (cf. Hohenhaus 1996: 218-228).[30]

A particularly interesting proposal is the integrational approach of Jackendoff (1997). The empirical basis for his endeavour comes from his '*Wheel of Fortune* Corpus' – a collection (compiled over a few months) of ca. 600 fixed expressions used in the game show of the same name, where contestants have to solve puzzles as quickly as possible from the step-by-step disclosure of letters. What is striking is that there seems to be little strain (on the part of the programme makers) in coming up with and (on the part of the contestants) recognizing vast amounts of such strings (and the show has been on air for many years six days a week). Strings in question include not only idioms proper such as *to throw in the towel* or *to eat humble pie*, but also *clichés* such as *we're doing everything humanely possible* or *gimme a break*, and well-known quotations such as *may the Force be with you* or *beam me up, Scotty*. Quite obviously, then, "there are too many idioms and other fixed expressions for us to simply disregard them as phenomena on the margin of grammar" (Jackendoff 1997: 177), and it is even possible that "their number is of the same order of magnitude as the single words of the vocabulary" (Jackendoff 1997: 156). The reason that such fixed expressions have typically been neglected esp. in generative theories (as 'not core grammar') probably does stem, as Jackendoff (1997: 153, 157) surmises, from the simple conception of the lexicon as the source of X^os at the point of lexical insertion only. Having replaced that notion (see section 2.3) with a model of tripartite parallel lexical licensing, Jackendoff (1997) manages to integrate listemes of all formats neatly.

Suffice it to say here, by way of a conclusion: it is clear that the lexicon has to be more than a simple list of 'words'. Rote-learning, memorized building blocks of various sizes and associations between them, form a large and integral part of 'lexical knowledge' alongside (competence-)knowledge of morphemes plus the productive morphological rule-system for on-line (de-)composition of complex words. In short: lexicalization/listing is of great relevance even beyond word-formation!

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[30] More recent evidence of the importance of larger-than-word memorized building-blocks of language also comes from Wray (2002).

REFERENCES

Aitchison, Jean. 1994. *Words in the Mind – an introduction to the mental lexicon.* 2nd edition, Oxford: Blackwell.

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. Cambridge, Mass.: MIT Press.

Aronoff, Mark. 1988. Review of: Di Sciullo/Williams (1987). *Language* 64, 766-770.

Aronoff, Mark and Anshen, Frank. 1998. "Morphology and the Lexicon." In: A. Spencer and A. Zwicky (eds.), 237-247.

Bauer, Laurie. 1983. *English Word-formation*. Cambridge: Cambridge University Press.

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.

Brekle, Herbert and Kastovsky, Dieter (eds.). 1977. *Perspektiven der Wortbildungsforschung. Beiträge zum Wuppertaler Wortbildungskolloquium vom 9. – 10 Juli 1976. Anläßlich des 70. Geburtstages von Hans Marchand am 1. Oktober 1977.* Bonn: Bouvier.

Coseriu, Eugenio. 1967. "Lexikalische Solidaritäten." *Poetica* 1, 293-203.

Crystal, David. 2001. *Language and the Internet*. Cambridge: Cambridge University Press.

De Jong, Nivja H.; Schreuder, Robert; and Baayen, Harald, R. 2000. "The morphological family size effect and morphology." *Language and Cognitive Processes* 15, 329-365

Di Sciullo, Anna-Maria and Williams, Edwin. 1987. *On the Definition of Word*. Cambridge, Mass.: MIT Press.

Downing, Pamela. 1977. "On the creation and use of English compound nouns." *Language* 53, 810-842.

Halle, Morris. 1973. "Prolegomena to a theory of word-formation." *Linguistic Inquiry* 4, 3-16.

Herbermann, Clemens-Peter. 1981. *Wort, Basis, Lexem und die Grenze zwischen Lexikon und Grammatik.* München: Fink.

Heringer, Hans Jürgen. 1984. "Wortbildung: Sinn aus dem Chaos." *Deutsche Sprache* 12, 1-13.

Hohenhaus, Peter. 1996. *Ad-hoc Wortbildung – Terminologie, Typologie und Theorie kreativer Wortbildung im Englischen*. Frankfurt/M., Berlin, Bern, New York, Paris, Wien: Peter Lang.

Hohenhaus, Peter. 1998. "Non-Lexicalizability as a Characteristic Feature of Nonce Word-Formation in English and German." *Lexicology* 4/2, 237-280.

Hohenhaus, Peter. 2000. "An Overlooked Type of Word-Formation: Dummy-compounds in German and English." In: Ch. Hall and D. Rock (eds.), *German Studies towards the Millennium*. Oxford, Bern, Berlin, Bruxelles, Frankfurt/M., New York, Wien, 241-260.

Hohenhaus, Peter. 2004. "Identical Constituent Compounds – a Corpus-based Study." *Folia Linguistica* 38/3-4, 297-331.

Hohenhaus, Peter. 2005a. "Elements of traditional and 'reverse' purism in relation to computer-mediated communication." In: N. Langer and W. Davies (eds.), *Linguistic Purism in the Germanic Languages*. Berlin, New York: De Gruyter, 186-202.

Hohenhaus, Peter. 2005b. "Where Word-Formation cannot Extend the Vocabulary - Creativity, Productivity and the Lexicon in Synchronic and Diachronic Morphology." In: D. Kastovsky and A. Mettinger (eds.), *Lexical Change and the Genesis of the English Vocabulary*. Berlin, New York: Mouton de Gruyter.

Hughes, Geoffrey. 2000. *A History of English Words*. Oxford: Blackwell.

Jackendoff, Ray. 1975. "Morphological and Semantic Regularities in the Lexicon." *Language* 51, 639-671.

Jackendoff, Ray. 1997. *The Architecture of the Language Faculty*. Cambridge, Mass.: MIT Press.

Kastovsky, Dieter. 1982a. *Semantik und Wortbildung*. Düsseldorf, Bern, München: Bagel/Francke.

Kastovsky, Dieter. 1982b. "Word-Formation: A Functional View." *Folia Linguistica* 16, 181-198.

Kastovsky, Dieter. 1993. *The Place of WF in Grammar: A Historical Survey*. ICOLS.

Kjellmer, Göran. 2000. "Potential Words." *Word* 51/2, 205-228.

Leech, Geoffrey. 1974. *Semantics.* Harmondsworth: Penguin.

Lehmann, Christian. 2002. *New reflections on grammaticalization and lexicalization*. In: I. Wischer and G. Diewald (eds.), *New Reflections on Grammaticalization*. Amsterdam, Philadelphia: John Benjamins, 1-18.

Lieber, Rochelle. 1981. *On the Organization of the Lexicon.* Bloomington, Indiana: Indiana University Linguistics Club.

Lieber, Rochelle. 1988. "Phrasal Compounds in English and the Morphology-Syntax Interface." In: *Papers from the 24th Annual Regional Meeting of the Chicago Linguistics Society. Part Two: Parasession on Agreement in Grammatical Theory* (= *CLS* 14), 175-184.

Lieber, Rochelle. 1992. *Deconstructing Morphology.* Chicago, London: University of Chicago Press.
Lipka, Leonhard. 1977. "Lexikalisierung, Idiomatisierung und Hypostatisierung als Probleme einer synchronen Wortbildungslehre." In: H. Brekle and D. Kastovsky (eds.),1977, 155-163.
Lipka, Leonhard. 1981. "Zur Lexikalisierung im Deutschen und Englischen." In: L. Lipka and H. Günther (eds.), *Wortbildung*. Darmstadt: Wissenschaftliche Buchgesellschaft, 119-132.
Lipka, Leonhard. 2002. *English Lexicology: Lexical structure, word semantics & word-formation*. Tübingen: Narr.
Lyons, John. 1977. *Semantics*. Cambridge: Cambridge University Press.
McQueen, James M. and Cutler, Anne. 1998. "Morphology in Word Recognition." In: A. Spencer and A. Zwicky (eds.),1998, 406-427.
McWhorter, John. 2001. *The Power of Babel – a Natural History of Language*. New York: Henry Holt/Times.
Meys, Willem, 1975. *Compound Adjectives in English and the Ideal Speaker-Listener.* Amsterdam: North Holland.
Meys, Willem. 1985. "Morphological meaning and the structure of the mental lexicon." In: A. J. Geer, P. Hoppenbrouwers, A. M. Seuren, and T. Weijters (eds.), *Meaning and the Lexicon*. Dordrecht: Foris, 76–85.
Motsch, Wolfgang. 1977. "Ein Plädoyer für die Beschreibung von Wortbildungen auf der Grundlage des Lexikons." In: H. Brekle and D. Kastovsky (eds.), 180-202.
Pinker, Steven. 1994. *The Language Instinct.* London: Penguin.
Selkirk, Elizabeth. 1982. *The Syntax of Words.* Cambridge, Mass.: MIT Press.
Spencer, Andrew and Zwicky, Arnold. 1998. *The Handbook of Morphology*. Oxford: Blackwell.
Štekauer, Pavol. 2000. *English Word-Formation – A History of Research (1960-1995)*. Tübingen: Gunter Narr.
Štekauer, Pavol. 2002. "On the Theory of Neologisms and Nonce-formations." *Australian Journal of Linguistics* 22/1, 97-112.
Toman, Jindřich, 1983. *Wortsyntax*. Tübingen: Niemeyer.
Weinreich, Uriel. 1969. "Problems in the Analysis of Idioms." In: J. Puhvel (ed.), *Substance and Structure of Language*. Los Angeles, Berkeley: University of California Press.
Welte, Werner. 1996. *Englische Morphologie und Wortbildung*. 2nd edition. Frankfurt/M, Berlin, Bern, New York, Paris, Wien: Peter Lang.
Wray, Alison. 2002. *Formulaic Language and the Lexicon*. Cambridge: Cambridge University Press.

ENGLISH WORD-FORMATION PROCESSES

Observations, Issues, and Thoughts on Future Research

ROCHELLE LIEBER

1. INTRODUCTION

Previous chapters have looked at a wide variety of theoretical approaches to word formation that have been developed over the last half century. The purpose of this chapter is not primarily theoretical. Rather here we turn the spotlight on English and look at the ways in which these theoretical developments have enriched our knowledge of word formation in English. The focus of this chapter is descriptive, but not descriptive in the sense that we merely review the data. Instead I explore the ways in which theoretical debates have been played out on these data, and in which the data have raised issues for various morphological frameworks. Where possible, I also attempt to highlight areas in which further research needs to be done. I will concentrate here primarily on productive processes of word formation such as compounding, affixation and conversion, leaving aside minor word formation processes such as blending, clipping, and back formation. My focus will be synchronic. If the reader wants an extensive diachronic description of English word-formation processes, Marchand (1969) is still the best resource available. A brief synchronic account of English word formation processes can also be found in Adams (2001).

2. COMPOUNDING

One of the principal and most heavily studied ways of adding words to the English lexicon is compounding. Two forms of compounds are often distinguished: synthetic compounds (also called verbal, deverbal, or verbal nexus compounds) are ones in which the second stem is derived from a verb, and root compounds (also called primary compounds) are ones in which the second stem is not deverbal. Synthetic compounds are illustrated in (1); root compounds in (2):

(1) truck driver, gift-giving, wind blown, revenue enhancement, waste disposal

(2) dog bowl, file cabinet, red hot, sky blue, blackboard, babysit

Synthetic compounding is highly productive in English, as is the root compounding of nouns. Noun-adjective (*sky blue*), adjective-noun (*blackboard*), and adjective-adjective) root compounds are also relatively productive. Root

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation, 375—427.

compounds of other categories are harder to form and relatively unproductive (for example, verb-verb compounds such as *stir-fry* or noun-verb compounds such as *babysit*).

2.1 Determining what counts as a compound

Oddly, it is not easy to come up with criteria that unequivocally distinguish all and only compounds in English, as has been pointed out by Marchand (1969), Levi (1978), Bauer (1978), Lieber (1992), and many others. In fact, Bauer (1998) goes so far as to argue that there are no criteria, either individually or collectively, which unequivocally serve to distinguish compounds from phrases. Among the criteria that have been proposed for compoundhood in English are stress, spelling, lexicalized meaning, unavailability of the first stem to syntactic processes such as inflection, anaphora, and coordination, and inseparability of the first and second stems.

Spelling and lexicalization are universally agreed to be poor criteria for compoundhood. English spelling is notoriously erratic in its treatment of compounds, with a single compound sometimes being written as two separate words, two words hyphenated, and one word (Bauer 1998: 96 cites the example of *daisy wheel*, *daisy-wheel*, and *daisywheel*, all of which are given as possible spellings in the *Oxford Dictionary of New Words*). Neither can compounds be distinguished from phrases on the basis of lexicalization; while many compounds have lexicalized meanings (*blackboard*, *green house*), compounding is highly productive and new compounds are very often compositional in meaning, at least when context is taken into account.

Stress often – but not always – distinguishes compounds from phrases in English. Both root and synthetic compounds are typically stressed on the first or left-hand stem: *dóg bowl*, *ápple cake*, *trúck driver*, *móth eaten.* But not all compounds receive left-hand stress. Root compounds consisting of two adjectives (e.g., *icy cold*, *blue-green*) often do not, and instead seem to have level stress. Further, even some noun-noun compounds do not exhibit left-hand stress: *ápple cake* does, but *apple píe* is stressed on the right-hand stem. Bloomfield (1933: 180) goes so far as to insist that only combinations of two stems with left-hand stress are compounds, so that *ice cream* is a compound when pronounced as *íce cream* but a phrase when pronounced as *ice créam.* Giegerich (2004) gives an excellent review of this controversy and proposes a somewhat less radical version of Bloomfield's analysis.

Similarly, although the first stem of a compound is usually inflectionless, there are examples like *children's hour* or *girls' club* that clearly carry an inflection. The first stem of a compound is also typically nonreferential; the first stem in *cat lover* does not refer to any specific cat. Allen (1978: 113) claims that "individual elements of compounds … generally cannot function independently with respect to syntactic processes." But as Bauer (1998: 72) illustrates, first stems can occasionally serve as discourse antecedents for pronouns (*So I hear you're a real cat-lover. How many do you have now?* [*TV game show, cited by Ward et al. 1991: 471*]). First stems of apparent compounds can also occasionally be conjoined, especially, as Bauer points

out (1998: 76) when they belong to the same semantic domain (for example, *cat and dog show, medical and life insurance*).

Inseparability is perhaps the strongest test of compoundhood. The two stems of a compound are relatively immune to separation by a modifier: **truck fast driver, *blue light green*. This does not, of course, mean that the second stem of a compound cannot itself be complex; Bauer (1998: 73) cites examples like [*Chinese* [*jade figure*]]. What it means is that an arbitrary modifier cannot be inserted between elements of a compound and still maintain compoundhood. So *[*Chinese dirty* [*jade figure*]] is unacceptable.

We acknowledge, however, that the line between compounds and syntactic phrases in English is more labile that we might wish. In fact, one consequence of the lack of unequivocal criteria for distinguishing compounds from phrases in English is that a controversy has arisen over items like those in (3):

(3) a who's the boss wink
an if-you-only-want-to know sneer (From Ripley, Mike, *Angels in Arms*, New York: St Martin's Press 1991, 10, quoted in Bauer and Renouf (2001: 108))

A number of theorists have considered forms like these to be 'phrasal' compounds, that is, compounds in which the first element is a syntactically formed phrase; see for example Botha (1980), Toman (1983), Hoeksema (1985, 1988), Sproat (1985), Lieber (1992). This designation would of course be problematic for strictly lexicalist frameworks such as those of Selkirk (1982) and Di Sciullo and Williams (1987). More recently, however, Bauer and Renouf refer to the second form in (3) as an example of a phrase that functions as a premodifier (see also Spencer chapter, this volume). It is difficult to decide between the two alternatives, however. On the one hand, such forms are quite productive, occurring often on the fly in spoken English, and more often than one might expect in written English. The forms themselves are not lexicalized, nor is the initial phrase restricted to lexicalized items. On the other hand, it's hard to see how we would identify them positively as compounds. Stress is unhelpful here; even in typical root compounds left hand stress is not obligatory, and phrasal compounds exhibit even more variability in stress placement. We saw as well that lack of inflection is not a good indicator of compoundhood in typical cases. We are left with the criterion of inseparability. I find (4b,d) far better than (4a,c), for example:

(4) a. *a who's the boss filthy wink
b. a filthy who's the boss wink
c. *an if-you-only-want-to know insinuating sneer
d. an insinuating if-you-only-want-to-know sneer

If these judgments are sound, and if it is indeed impossible to insert a random modifier between the first (phrasal) part and the second stem, then perhaps it is possible to class these forms as a type of compound in English.

2.2 Root compounding

In English, root compounds can be found consisting of combinations of the open categories N, V, and A; (5) (from Lieber 1992: 80) gives examples:

(5)

N N	file cabinet, towel rack, catfood, steelmill
N A	sky blue, leaf green, stone cold, rock hard
A A	icy cold, red hot, green-blue, wide awake
A N	hard hat, bluebird, blackboard, poorhouse
A V	dry farm, wet sand, double coat, sweet talk
N V	handmake, babysit, spoonfeed, machine wash
V N	drawbridge, cutpurse, pickpocket, pull toy
V V	stir-fry, blow-dry, jump shoot, jump start

Of these, only the first four types are productive, with N N compounds being by far the most productive compound type in English. Compounds containing V as one or both members are barely productive, although Bauer and Renouf (2001: 110) cite neologisms such as *dry-burn*, *test-release*, *thumb-strum*, and *slow-bake* in their corpus-based study of compounds.

Root compounds are syntactically, and usually semantically right-headed. This means that in general root compounds are endocentric, being interpreted as hyponyms of their second stems. So a *file cabinet* denotes a kind of cabinet, *sky blue* is a sort of blue, and *to dry farm* is a method of farming. But English does have exocentric root compounds: compounds like *red head* or *airhead* are not types of head, but are metonyms for types of people, in the former case a person with red hair, and in the latter case a forgetful, flighty person. This type of exocentric compound is traditionally referred to as a bahuvrihi compound.[1] Bauer and Renouf (2001) also find ample neologisms of another sort of exocentric compound, that is, forms like *angel-beast* or *kick-arse* which are used as premodifiers of nouns (for example, 'this unconscious angel-beast division' (2001: 113) or 'a very kick-arse attitude' (2001: 105)).

English also has dvandva or copulative compounds. In the interpretation of this type of compound the stems are given equal weight. For example, a *producer-director* is both a producer and a director, and a *fighter bomber* is equally a fighter and a bomber. Note that it might be said that at least some exocentric and copulative compounds are endocentric in terms of their syntax, if not their semantics, as the syntactic category of the compound still corresponds to the category of the second stem. Such is the case with compounds like *redhead* or *producer-director*, but perhaps not with cases like *kick-arse* or *angel-beast* which appear as premodifiers.

[1] See Štekauer (1998) for an argument that there are in fact no exocentric compounds in English. Within his onomasiologocial theory of word formation, Štekauer argues that these compounds are subject to a process of 'elliptical shortening' which is not in fact a matter of word formation.

2.3 Synthetic compounding

Synthetic compounding, like root compounding, is right headed, and is highly productive in English. (6) gives some examples (taken from Lieber 1992: 81):

(6) a. truck driver, meat eater, cat lover, flower grower, gift giver
b. truck driving, meat eating, cat loving, flower growing, gift giving
c. power driven, moth eaten, well loved, home grown, law given
d. tax evasion, revenue enhancement, school closure, waste disposal

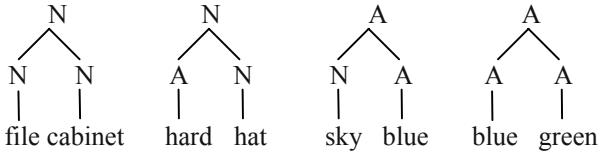
It is generally agreed that where the deverbalizing suffix is *-er* or *-ing*, as in (4a,b), or one of the less productive nominalizers like *-ion, -ment, -ure*, or *-al*, as in (4d), the first stem is typically interpreted as an internal argument of the verb stem (so a *cat lover* is someone who loves cats). If the internal argument is manifested syntactically, as in *the home-growing of tomatoes*, or if the verb stem lacks an internal argument, as in *lake-swimming*, the first stem of the compound may be interpreted as an adjunct. An adjunct interpretation is also frequent when the suffix is the passive *–en*, as in (4c). It is generally said that the first stem in a synthetic compound cannot be interpreted as the subject of the verb and therefore that compounds like **girl-swimming* are unattested. While this seems to be true more often than not, Lieber (2004) notes examples like *city employee* in which a subject interpretation is natural. Bauer and Renouf (2001) find several convincing neologisms in their database, including *blood-pooling* ("The make-up man is surely up for some technical prizes for the quality of his lesions and blood-pooling" (2001: 118)), and *director-buying* ("It was helped on Tuesday by director-buying and gained a further 12.5p." (2001: 119)). Jespersen (1965: 143) points out compounds in which the second stem is a noun converted (or zero-derived) from a verb and in which the first stem likewise bears a subject relation to the second stem: *sunrise, daybreak, nightfall*.

At various times, theorists in the generative tradition have tried to capture the relationship between the first and second stems in synthetic compounds in a number of ways, including Roeper and Siegel's (1978) *First Sister Principle*, Selkirk's (1982) *First Order Projection Hypothesis*, and Lieber's (1983) *Argument Linking Principle*, and through movement analyses such as those in Roeper (1988) and Lieber (1992). Lieber (2004) gives a lexical semantic account of the interpretation of synthetic compounds (see section 1.4). We will return to these theoretical positions below.

2.4 Structure and interpretation

The structure of root compounds is relatively uncontroversial: the righthand stem is the head, and thus contributes category and morphosyntactic features to the compound as a whole.

(7)

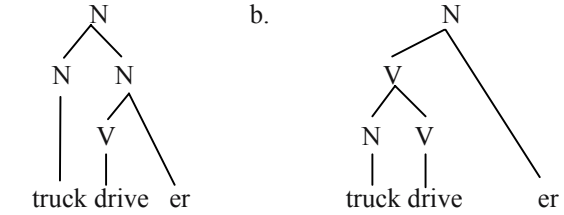


Although early generative theorists attempted to derive root compounds transformationally from complete sentences (Lees 1961, Kastovsky 1969, Brekle 1970) or to reduce their interpretation to a fixed number of types (Levi 1978), in more recent years it has generally been agreed that there is no fixed semantic relationship between the two stems of a root compound. In fact, there are two main observations we might make about the interpretation of root compounds: first, that the lefthand stem receives a generic interpretation (that is, it is non-referential), and second, that the compound as a whole denotes a subset of the denotation of the second stem. For example, in the compound *catfood* the first stem does not refer to any particular cat, and the compound as a whole denotes a sort of food, in this case, food intended for cats. As for exocentric compounds like *airhead*, Booij (1992) points out that morphological theory need not say anything special: whatever principle of metonymy allows us to refer to players in a pick-up ball game on the street as the 'shirts' (i.e., the guys in shirts as opposed to the 'skins', the ones without shirts) will also allow us to account for the interpretation of bahuvrihi compounds.

Perhaps more problematic are cases like *kick-arse* cited by Bauer and Renouf (2001) as premodifiers; here metonymy is not relevant, and the issue is whether *kick-arse* is to be treated as an adjective in a phrase like 'a very kick-arse attitude' or as something else. To date, I know of no particularly satisfying analysis of forms of this sort.

The structure and interpretation of synthetic compounds have been a matter of some controversy among generative morphologists at least. Two basic structures have been proposed:

(8)



In (8a) the deverbal noun *driver* is compounded with the noun *truck*, whereas in (8b) a compound is first formed of the noun *truck* and the verb *drive* to which the noun-forming suffix *-er* is then attached. Lieber (1992: 85) discusses the relative merits of the two structures:

> The structure in [(8b)] has the advantage that it allows us to say that an obligatory complement of a verb is satisfied in the first projection above the verb in synthetic compounds, just as it is in phrasal syntax. Such a structure has in fact been proposed by

> Lieber (1983). As has been pointed out by Booij (1988), however, this structural analysis suffers from a rather serious drawback in that it claims, at least implicitly, that there should be verbal compounds like *truckdrive* in English. Yet this sort of compound is not formed productively in English. The few verbal compounds that do exist (*babysit, aircondition*, and the like) are generally acknowledged to be the result of backformation from synthetic compounds (*babysitter, airconditioner*, etc.). In other words, a grammar which generated [(8b)] as the structure for synthetic compounds would have to overgenerate large numbers of nonoccurring (and impossible) verbal compounds.

The majority of generative morphologists, then, have chosen (8a) as the likely structure of synthetic compounds, among them Selkirk (1982), Booij (1988), and Lieber (1992, 2004).

Theorists' choice of structure has to some extent depended upon the formal mechanism proposed to explain key observations concerning the interpretation of synthetic compounds, namely that the left-hand stem is typically interpreted as the object of internal argument of the verb (as in *basket making*), unless the verb does not allow an internal argument (for example, *ocean swimming*) or the internal argument is discharged syntactically (as in *hand-making of baskets*). In the latter case, the first stem often bears an adjunct relationship to the verb.

In perhaps the earliest generative treatment of synthetic compounds, Lees (1961) proposes a transformational derivation for synthetic compounds. Synthetic compounds arise from full sentence deep structures and transformations successively pare down those sentential bases. A compound like *apple eater* derives from a deep structure sentence *the man eats apples* as do the synthetic compound *apple eating* and the root compound *eating apple*. Marchand (1966) offers strong contemporary criticism of Lees' analysis, pointing out the arbitrariness of both the underlying structures and the transformations proposed. His own semantically-based analysis, most fully worked out in his (1969) *Categories and Types of Present-Day English Word Formation*, is in some way inspired by Lees, however, in that he classifies synthetic compounds on the basis of grammatical relations that correspond to those manifested in sentences (subject, object, verb). Still, in the generative framework, Lees' work continued to be refined in the transformational analyses of compounds proposed by Levi (1978) and Bauer (1978) albeit in a far more principled and constrained way.

Subsequent generative analyses have capitalized on theoretical changes in generative syntax. With the advent of lexicalism in the mid-seventies, Roeper and Siegel (1978) proposed a 'lexical transformation' which modifies the subcategorization frames of deverbal nouns to result in synthetic compounds:

(9) Roeper and Siegel (1978: 209)

[[empty] + verb + affix] [$_{X+N}$ + word] W => [[word] + verb + affix] W
1 2 3 4 5 4 2 3 0 5

where W ranges over subcategorization frames and X_{+N} stands for lexical categories N, A, Adv

The lexical transformation in (9) takes a deverbal stem which has an empty slot for a preceding stem and fills that slot with the word which follows the deverbal stem. This is intended to capture the generalization that the first stem of synthetic

compounds is generally the internal argument of the verb, a generalization which Roeper and Siegel call the *First Sister Principle*.

Both Selkirk (1982) and Lieber (1983) replace syntactic transformations and lexical transformations with interpretive principles based on argument structure. Selkirk's First Order Projection Condition (1982: 37) allows the direct internal argument of the verb to be satisfied by the first stem of the compound, thus ruling out both forms like **girl-swimming* in which the subject is the first stem, and forms like **shelf-putting* in which the first stem is an internal argument of the verb, but not the direct internal argument. Lieber's Argument Linking Principle is similar to spirit to Selkirk's First Order Projection Condition, but attempts to account in a single principle for the interpretation of both synthetic compounds and root compounds.

With the advent of the Principles and Parameters model of syntax and more recently Minimalism, several theorists attempt a return to a movement-based analysis of synthetic compounds. Roeper (1988) analyzes synthetic compounding in English as a form of Head Movement, inspired by Baker's (1988) analysis of noun-incorporation. In an attempt to integrate the analysis of word formation with an analysis of syntax in which theta-role assignment in English is strictly to the right, Lieber (1992) also proposes a form of Head Movement for synthetic compounds.

Lieber (2004) returns to an interpretive principle for synthetic compounding, suggesting that the interpretation of synthetic compounds should be treated as a matter of lexical conceptual structure, rather than as a matter of syntax. This is, of course, only possible within a theoretical framework which allows discussion of the semantics of word formation. Within the theory proposed in Lieber (2004), words of all categories, both simple and complex, have lexical conceptual structures, roughly of the form developed by Jackendoff (1990), but with the refinement that semantic functions have been broken down into a number of features which allow us to characterize the core meanings of affixes as well as of stems. Roughly, both simplex lexical items and affixes are characterized by a central core of meaning called the *skeleton* that consists of features like [+/– material] and [+/– dynamic], along with their arguments. For our purposes it is sufficient to note that [+material] items are concrete, and [–material] items abstract. Items which are [+dynamic] are events, and those which are [–dynamic] are states. The two features are not mutually exclusive, however, so that an eventive or processual noun like *sunset* can be both [–material] and [dynamic]. Word formation consists of linking together the skeletons of morphemes according to the following principle:

(10) *Principle of Coindexation:*
In a configuration in which semantic skeletons are composed, coindex the highest nonhead argument with the highest (preferably unindexed) head argument. Indexing must be consistent with semantic conditions on the head argument, if any.

When an affixal skeleton is composed with the skeleton of its base, the latter is subordinated to the former. When two stems are composed in compounding, the two skeletons are coordinated.

(11) is an example of the skeletal representation of the agent/instrument suffix *-er* in English (see also below, section 2.2.1):

(11) *-er*
[+material, dynamic ([ ], <base>)]

Lieber (2004) claims that a the suffix *–er* in English creates concrete dynamic nouns. Further, its argument (the so-called 'R' argument, see Williams 1981, Higginbotham 1985), is co-indexed and therefore identified with the highest argument of its base. So a derived word like *driver* has the composed skeleton in (12):

(12) [+material, dynamic ([ ]$_i$, [+dynamic ([ ]$_i$, [ ])])]
-er *drive*

What the representation in (12) says, in effect, is that the affix takes an eventive base, in this case one corresponding to the activity verb *drive*, and subordinates it, co-opting its highest argument. This is similar to the argument-structural analysis in Booij (1986) or in work of Rappaport Hovav and Levin (1992), except that it translates that analysis into lexical semantic terms, which Lieber (2004) argues to be the appropriate terms.

We then integrate the skeletal representation for the complex word *driver* in (12) with that of the stem *truck*. Since the affix *–er* has already has its "R" argument co-indexed with the highest argument of its base *drive*, and therefore shares the subject interpretation with its referent, the "R" argument of *truck* is co-indexed with the next available argument, namely the internal argument of *drive*. This is illustrated in (13):

(13) [+material ([ ]$_j$)], [+material, dynamic ([ ]$_i$, [+dynamic ([ ]$_i$, [ ]$_j$)])]
truck *-er* *drive*

The initial stem of the synthetic compound is interpreted as an internal argument because the highest free argument of the base happens to be the internal argument of the verb *drive*.

3. DERIVATION

I leave the debate over the precise dividing line between inflection and derivation to other authors. See Stump (this volume), as well as Anderson (1992) and Haspelmath (1996) for discussion of this issue. I will merely state at the outset that I will not treat English participles in *–ing* or *–en* in this section. I will also not make a strict division in the section on prefixation between prefixes and elements that in other works have been termed combining forms or even compounding elements.

Derivation is an especially active means of word formation in English. Among the many prefixes and suffixes in the language, some are quite productive, others moderately so, and some exist only in lexicalized remnants of processes that no

longer form new words in the language (see Kaisse, this volume). Some affixes can be traced back to native stock; others are borrowed from Latin, often through French, or from Greek. Although the two stocks of affixes are diachronically distinct, in modern English they do not always remain distinct, with etymologically Germanic affixes often attaching freely to Latinate roots, and less often etymologically Latinate affixes attaching to native stock. In fact, the partial integration of the historically different systems has given rise to much discussion among generative morphologists, providing the basis for the theory of Lexical Phonology and Morphology (Kiparsky 1982, Mohanan 1986; Kaisse, this volume), and for subsequent critiques and refinements of that theory (Fabb 1988, Plag 1999, Giegerich 1999, Aronoff and Fuhrhop 2002).

As a way of summarizing the complexities that underlie the theoretical discussion, we offer a number of tables which cull information from Marchand (1969), Jespersen (1965), the OED, the above-mentioned sources, and my own explorations. Table 1 indicates what sorts of bases various suffixes prefer (root or word, native or Latinate), and whether these suffixes have stress or other phonological effects on their bases. Table 2 indicates for each suffix whether it attaches to already affixed bases, or can itself undergo further affixation. Table 3 gives comparable information for prefixes. In all three tables, native affixes are indicated by boldface.

Affixes	*segmental phonological effects*	*stress effects*	*attaches to roots*	*attaches to words*	*attaches to non-native bases*	*attaches to native bases*
-able V->A	as–*ible*: perceptible	sometimes: comparable	yes: capable, probable	yes: washable	yes	yes
-age N->N	no	no	no	yes: orphanage	yes	yes
-al V->N	no	no	no	yes: arrival, refusal	yes	occasionally: betrothal, withdrawal
-al N->A	yes: sacrificial	yes: architectural, accidental	yes: minimal	yes: architectural	yes	occasionally: tidal
-an, -ian N,A->N	yes: Christian	yes: contrarian, Elizabethan	yes: pedestrian	yes: Bostonian	yes	occasionally: earthian, anti- churchian
-ance, -ence V->N	yes: inductance	yes: preference	yes: obedience	yes	yes: admittance	yes: riddance, forbearance
-ant, -ent V->N	yes: resident	yes: resident	yes: litigant, stimulant	yes: accountant	yes	occasionally: coolant
-ate stem->V	no	occasionally: nitrogenate	yes: litigate, stimulate	yes: fluorinate	yes	no
-ation	yes:	yes: revelation	yes:	yes:	yes	occasionally:

Affixes	*segmental phonological effects*	*stress effects*	*attaches to roots*	*attaches to words*	*attaches to non-native bases*	*attaches to native bases*
V->N	revolution, perception		perception	restoration		flirtation, starvation
-dom **N->N**	occasionally: wisdom	no	no	yes: kingdom, popedom	yes	yes
-ed **N->A**	no	no	no	yes: iced, cultured	yes	yes
-ee V->N	no	yes: absentee	yes: evacuee	yes: escapee	yes: nominee	yes: payee
-en **N->A**	no	no	no	yes: wooden, waxen	no	yes
-en **A-> V**	no	no	no	yes: lengthen, blacken	occasionally: chasten, moisten	yes
-er **V,N->N**	no	no	yes: astronomer, philosopher	yes: singer, writer	yes	yes
-ery N->N	no	no	yes: monastery, surgery	yes: nunnery, piggery	yes	yes
-esque N->A	no	stress on suffix: chivalresque	yes: grotesque, chivalresque	yes: statuesque	yes	yes
-ess N->N	no	no	yes: abbess	yes: lioness	yes	yes
-ette N->N	no	stress on suffix	?baguette	yes: featurette, kitchenette	yes	yes
-ful **V,N->A**	no	no	occasionally: vengeful	yes: sorrowful	yes	yes
-hood **N->N**	no	no	no	yes: knighthood	yes	yes
-ic N->A	yes: parasitic	yes: historic, Germanic	yes: electric, geographic	yes: dramatic, problematic	yes	no
-ify N,A-V	no	no	yes: pacify	yes: fishify	yes: pacify, terrify	yes: beautify
-ish **N,A->A**	rarely: wolvish	no	no	yes: mulish	yes: modish, stylish	yes
-ism N->N	yes: Catholicism	yes: catholicism	yes: fascism, plagiarism	yes: sexism, escapism	yes	yes
-ist	yes: Anglicist	occasionally:	yes: fascist,	yes: sexist,	yes	yes

Affixes	*segmental phonological effects*	*stress effects*	*attaches to roots*	*attaches to words*	*attaches to non-native bases*	*attaches to native bases*
N->N		algebraist	plagiarist	escapist		
-ite	no	yes:	yes: hematite,	yes:	yes	on names
A->N		cosmopolite	cosmopolite	suburbanite		
-ity	yes: historicity	yes: historicity	yes: atrocity,	yes: similarity,	yes	occasionally:
A->N			hilarity	purity		oddity
-ive	yes:	yes:	yes:	yes:	yes	only talkative
V->A	productive, allusive	productive	productive	successive, decorative		
-ize	yes: historicize	yes:	yes: baptize,	yes: winterize,	yes	yes
N,A->V		historicize, immunize	evangelize	standardize		
-less	no	no	occasionally:	yes: shoeless	yes	yes
N->A			reckless			
-ly	no	no	no	yes: friendly	yes: princely	yes: lordly
N->A						
-ment	no	no	rarely?	yes:	yes:	yes:
V->N			testament	development	development	bereavement
-ness	no	no	no	yes	yes	yes
A->N						
-ory	yes:	yes: excretory	yes:	yes:	yes	no
V->A	classificatory, satisfactory		perfunctory	contradictory		
-ous	yes: avaricious	yes:	yes: sonorous,	yes:	yes	yes
N->A		courageous, harmonious	blasphemous	courageous, murderous		
-ship	no	no	no	yes: kingship	yes	yes
N->N						
-some	no	no	rarely:	yes:	occasionally:	yes
A,N->A			gruesome	wholesome	quarrelsome	
-ure	yes: closure	no	no?	yes: closure	yes	no
V->N						
-y	seldom:	no	rarely: grisly?	yes: sunny,	yes	yes
N->A	worthy, piracy			salty		

Table 1 *Suffixes and their bases*

suffix	*what this suffix attaches to*	*what suffixes attach to it*
-able	Won't attach to *–le* words. Will attach to bases in *–en, -ify, -ate.*	*-ity, -ness*
-age	Tends to prefer unaffixed bases. Plag (1999, 76) notes that affixed Ns tend to be abstract, to attaching another abstract suffix would be redundant.	*-ize?*
-al (N)	Likes final stressed unaffixed Vs. Note that verbal affixes are not stress-bearing.	
-al (A)	Likes simplex Ns, but will also attach to *–ion, -ment, -or, -ure, -ant/-ent, -ance, -ory, -ive.*	*-ize, -ism, -ist, -ity, -ness*
-an, -ian	Prefers simplex bases. Also attaches to *–ic*.	*-ize, -ism, -ity, -ship*
-ance	Attaches to simplex Vs with final stress.	*-al, -less*
-ant, -ent	Prefers simplex bases.	*-ize, -al*
-ate	Attaches to *–ic, -ion, -ive*	*-ion, -able, -ee, ive, -ory, -ous*
-ation	Attaches to affixed verbs in *–ize, -ify.*	*-al, -ize, -ist, -ism, -ate, -less*
-dom	Attaches to *–er, -ess, -ee, -ing, -ist*	*-ize?, -ish, -less*
-ed	Prefers simplex bases.	*-ness*
-ee	Prefers simplex bases. Will attach to *–ize, -age.*	*-dom, -ship, -hood, ism?, -ist?*
-en (A)	Prefers simplex bases.	*-ness*
-en (V)	Attaches to monosyllabic bases ending in an obstruent.	
-er	Attaches quite freely even to suffixed forms in *–ize, -ify, -en.*	*-ize, -dom, -ship, -hood, -ism, -ish, -less, -ly*
-ery	Attaches to consonant-final simplex bases	*-ish?*
-esque	Attaches to simplex bases.	*-ify?*
-ess	Attaches to simplex bases and *–er.*	*-dom, -hood, -less, -ship*
-ful	Attaches to monosyllabic Vs or disyllabic Vs with final stress. Attaches to simplex Ns or Ns in *–th, -ing.*	*-ness*
-hood	Prefers simplex bases, but will attach to *–ly, -y, -er, -ess, -ing* occasionally.	
-ic	Attaches to *–ist, -ism, -or.*	*-ist, -ism, -ize, -ity, -ness, -ian, -ate*
-ify	Prefers monosyllabic bases or ones ending in *y*. Can attach to *–ive*?	*-ation, -able*
-ish	Prefers simplex bases, but will attach to *-y* or *-er*.	*-ness*
-ism	Attaches to *–ive, -ic, -al, -an, -ion, -er.*	*-ic, -ize, -less*
-ist	Attaches to *–ive, -ic, -al, -an, -ion, -ment.*	*-dom, -ic, -ize*
-ity	Does not attach to *–ory*. Will attach to *–*	

suffix	*what this suffix attaches to*	*what suffixes attach to it*
	ive, -ic, -al, -an, -ous, -able. Prefers bases ending in non-glide consonants.	
-ive	Attacjes tp Latinate simplex bases ending in t, d, s, or verbs in *–ate*.	*-ication, -al, -ate, -ity, -ize, -ness*
-ize	Will not attach to *–ous*. Can attach to simplex nouns and adjectives, as well as those in *–ive, -ic, -al, -an, -ism, -ist.*	*-ation, -ment, -able, -er, -ee*
-less	Avoids *–ment* (Chapin 1967). Attaches to *–ion, -ing, -ism, -er, -ance, -dom, -ess*.	*-ness*
-ly	Attaches to *–er.*	*-ness*
-ment	Attaches to simplex Vs or Vs prefixed with *en-* or *be-*.	
-ness	Attaches freely to all adjective-forming suffixes, as well as to simplex bases.	
-ory	Attaches to *–ate*.	*-al*
-ous	Prefers simplex bases.	*-ity*
-ship	Attaches to *–ee, -ian, -er, -y, -ess*	
-some	Prefers simplex bases.	
-ure	Prefers simplex bases.	*-al*
-y	Prefers simplex bases.	*-ness*

Table 2 *Suffixes: what attaches to what*

Prefix	*Attaches to non-native base?*	*Attaches to native base?*
a-	yes: aseptic, amoral	no
after-	yes: afterimage	yes: afterthought
ante-	yes: antechamber, anteorbital	yes: anteroom
anti-	yes: anti-hero, anti-communist	yes: anti-clockwise, antibody
arch-	yes: archenemy, archbishop	no
auto-	yes: autobiography	rarely: autoharp
back-	rare: backspace	yes: backwater, backlight
be-	yes: bepowder, besiege	yes: befriend, bemoan
bi-	yes: bicentennial, bilingual	yes: biyearly, biweekly
by-	yes: by-election	yes: bystander, byword
circum-	yes: circumnavigate	rare: some nonce creations in 17th c.
co-	yes: co-edit, co-defendant	no
counter-	yes: counterrevolution	yes: counterweight
de-	yes: dethrone	yes: delouse
demi-	yes: demiseason	rare: demigod
dis-	yes: dishonour	yes: distrust, dislike, dishearten
down-	no	yes: downcast, downplay
en-	yes: enchain	yes: enshroud

Prefix	*Attaches to non-native base?*	*Attaches to native base?*
ex-	yes: ex-president	yes: ex-husband
extra-	yes: extracurricular	no
fore-	yes: forecourt	yes: forego, foreman
hyper-	yes: hyperphysical, hyperactive	no
in-	yes: intolerant, impossible	no
inter-	yes: interchange, interact	rare: intertwine
meta-	yes: metaphysics	no
micro-	yes: microbiology	rare: microskirt
mis-	yes: mismanage,	yes: misunderstand, mislike, misdeed
multi-	yes: multicellular	yes: multi-armed
non-	yes: non-resident	yes: non-heathen
off-	yes: offcolor	yes: offhand
on-	rare: onmarching	yes: onset
out-	yes: outachieve, outpatient	yes: outbid, outhouse
over-	yes: overcompensate	yes: override
post-	yes: postclassical	yes: postwar
pre-	yes: preclassical, pre-existence	yes: prewar, preschool
pro-	yes: proform, pro-abortion	yes: pro-war, pro-life
pseudo-	yes: pseudo-intellectual	yes: pseudo-book, pseudo-word
re-	yes: reassure	yes: rewash
retro-	yes: retroanalysis, retrovision	no
semi-	yes: semifluid, semiannual	rare: semiweekly
sub-	yes: subhuman, subcommissioner	rare: sublet
super-	yes: superhuman	yes: superclean
supra-	yes: supraorbital	no
trans-	yes: transpolar	yes: tranship, trans-Mississippi
un-	yes: unintelligible, untenable	yes: unhappy
under-	yes: underage, undergraduate	yes: underlie, underhanded, undershirt
up-	rare: upcountry	yes: uphold, upbeat, uprising, upland

Table 3 *Prefixes and their bases*

Before we go on to look at cohorts of various affixes, some summary remarks are in order. First, it appears that the distinction between native and Latinate is more salient – has wider effects – in suffixes than in prefixes. The vast majority of prefixes in English are of Latinate or Greek stock (see Bauer 2003). Native prefixes are often prepositional in nature. Whatever their origin, English prefixes tend to attach to both native and Latinate bases. As prefixes generally bear some stress themselves, they also tend not to perturb the stress pattern of their bases. And with the exception of *in-* and e*n-* , which assimilate to the initial consonant of their base, prefixes neither change form themselves, nor have segmental phonological effects on their bases. Prefixes, in addition, can often attach to other prefixes, and even to themselves, provided their meanings are amenable to scalar interpretations. So

formations like *repreheat*, *rereheat*, or *prepreheat* are reasonable formations. Prefixes are rarely category-changing in English; the prefixes *en-* and *de-* are notable exceptions here.[2] Generally, however, prefixes will attach to more than one category of base and return a derived word of the same category as the base. The prefix *counter-*, for example, attaches to nouns (*counterexample*), adjectives (*counterintuitive*), and verbs (*countersign*), with no change of category.

With suffixes, in contrast, those which are of Latinate origins sometimes prefer Latinate bases (e.g., *-acy*, *-ation*), although others are equally at home on either native or Latinate bases (e.g., *-able*, *-age*). Some attract stress from their bases, or otherwise change stress pattern, some have other phonological effects. Others affect neither stress nor base phonology. Native suffixes are stress and phonology neutral. Latinate affixes almost always attach to roots; native affixes often do as well. Suffixes, in general, are less amenable to iteration than prefixes. Although some of the Latinate suffixes can attach to each other so that formations like *organizationalize* are possible, these derivational loops are restricted by pragmatic considerations such as the ultimate interpretability and usefulness of the resulting words. See Lieber (2004, chapter 6) for an extensive discussion of this issue. As Aronoff and Fuhrhop (2002) point out, there are a number of suffixes in English that attach only or almost exclusively to roots or unsuffixed words (e.g., verb-forming *-al*, *-ant/-ent*, *-ance*. Whether it is true, as they argue that English obeys the 'Monosuffix Constraint', namely that "[s]uffixes that select Germanic bases select unsuffixed bases (2002: 473)", is open to dispute, however. Suffixes, unlike prefixes, are frequently (although not always) category-changing, and more often than not attach only to a single category of base.

Affixes can often be grouped into what have been called cohorts or rival sets (Van Marle 1985). Within these sets, affixes share syntactic and semantic characteristics, often rather neatly partitioning the set of available bases (see Plag 1999). We will first look at groups of prefixes, grouped either by cohorts of this sort, or by semantic categories like 'locational', and then go on to do the same for suffixes.

3.1 Prefixation

Bauer (2003) points out that it is often difficult in English to distinguish prefixes from the first elements of compounds. Prefixes generally bear stress in English, and often behave as distinct phonological words. Increasingly, as Bauer points out, elements such as *agri-, eco-, Euro-, psycho-, techno-* and the like are used as combining forms, and perhaps represent elements that should be classed synchronically with prefixes. Indeed, this seems to be an open question. Certainly, some researchers have treated some forms we will discuss below as compounding elements. Here, I will not make too fine a distinction between prefixes and combining forms, although for the sake of brevity I will stick to types that are

[2] The prefix *be-* also changes category (*bedew, becalm*), although it is unproductive in present-day English.

generally or at least often classed as prefixes. See Lehrer (1995) as well for discussion of the distinction between prefixes and combining forms in English.

Generally, prefixes attach to words, rather than roots, although Latinate forms like *super-, supra-, trans-, circum-, inter-, intra-, sub-,* and the like do attach to Latinate roots (*transport, circumvent, intervene, subject*, etc.), albeit not with compositional meanings. In fact, it has long been a controversy among morphologists whether to treat such forms as formally complex, since synchronically they are not semantically complex (see, for example, Aronoff 1976). Here I will confine myself to prefixation to words, leaving aside this problem.

3.1.1 Negative prefixes (un-, in-, non-, de-, dis-)

Negative prefixes have been discussed quite extensively in the literature over the years; see for example Zimmer (1964), Marchand (1969), Algeo (1971), Maynor (1979), Andrews (1986), Horn (1989/2001, 2002, forthcoming), and Lieber (2004).

Each of these affixes attaches to at least two lexical categories of base:

(14)

	on A	on N	on V
de-		delouse	demilitarize
		deice	decontaminate
dis-	discourteous	discomfort	
	disloyal	disrespect	
in-	inaccurate	incapacity	
	infinite	inaction	
non-	non-moral	non-smoker	
	non-violent	non-violence	
un-	unbreakable	unease	undress
	unhappy	uncola	uncork

Of course, these affixes do not exhibit equal productivity on all these categories. The prefixes *non-* and *de-* are both quite productive on nouns, the former being non-category-changing, the latter changing nouns to verbs. *Non-* also attaches quite freely to adjectives. *Un-* and *in-* are both productive on adjectives, with *un-* being the more productive of the two. As Horn (2002, forthcoming) has shown, however, *un-* exhibits a surprising productivity on nouns in present-day English. As we will see below, *un-* also attaches productively to verbs, albeit only within a certain semantic class of verbs. *De-* favors derived verbs in *-ize, -ate*, and *-ify*. *Dis-* may attach to a wide variety of verbs.

The semantics of this cohort of prefixes has been of particular interest to morphologists. *De-* is typically characterized as privative, *un-, in-,* and *non-* as negative on adjectives and nouns, *dis-* as negative or reversative on verbs. When attached to verbs, the meaning of *un-* is generally described as reversative. At issue

in the literature, however, is whether these meanings are different and distinct, or whether they are the same, with differences arising from the category and semantics of the particular bases to which they attach. Marchand (1969) treats different nuances of meaning separately in each of these affixes, and Dowty (1979) argues in effect that negative and reversative *un-* are separate homophonous prefixes. Horn (1989/2001, 2002, forthcoming) and Lieber (2004) follow earlier work of Maynor (1979) and Andrews (1986) in arguing that this cohort of affixes shares a central core of meaning, with the extensive polysemy that they display following from the semantics of the base to which they attach.[3]

I believe that a good case can be made for polysemy in this cohort of prefixes, rather than homophony. Let us look first at the notion of negativity, which itself is not necessarily a unitary concept. As Horn (1989/2001) points out, we must distinguish *contradictory negation* from *contrary negation*. In contradictories, something is either X or not-X; the positive and negative counterparts admit of no middle ground. For example something may be either *breakable* or *unbreakable*, and someone either *pregnant* or *non-pregnant*, but there is nothing in between. In contrast, someone may be neither *happy* nor *unhappy*, and a movie may be neither *violent* nor *non-violent* (at least for me). These latter negatives are contraries. In terms of logic, contradictories obey the *Law of the Excluded Middle*, while contraries do not. In Lieber (2004) I argue that negative prefixes may deliver either a contradictory meaning or a contrary meaning, depending on the meaning of their base. Which interpretation arises depends on whether the base adjective can be interpreted as gradable or scalar. If an adjective is amenable to a gradable interpretation (as *happy* and *violent* are for me), the resulting negative-prefixed form will have a contrary meaning; if the adjective is not scalar or gradable in interpretation, the negative-prefixed form will be interpreted as contradictory. This is true regardless of which negative prefix we use. Speakers may of course differ on which adjectives they feel to be gradable, and even whether a given adjective is gradable depending on nuances of meaning. For example, the adjective *American* is non-gradable to me if it merely denotes nationality: someone either holds American citizenship or not. But to the extent that someone's behavior can be characterized as 'American', that concept is gradable for me, and hence *un-American* in that sense has a contrary rather than a contradictory interpretation.

It has been noted in the literature (e.g., Algeo 1971, Horn 1989, 2001) that some adjectives can be prefixed by *un-* (or *in-*) and *non-*, with the negated adjective having slightly different nuances of meaning. When this occurs, *non-* generally targets a non-emotive or non-affective sense of the base, while *un-* or *in-* picks out a more emotion-laden sense. So, if we say that someone is *non-professional* we merely say that they do not work as a doctor, lawyer, professor, or the like. But if we call them *unprofessional*, we are accusing them of questionable conduct in the workplace.

[3] Of the references mentioned, only Lieber (2004) treats all of these affixes. Andrews concentrates on *un-* and *de-*, and Horn on *in-*, *un-,* and *non-*.

Regarding the prefix *un-* on nouns, Horn (forthcoming 1-2) points out that there are a number of special nuances that can arise. Specifically, while an *uncola* and an *unhotel* are both in some sense not the nouns denoted by their bases (respectively a cola or a hotel), they require slightly different interpretations: "… a given un-noun refers either to an element just outside a given category with whose members it shares a salient function (e.g. *un-cola*) or to a peripheral member of a given category (an *unhotel* is a hotel but not a good exemplar of the category…)." *Un-* nouns of both sorts appear to be having a vogue in present-day English.

We may now discuss whether a distinction needs to be made between reversative and negative *un-*. We have seen that we can characterize *un-* as negative when it attaches to adjectives and nouns. With respect to verbs, *un-* shows a special preference for causative/inchoative verbs, and specifically those causative/ inchoative verbs which imply a result which is not permanent. So *unbutton* or *uncork* are possible *un-* verbs, but **unexplode* is not. As has been pointed out before, it is possible to interpret these verbs as involving negation of an impermanent result, so that *unbutton* in effect means 'cause to be not buttoned'. Note, interestingly, that the prefix *dis-*, which typically returns a negative interpretation when attached to stative verbs (*dislike* means 'not like'), returns a reversative meaning when attached to a verb which implies an impermanent result. So *disrobe* means 'cause to be not robed', just as *undress* means 'cause to be not dressed'. This suggests that the reversative meaning is not meaning-specific to the verbal affix *un-*, but rather arises from a general negative affix when attached to the right sort of verbal base.

The final meaning expressed in this cohort of prefixes is the privative meaning of *de-*. Verbs in *de-* can be interpreted in some sense as negative causatives. So to *debug* is to 'cause to not have bugs', and to *debone* is to 'cause to not have bones', and so on. The latter example is of some interest for other reasons: in this form the prefix *de-* is actually redundant, as to *bone* itself means 'cause to not have bones'. This does not, I believe, mean that *de-* has no meaning here, but only that its addition to the word does no more than intensify the negative causative meaning already inherent in *bone*. In any case, if privatives can be classed as negative causatives, they clearly belong to the same general cohort of prefixes as *in-*, *un-*, *non-*, and *dis-*.

One last issue has figured prominently in the literature on negative prefixes. At least since Jespersen (1965) and Zimmer (1964), it has been noted that negative prefixes tend not to attach to bases which already have negative connotations. So we have *unhappy* but not *unsad*, *unattractive*, but not *unugly*. As Zimmer points out, however, this is only a tendency, albeit a fairly strong one. There are a significant number of exceptions to this observation, if one looks for them, among them words like *unhostile, unvulgar,* and *incorrupt* that Zimmer himself cites (1964: 30, 35-37).

3.1.2 Locational prefixes

Among the locational prefixes are the following: *over-*, *under-*, *out-*, *back-*, *down-*, *up-*, *off-*, *on-*, *fore-*, *inter-*, *sub-*, *supra-*, *trans-*. These have not received as much attention in the literature as have negative affixes. To the extent that this cohort of affixes has attracted some attention, that attention has been focused

primarily on two issues: polysemy and the effects of some locational prefixes on argument structure. See Fraser (1976), Bresnan (1982), Walinska de Hackbeil (1986), Lakoff (1987), Williams (1992), Lehrer (1995), Roeper (1999), Tyler and Evans (2001, 2004), and Lieber (2004) for different approaches.

All of these affixes attach to multiple categories, as the chart in (15) illustrates:

(15)

	on N	on V	on A
over-	overcoat, overlord	overeat, overfly	overproud,overfull
under-	underarm, undershirt	undercut	underripe
out-	outhouse, outfield	outdo, outrun	
back-	backlash, backstitch	backstroke	backbreaking
down-	downbeat	downshift	downcast
up-	upcountry	uplift, upgrade	
off-	offshoot, offprint	offload	offwhite
fore-	foretaste, foremast	foresee	
by-	bystander, byway		bygone
ante-	antechamber		
circum-		circumnavigate	circumpolar
extra-			extraterrestrial
inter-	interface	intermarry	interdependent
sub-	subbasement		subacute
super-	superstructure	supersaturate	supersensual
supra-	supracouncil		supramolecular
trans-		tranship	transpolar

All of the locational prefixes that correspond to prepositions exhibit substantial polysemy, as do most of the Latinate locational prefixes. It has been pointed out many times that prepositions in English are multiply polysemous. Within the literature on Cognitive Linguistics, for example, extensive explorations of prepositional polysemy can be found in Lakoff (1987), and Tyler and Evans (2001, 2004), and within other frameworks discussions can be found in Walinska de Hackbeil (1986), Bierwisch (1988, 1996), Jackendoff (1996), Landau (1996), Talmy (2000) and elsewhere. The polysemy of the prepositional prefixes logically stems from this generally property of polysemy among prepositions, although most of the prefixes exhibit a somewhat smaller range of polysemy than do their prepositional counterparts.

This pattern can be well-illlustrated with the case of *over.* As a preposition, *over* has purely locational uses (*The hummingbird hovered over the flower*), as well as locational uses that add a notion of 'completion' (*We threw a blanket over her*). The preposition is extended as well to mean 'to excess' (*Our article is over the page limit*). In addition, as Tyler and Evans (2004) point out, there are a variety of extended meanings including repetition (*Do it over*), transfer (*We handed the money over*), and power (*The guard kept control over the prisoners*). The first three of the prepositional meanings occur in prefixal uses as well, as Lieber (2004) points out:

(16)	over-	locational	on N	overlord, overarm
			on V	overfly, overarch
		locational and contemplative	on N	overcoat, overshoe
			on V	overrun, overpower
		excess	on N	overconfidence, overdose
			on V	overdevelop, overcharge
			on A	overfond, overgenerous

Parallel to *over-* is the prefix *under-* which shares with its prepositional mate locational (lower than) and quantitative (less than) meanings:

(17)	under-	locational	on N	underarm, understory
			on V	underthrust, underscore
			on A	undersigned, underhanded
		less than	on N	underemphasis
			on V	underbid, underachieve
			on A	underprivileged

What is odd, however, is that the prefix *out-*, while exhibiting meanings that generally parallel those of its prepositional counterpart, exhibits one meaning – its predominant one in fact – that is not found in the preposition. The former meanings include a purely locational sense of exteriority (*She walked out the door*), as well as a sense of non-existence (*We're out of milk*), and an exclusion sense (*We voted the Republicans out*); the prefixal counterparts are illustrated in (18). With regard to the uniquely prefixal sense illustrated in (19), the OED states, "It is not very clear how this use arose, or to what sense of *out* it is to be referred":

(18)	out-	locational	on N	outback, outhouse
			on V	outbreak, outflow
			on A	outdoor, outgoing
		non-existence	on V	outblot
		exclusion	on N	outparty

(19)	out-	comparative	on V	outhit, outdebate

In its comparative sense, *out-* attaches only to verbs, and is accompanied by the systematic addition of an argument to the argument structure of its base; we will return to this latter phenomenon below.

The forms *back-*, *up-*, and *down-* again parallel their prepositions when they appear as prefixes. As a preposition, *back* has its central locational sense (*We turned back*), as well as a temporal sense (*We were happy back then*), and a sense of reversal (*We had to put it back*). These three senses appear in prefixed forms as well, although only the locational sense appears with any frequency:

(20)	back-	location (rear)	on N backchamber, backdraft
			on V backslide, backfire
			on A backlooking
		temporal	on N backpayment
		reverse	on N backfill
			on V backfill

Similarly, *up* and *down* both have central locational senses that appear frequently in their prefixal form, as well as a quantitative meaning (*Turn up/down the volume on the radio*) that appears only infrequently in prefixed forms:

(21)	up-	location	on N upland, upcurve
			on V uplift
		quantity	on V upgrade, uprate
(22)	down-	location	on N downcountry, downbeat
			on V downturn, downshift
		quantity	on V downgrade, downplay

The preposition *off* exhibits a variety of senses, among them its chief directional sense (*He walked off the field*), an 'abnormal' sense (*This milk smells a bit off*), a separation sense (*We cut off the dead flowers*), and an interruption sense (*The interviewer cut her off*). The first three of these can be found in prefixed forms, although only the first two appear with any frequency:

(23)	off-	direction	on N offglide
			on V offload, offset
			on A offputting
		abnormal	on A off-white, off-flavor
		separation	on N offline

It might be thought that *on* would occur prefixally, as does *off*, and the other prepositional forms detailed above. However, except for a few formations like

oncoming or *onlooker*, this preposition seems hardly to have been productive as a prefix. Marchand (1969: 116) mentions it only as 'a weak formative'.

The remaining locational prefixes – *by-*, *circum-*, *extra-*, *ante-*, *fore-*, *inter-*, *sub-*, *supra-*, *super-*, and *trans-* – sometimes exhibit as many nuances in meaning as prepositional prefixes, but locational meanings usually seem to be central. The Latinate prefix *sub-*, for example, exhibits the expected locational sense (*subfloor*), as well as extended senses of subordinacy (*subdeacon*), 'part of' (*subcommittee*), bordering (*suburban*), and smaller quantity (*subaudible*). The native prefix *fore-* occasionally has temporal as well as locational force (*forecast*), as does *inter-* (*interwar*) and *ante-* (*antedawn*). *Supra-* has quantitative extensions (*suprarational, supracentarian*) in addition to its locational uses, and in fact is used in many ways as a synonym of the prefix *super-* which has largely extended itself beyond locational uses; so in addition to locational examples like *superstructure*, we find an excess meaning (*supersensitive*), and a superlative meaning (*supermom*). The prefixes *trans-*, *by-*, *circum-*, and *extra-* seem the least polysemous of this cohort.

For the most part, when locational prefixes attach to verbs, they have no effect on the argument-taking possibility of their bases:

(24)

under-	We estimated the damage We underestimated the damage
back-	She pedalled (the bicycle) She backpedalled (the bicycle)
down-	I shifted (the gears) I downshifted (the gears)
up-	We graded the goods We upgraded the goods
off-	They loaded the ship (with wood)/ They loaded wood onto the ship They offloaded the ship (of wood)/ They offloaded wood from the ship
fore-	No one can see the tree. No one can foresee the future
super-	We saturated the cloth We supersaturated the solution
trans-	They shipped the goods They transhipped the goods

The prefixes *out-* and *over-* have a somewhat more complicated effect on the argument structures of verbs to which they attach. It has been noted in the literature

as early as Bresnan (1982) that comparative *out-* systematically adds an argument to its base verb if that verb is intransitive to begin with. For verbs that are normally transitive, the nature of the internal argument changes:

(25) out- Fenster ran (quickly)
*Fenster outran (quickly)
Fenster ran the Boston Marathon
*Fenster outran the Boston Marathon
*Fenster ran Letitia
Fenster outran Letitia

Similarly, as first noted in Walinska de Hackbeil (1986), in its locational, or locational/competive meaning, *over-* often (but not always) adds an argument:

(26) over- *The plane flew the field (locational)
The plane overflew the field

*The enemy ran the battlefield (locational/completive)
The enemy overran the battlefield

In this meaning, *over-* prefers intransitive bases (e.g., *arch*, *flow*, *hand*, *fly*, *rise*, *lay*, *soar*). Lieber (2004) suggests that *over-* comes with an argument which is added to that of its base, making transitives of intransitives. Where it does attach to transitive verbs, Lieber suggests (2004: 131) that the prefixal argument is linked to the second argument of the verb, imposing its semantic characteristics on that argument. It is likely that comparative *out-* could be analyzed in a similar way.

With the excess sense, *over-* most frequently has no effect on the argument structure of its base verb; it attaches to either transitive or intransitive verbs with the same sort of verb resulting:

(27) over- We slept (excess)
We overslept

They developed the area
They overdeveloped the area

The one verb that behaves oddly in this respect is *eat*; although *eat* can occur with an object or not, *overeat* cannot have an object:

(28) We ate
We overate
We ate pickles
*We overate pickles

Lieber (2004: 132) explains this case as follows:

> It is interesting that the internal argument is disallowed only when the "excess" part of the semantic body of *over-* would implicitly have to take scope over that argument. If *she overate pickles* were to be acceptable, it would have to have the meaning "she ate too many pickles." On the other hand, in the more typical cases where *over-* has no effect on argument structure, the "excess" meaning added by the prefix is typically interpreted as having scope over the verb phrase. That is, *they overworked the peasants* can be paraphrased as "they worked the peasants too hard" and not as "they worked too many peasants." …although I am not sure how to formalize this observation, it seems plausible to say that *over-* does not actually delete an argument when it attaches to the verb base *eat*, but rather chooses as its base the intransitive form of the verb, avoiding, if it possibly can, taking scope over an overt object.

Another case in affixation of a locational prefix that can impose restrictions on its arguments is the prefix *inter-*:

(28) The villagers intermarried.
The villagers and the city-dwellers intermarried.
The tribe intermarried.
*The villager intermarried.
Fenster married Letitia.
*Fenster intermarried Letitia.

These effects stem not so much from the addition or deletion of an argument, but from the quantificational nature of the arguments. Specifically, *inter-* requires plural, conjoined, or collective arguments.

A final issue concerning locational prefixes is raised in Roeper. He notes (1999: 36-37) that structures of the sort illustrated in (29a) are generally preferred to those in (29b):

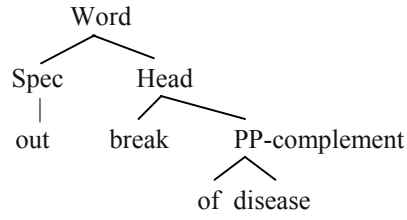
(29) a. the outbreak of disease
the outflow of funds

b. *the handout of good examples
*the carryout of food

Grammaticality judgments in these examples are as indicated in Roeper (1999). Working from a minimalist perspective that privileges anti-symmetrical structures (Kayne 1994), he attributes the putative difference in grammaticality to a structural constraint; prepositional prefixes (or what he calls 'leftward-moved particles') occupy a Specifier position, which c-commands a complement position. Particles which follow are incorporated into their base and cannot themselves c-command a complement. The anti-symmetrical structure that Roeper has in mind is given in (30).

The difficulty with this analysis is that judgments on the data are not at all solid. For example, it is possible to find many attestations on the web of phrases like *the carryout of (X)* or *the sleepover of (Y)* – precisely the forms that this analysis rules out. It remains to be seen, then, if minimalist treatments of prefixed words are in any way illuminating.

(30)



3.1.3 Temporal and aspectual prefixes

English has a number of prefixes that might be categorized as primarily temporal or aspectual, all of them from the Latinate sector of the morphology. The prefixes *pre-*, *post-*, *ex-*, and *retro-* clearly add a temporal meaning to their bases: *pre-* usually means 'before', *post-* 'after', *ex-* 'formerly', and *retro-* 'backwards'. Occasionally, *pre-*, *post-*, and *retro-* have locational uses as well.

(31)

	on N	on V	on A
pre-	preschool, prerinse	preheat, presift	prehistoric
post-	posteternity	postdate, postpose	post-adolescent
ex-	ex-mayor, ex-president		
retro-	retrochoir	retrofit, retroact	retro-ocular

While these prefixes have not received too much attention in the literature; Southerland (1994) discusses the discourse function of new coinages in *pre-*, and a number of these prefixes are mentioned in Lehrer (1995) and Keyser and Roeper (1992).

This is not to say that they are uninteresting. Writing about the Catalan and Basque equivalents of *pre-*, Gracia and Azkarate (1998) make a number of observations that are potentially of interest in the lexical semantic analysis of words formed with this cohort of prefixes. They note that words in *pre-* and *post-* in Romance (and hence in English, since these prefixes belong to the Latinate sector of the morphology) are all right-headed, in the sense that it is their base, rather than the prefix that determines the category (and the morphosyntactic class) of the derived words. Nevertheless, only some forms in *pre-* and *post-* seem to be semantically headed by their bases. That is, a *preschool* is a kind of school, and the *post-abdomen* is a part of the abdomen. *Prehistory,* however, is not a period of history, but rather a period of time before history. Similarly, music that is *preclassical* is not classical. Gracia and Azkarate (1998) suggest that the latter type should be analyzed as syntactically endocentric, but semantically exocentric.

The prefix *ex-* is also not without interest. First, it appears that *ex-* is far more comfortable attaching to stage-level nouns (*mayor*, *president*) than to individual-level nouns (*car*). For example, an *ex-mayor* is someone who was formerly mayor, but an *ex-car*, if it's anything at all, can only be interpreted as a twisted pile of scrap

metal. Oddly, however, the prefix *ex-* can attach quite comfortably to an individual-level noun as long as it can take scope over something stage-level other than the noun; that is, it is perfectly normal to talk about *my ex-car*, with the prefix taking scope over the possessive pronoun. Gracia and Lieber (2000) discuss these facts briefly, without arriving at a satisfactory formal analysis, however.

Far more attention has been devoted to the prefix *re-*, both in terms of its syntax and in terms of its semantics. With regard to syntax, Keyser and Roeper (1992) argue on the basis of facts concerning this prefix that it is generated postverbally in what they call the 'abstract clitic' position, and then moved to a position before the verbal head. They cite as evidence for this analysis that the prefix *re-* appears to occur in complementary distribution with items like dative nouns, particles, and idiomatic nouns, all of which occur post-verbally:

(32) a. We gave him money.
b. *We regave him money.
c. *W regave ourselves up.
d. We lost touch.
e. *We relost touch.

Lehrer (1995: 147) points out a number of problems with this analysis. The most obvious is that it is possible to use the prefix *re-* recursively; formations like *re-reread* are not at all unusual. Keyser and Roeper's analysis depends on the assumption that only one item can occupy the Abstract Clitic position; recursion of the prefix should therefore not be possible. Further, Keyser and Roeper suggest that verbal *un-* might also be argued to occupy the Abstract Clitic position. If so, it also should not co-occur with *re-*. However, given the right pragmatic circumstances, it seems possible to combine the two; for example to *unrefill* something seems possible.

Others have been more concerned with the semantics of this prefix than with its syntactic properties. Marchand (1969: 189-90) suggests that "*re-* does not express mere repetition of an action; it connotes the idea of repetition only with actions connected with an object." He goes on further to suggest that *re-* rectifies a previously imperfect or inadequate result, as in *rewrite*, or reverses a former state, as in *repossess*.

Smith (1997: 179) suggests that *re-* is a 'telic' prefix:

> The verbal prefix *re-* (to do over again) is telic: it appears in constellations with verbs such as *reopen, reevaluate, reassemble*, etc. Stative , Activity and Semelfactive verbs do not take this prefix; **rebelieve, *reunderstand, *resneeze, *relaugh, *reknock* are impossible, nor do verbs with *re-* appear in atelic constellations.

Lieber (2004: 146-7) argues against the characterization of *re-* as a telic prefix, however. She points out that *re-* can attach to some verbs which are atelic, with the result still being atelic:

(33) I stocked the shelves for hours.
I restocked the shelves for hours.

Lieber argues that *re-* is instead a quantitative prefix, doing derivationally what verbs like *totter* or *pummel* do intrinsically – that is, creating an iterated action. Further, Lieber points out that *re-* attaches only to verbs whose results are not fixed or permanent. So it does not attach to verbs like *yawn* which have no result, nor will it attach to a verb like *explode* whose result is not reversible.

3.1.4 Quantitative prefixes

English has absorbed a variety of quantitative prefixes from Latin, Greek, and French, including *bi-*, *di-*, *demi-*, *multi-*, *poly-*, and *semi-*. No particular theoretical attention has been paid to these in the literature, so the reader is referred to Marchand (1969) or the OED for historical description.

3.1.5 Verbal prefixes

With the exception of privative *de-*, English has no productive verb-forming prefixes. The prefix *de-* is relatively straightforward, forming privative or ablative verbs from nouns (*delouse, debug, deice, dethrone, deplane*) or from other verbs, often those in *-ize*, *-ify*, or *-ate* (*deregister*, *demilitarize*, *denazify*, *decontaminate*). On nouns, the prefix adds a causative meaning, as well as a privative one: to *delouse* something is to cause it to be without lice. On verbs which are already causative in meaning, e.g., *militarize*, only the privative meaning is added.

According to the OED and Marchand (1969), the prefix *be-* derives historically from the preposition *by*, and attaches to verbs adding a meaning of 'around' or 'all around' (e.g., *bestir*, *besmear*) or by extension an intensive meaning (*bedew*, *becrowd*). It can attach to nouns and adjectives as well, often with causative force (e.g., *befriend*, *befoul*). It is not, however, productive in present day English.

The final verb-forming prefix of English is *en-*, which, like *be-*, is barely if at all productive. It attaches to nouns (*enthrone*, *entomb*) or adjectives (*enrage*, *ennoble*), forming causatives of them; so to *entomb* something is to cause it to go into a tomb, and to *enrage* someone is to cause them to be in a rage.

These three prefixes have principally been of interest in the framework of generative morphology, because they form potential counter-examples to the Right-hand Head Rule of Williams (1981) or its variants (see, for example, Selkirk 1982, Di Sciullo and Williams 1987). The Right-hand Head Rule (RHR) states that it is the rightmost morpheme in a word that determines the category and morphosyntactic properties of that word. This rule accounts nicely for much of English word formation, as suffixes frequently (but not always) determine the category of the derived word (see below), and prefixes most often do not. But it is certainly not a universal rule; as Lieber (1980) points out, some languages like Vietnamese and Tagalog have robustly lefthanded derivation, and even in English there are suffixes that are not category-changing, and of course prefixes like *de-*, *be-*, and *en-* that do appear to determine the category of the resulting word. Granted that only one of these three prefixes has any current productivity, the prefix *de-* still constitutes a problem for the RHR.

One attempt to explain cases such as these can be found in Walinska de Hackbeil (1986), who argues that the prefix *en-* is not a prefix at all, but rather a positional allomorph of the preposition *in*. According to her analysis, the preposition *en-* takes a noun or an adjective as its complement, and a zero affix then forms a verb from the P+N or P+A collocation. While this analysis cannot be dismissed out of hand, it does suffer from a number of defects. First, it forces us to posit a phonologically null affix for which there is no independent evidence. And further, the analysis does not easily extend to *de-* which has no prepositional counterpart, and which indeed is the only one of these three prefixes that is at all productive.

3.2 Suffixation

Suffixation in English has received far more attention in the literature on word formation than prefixation has. It is beyond the scope of this article to cover every suffix in English, or even every suffix listed in Tables 1-2. Here, I will confine myself again either to cohorts of suffixes or semantic groupings that have been widely discussed or raise interesting theoretical questions.

3.2.1 Personal nouns

Suffixes which are used to form personal nouns include *-er* (*writer*, *talker*, *Londoner*), *-ant/-ent* (*accountant*, *claimant*), *-ist* (*guitarist, Marxist*), and *-ee* (*employee*, *nominee*, *biographee*). We will concentrate on the four suffixes above, although *-an/-ian* (*African*, *Australian*) and *-ite* (*Canaanite*, *Stalinite*) might be added to them. This cohort of affixes, and especially *-er* and *-ee* have been much discussed in the literature, both within the generative framework (e.g., Levin and Rappaport 1988, Rappaport Hovav and Levin 1992, Barker 1998, Bauer 1987, Lieber 2004, Booij and Lieber 2004), as well as within Cognitive Grammar (Panther and Thornburg 1998, Ryder 1999) and from a functionalist perspective (Heyvaert 2001). The chief reason for this interest is that this cohort of affixes displays quite a range of polysemy; indeed, the same polysemy is largely replicated in other languages (see Booij 1986 and Booij and Lieber 2004 on Dutch, for example). The range of polysemy of these affixes is illustrated in (34), which is taken from Lieber (2004: 17):[4]

(34)

-er	
agent	writer, driver, thinker, walker
instrument	opener, printer, pager
experiencer	hearer
stimulus	pleaser, thriller
patient/theme	fryer, keeper, looker, sinker, loaner
denominal noun	Londoner, villager, carpetbagger, freighter

[4] There are authors, of course, who consider that the meaning distinctions in affixes like *-er* constitute cases of homonymy rather than polysemy. For example, within Lexeme Morpheme Base Morphology, the agent and instrument readings constitute quite different semantic functions.

measure	fiver
location	diner
-ee	
patient/theme	employee, nominee, deportee
agent/subject	escapee, attendee, standee, arrive, resignee,
indirect object	addressee, dedicatee, offeree
governed preposition	experimentee, laughee, ejectee
no argument	amputee
denominal noun	biographee, mastectomee, asylee, aggressee
-ant/ent	
agent	accountant, claimant, servant
instrument	evacuant, adulterant, irritant
experiencer	dependent, destant, discernant
patient/theme	confidant, insurant, descendant
-ist	
denominal noun	guitarist, Marxist
deadjectival noun	purist, fatalist

Perhaps the most curious part of this pattern of polysemy is that these affixes overlap in meaning: while *-er, -ant/-ent,* and *-ist* most often form personal agent nouns, and *-ee* most often forms patient/theme nouns, not infrequently we find precisely the opposite situation, where *-er* and its cohort form patient nouns and *-ee* agent or at least subject-oriented nouns. Ryder (1999) gives a wealth of data on *-er* that shows that patient forms in *-er* are not just lexicalized oddities, but rather are formed with surprising productivity in present day English. Barker (1998) shows as well that agent or subject forms in *-ee* are not infrequent either. The question then arises why such overlap should exist.

A number of analyses have been proposed in recent years which address parts of this problem. Probably best known is the analysis of Rappaport Hovav and Levin (1992), which is similar in many ways to Booij's (1986) analysis of Dutch facts. They suggest that much of the behavior of *-er* can be explained by saying that *-er* binds the external argument of a verb, therefore taking on whatever thematic role the external argument can carry. This analysis accounts nicely for agentives, of course, and for instrument nouns in *-er*. Some of the patient/theme *-er* forms can be analyzed as deriving from middle forms of the base verb, where the external argument bears the patient role: for example, *sinker = This ship sinks easily*. But not all *-er* forms can be explained this way; some patient *-er* forms like *looker* are not easily related to middles, and noun-based *-er* forms are neglected as well.

Heyvaerts (2001) uses a functionalist approach in her analysis of *-er*. She argues (2001: 7) that nouns in *-er* "realize an active, passive or middle voice relationship between an entity and a process," and that *-er* forms function as subjects: "like Subjects, *-er* nominals will be argued to profile entities that are *speech functionally*, rather than causally responsible for *instantiating* the process type specification that

is realized by the verb [emphasis in original].” In many ways, this analysis is close to that of Rappaport and Levin (1992); Heyvaerts is concerned only with deverbal *-er* forms, however, and does not try to extend her analysis to denominal forms.

Ryder (1999), in contrast, attempts to account for the full range of *-er* data. Working within the framework of Cognitive Grammar, Ryder (1999: 278) has suggested that the breadth of usage for the *-er* suffix stems from a lack of inherent semantic content for the affix, “which in Present-day English indicates only that the whole word is a noun.” The suffix refers to the event-schemas evoked by its base, and the narrower the range of event schemas evoked by its base, the likelier the *-er* form is to be interpretable. Since verbs evoke a narrower range of event schemas than nouns, nouns a narrower range than adjectives, and so on, the suffix is more likely to attach to verbs than to other categories. As for the preference of *-er* for creating agent, as opposed to patient or other types of nouns, Ryder assumes that the referent of the *-er* noun is constrained by two things, the ‘salience’ of the referent (“the degree to which something is noticeable in comparison with its surroundings” (1999: 285)), and its ‘identifiability’ (“the extent to which a participant is readily identifiable by mention of the event alone” (1999: 285)). Unless overridden by context, agents are more salient and identifiable than patients. Ryder’s analysis is comprehensive, but its reliance on vague notions like salience and identifiability reduces its appeal.

The suffix *-ee* has received somewhat less attention in the theoretical literature, but the analysis of Barker (1998) is both thorough and insightful.[5] Like Rappaport Hovav and Levin (1992) on *-er*, Barker argues that *-ee* binds an argument of its base. Unlike them, he argues that the conditions on the binding of the argument are semantic, rather than argument-structural: the argument that *-ee* binds must be ‘episodically linked’ to the verb (it must be a participant in the event denoted by the verb), and it must be sentient, but not volitional. Generally, the argument that is bound, then, is the patient/theme, as it generally is this argument that lacks volitionality (for example, in the verb *employ*). But if the patient/theme argument is nonsentient, another argument can suit as well, just as long as it fulfils the requirements of sentience and non-volitionality. So with a verb like *address*, the *-ee* form denotes the recipient, rather than the patient/theme. And if there is no patient/theme argument, a subject argument can be bound, as long as it is not too volitional (*standee*, *escapee*). Nouns can function as bases if they have some sort of eventive meaning.

Lieber (2004) is an attempt to account for the full range of polysemy in this cohort of affixes, and to make sense of them in relation to one another. Building on the analyses of Rappaport Hovav and Levin (1992) and Barker (1998), and using a framework of lexical semantic analysis that attributes broad semantic content to affixes, Lieber suggests that all affixes in this cohort form concrete processual nouns; that is, in her system, they bear the semantic features [+material, dynamic] (cf. section 1.4 above). The affixes differ from one another, however, in their argument-binding properties. The suffix *-er* (as well as *-ant/-ent*) binds the highest argument of its base, whatever the semantic characteristics of that argument. The

[5] See also Bauer (1987, 1993) for useful data.

suffix *-ee* binds the first argument that is sentient but nonvolitional. The suffix *-ist* attaches only to nouns and adjectives, and it binds the first *volitional* argument of its base. The fact that *-er* and *-ant/-ent* denote concrete nouns without specifying volitionality accounts for their ability to create instrument as well as agent nouns. The fact that all of these affixes bear semantic content accounts for the processual nature of the resulting words, even when they attach to non-verbal bases. And the fact that their argument-binding properties are not always mutually exclusive accounts for their occasional overlap in meaning: if the highest argument of a verb is sufficiently nonvolitional, either *-ee* or *-er* can attach, giving rise to doublets like *escapee* and *escaper,* both attested in a piece about an escape from a WWII prisoner-of-war camp in which the planners are referred to as the *escapers*, and the accompanying prisoners as the *escapees* (Lieber 2004: 66).

Booij and Lieber (2004) push this analysis a bit further, by analyzing difficult cases such as *loaner* and *keeper* as paradigmatic extensions of *-er* forms. They point out that English lacks a dedicated affix which forms nouns meaning 'thing which one Xes', that is, a concrete, theme-oriented thing noun. The suffix *-ee* is usually theme-oriented, by virtue of seeking to bind a nonvolitional argument, but because of its requirement of sentience for this argument, it cannot form thing-nouns as *-er* can. What happens, Booij and Lieber argue, is that given a real-world need for a word which designates a 'thing which one Xes', speakers will extend the use of the closest productive affix in coining a word. As *-er* is productive and has no requirement of sentience on its associated argument, it fits the bill best, and therefore words like *loaner* and *keeper* can be coined, although clearly only under pragmatic pressure, that is, the real-world need to coin a word to fit a special situation.

3.2.2 Abstract nouns

Among these affixes are the nominalizers *-al* (*refusal*), *-ance/-ence* (*admittance*), *-ation* (and its allomorphs) (*restoration*), *-ment* (*amusement*), and *-ure* (*closure*), all of which attach to verbs; the affixes *-ity* (*similarity*) and *-ness* (*happiness*) which attach to adjectives; and the affixes *-dom* (*kingdom*), *-hood* (*knighthood*) and *-ship* (*kinship*), which attach to nouns. I will touch upon each of these cohorts in turn.

Deverbal nominalizers

The deverbal nominalizers *-al*, *-ance*, *-ation*, *-ment*, and *-ure* all form abstract nouns from verbs. In Beard's (1995) terms, they in fact are alternative phonological manifestations of the same morphological relationship; all are transposers of nouns to verbs. In semantic terms, a significant number of nominalizations formed with these suffixes have lexicalized meanings: a *transmission* is a part of a car, a *development* can be a group of new houses, and so on. Nevertheless, compositional meanings are also frequent and with them individual formations can often have both a result meaning (e.g., *a long examination*) and a process/event meaning (*the doctor's examination of the patient*). Much of the theoretical discussion surrounding these affixes has concerned the relationship between these semantic nuances and the syntactic behavior of nominalizing affixes.

This cohort of suffixes also bears the distinction of being the motivating force behind the birth of generative morphology in the mid-seventies. In some of the earliest work on word formation in the generative tradition. Lees (1961) generated derived nominals transformationally; a noun like *destruction* would have been generated via a series of transformations from a sentential deep structure something like *The Romans destroyed the city*. In response to such analyses, Chomsky (1970) in 'Remarks on Nominalizations' argues that nominalizations like *destruction, transmission,* and *refusal* are idiosyncratic in meaning, and that the suffixes which derive them attach only to selected verbs. Given their lack of full productivity and tendency towards noncompositional meaning, such forms should not be generated via syntactic rule. (See chapters by Roeper, and Scalise and Guevara, this volume.)

A principal motivation for the transformational analysis of nominalizations had been the resemblance between the arguments manifested by the derived nouns and their corresponding verbs. It has long been noted that derived nouns frequently exhibit the same argument structure as their base verbs; however, the argument structures of derived nouns are always optional, even where the arguments of the corresponding verb are obligatory (Booij and van Haaften 1988, Grimshaw 1990, among others):

(35) a. The enemy destroyed the city.
b. *The enemy destroyed.
c. The enemy's destruction of the city.
d. The destruction of the enemy.
e. The enemy's destruction.
f. The destruction.

The question then arises within current theoretical frameworks what the proper analysis is for these correspondences. The facts are notoriously complex. First, it appears that neither 'subject' nor 'object' argument is obligatory in this cohort of derived nouns. Both arguments can, of course, be present, as in (35c). But it is also possible for only one of the arguments to appear, with either 'subject' or 'object' interpretation being available for the single argument; so in (35e), *the enemy's destruction* can either be interpreted as the enemy doing the destroying, or being destroyed, as can (35d) *the destruction of the enemy*.

Further, it was pointed out at least as early as M. Anderson (1979), that only 'affected' object arguments can appear in the possessive position of the noun phrase. So whereas *the city's destruction* is fine (where *city* is an affected object), **the book's discussion* is not. In the latter case, the object is not affected by the action. See Comrie and Thompson (1985), Zubizaretta (1987), and Zubizaretta and van Haaften (1988) for discussion. To my knowledge, although these facts have been noted, no satisfactory explanation has been offered to date.

What has been prominent in the literature has been the attempt to explain the variant compositional interpretations of the deverbal nominalizations. Grimshaw (1990) attempts to link interpretation to the presence or absence of arguments. With all arguments expressed, for example, abstract nominalizations have what Grimshaw (1990: 45) calls the 'complex event' interpretation (otherwise referred to as the

'process' or 'event' reading); this is the interpretation of (35c). With arguments missing or completely absent, only a result interpretation is available. She argues that only complex event nominals inherit and project the argument structures of their base verbs; other argument-like interpretations that one finds in result or simple event nominalizations (like the simplex noun *trip*) arise from *Lexical Conceptual Structure* rather than from syntactic argument structure. In contrast, Bierwisch (1989: 38-39), discussing similar issues in German, argues that nominalizations always inherit the argument structures of their base verbs; the alternation between event and result readings is not to be attributed to presence or absence of argument structure, but rather to an "overall phenomenon of polysemy" that is exhibited in simplex lexical items as well. See Booij and van Haaften (1988) and Lieber and Baayen (1999), and Harley and Noyer (2000) for other views.

More recently, there has been a move to return to a syntactic analysis of deverbal nominalizations. Fu, Roeper, and Borer (2001) argue on the basis of facts such as those in (36) that there must be a VP projection inside the nominal projection of derived nominals:

(36) a. The occurrence of the accident suddenly
b. Sue's exploration of Easter Island was impressive, then Amy's doing so was a real surprise.

The verbal base is generated as head of a VP projection and then raises to adjoin to the nominalizing affix. The presence of the VP projection explains, they say, the possibility of using VP adverbs like *suddenly* or proforms like *do so* with event nominalizations like those above, but not with simplex event nominals. It remains to be seen whether this is the last word in the analysis of nominalizations, or whether a semantic analysis of these facts can be motivated.

This cohort of affixes has also been of interest from the point of view of productivity: individual affixes vary widely in their productivity in present day English, with various morphological, etymological, and phonological factors entering into their productivity vis a vis one another. Bauer (2001: 180) argues on the basis of a number of measures that the abstract nominalizing suffixes *-al, -ance/-ence*, and *-ure* have all had periods of productivity in the history of English, but that they are no longer productive in present day English. The suffix *-ment* still has some degree of productivity, and most productive of all is *-ation* (and its various allomorphs); as Plag (1999) points out, one reason for the productivity of *-ation* is that it is the exclusive nominalizer of verbs formed with *-ize* and *-ify*, both of which are reasonably productive in present day English.[6] Plag (1999) generally gives an insightful analysis of the way in which this cohort of affixes divides up the range of available bases. For example, it follows from the observation that verbs derived with suffixes *-ate, -ize,* and *-ify* are nominalized using *-ation* (or one of its allomorphs) that the remaining affixes are restricted to simplex bases. Of these, *-al* and *-ance/-ence* are confined for the most part to simplex verbs which have final stress (e.g., *refusal*, *attendance*). The suffix *-ment* as well favors disyllabic bases with final

[6] This, of course, is a good example of potentiation.

stress (e.g., *amusement*), although this is a tendency rather than a hard and fast restriction. The suffix *-ment* also favors prefixed bases, especially those prefixed with *en-* (*endearment*), and to a lesser extent *dis-* (*disfigurement*). The suffix *-ation* and its allomorphs attach to simplex bases as well, but almost exclusively to Latinate ones.

Deadjectival nominalizers

Although Riddle (1985) attempts to question whether the deadjectival nominalizers *-ness* and *-ity* are in fact synonymous, they are most frequently treated as a rival pair. They have been discussed in the generative literature primarily as test cases for various theories of productivity. Generally speaking, it is clear that *-ness* is highly productive and gives rise to forms which are compositional in meaning. The suffix *-ity* is less productive, although it has a measure of productivity in some domains, attaching to Latinate bases, and especially to those ending in the suffixes *-ic* and *-ile.* In contrast, *-ness* attaches freely either to native or to Latinate bases.

The main interest in this pair is that they divide up the range of certain Latinate-suffixed forms in an interesting way. Aronoff (1976: 37-45) notes that both *-ness* and *-ity* can attach to bases ending in the suffix *-ous*. Forms in *-ousness* are more predictable in meaning than those in *-osity*; the latter frequently have lexicalized meanings. Aronoff correlates the productivity of *-ness* in this domain with the transparency of meaning, and hypothesizes that forms in *-ousness* are not listed in the mental lexicon, whereas forms in *-(os)ity* frequently are. Listing allows semantic drift to take place. Forms in *-(os)ity* are blocked, however, if a simplex abstract noun exists (e.g., *glory ~ glorious*, but **gloriosity*); since items in *–ness* are not listed, blocking cannot occur, and therefore nothing rules out *gloriousness* as a possible word alongside *glory*. Aronoff also shows that adjectives which end in *-acious* always take *-ity* (*veracious ~ veracity, capacious ~ capacity*), and are rarely lexicalized in meaning, whereas adjectives in *-ulous* are less productive with *-ity*, and less regular in meaning (e.g, *credulous ~ credulity* but *meticulous ~ meticulousness*). Further discussion of the productivity of these suffixes can be found in Romaine (1983) and Bauer (2001).

Denominal nominalizers

The suffixes *-dom, -hood,* and *-ship* attach to nouns and form nouns. Although largely neglected in the generative literature, these suffixes have received increased attention in recent years as generative morphologists have turned their interest to semantic constraints on affixation. For example, Aronoff and Cho (2001) propose that *-ship* and *-hood* differ in the semantic class of base nouns to which they attach: *-ship*, they claim, attaches only to stage-level nouns (that is, those that denote temporary characteristics of their referents), while *-hood* can attach either to stage- or individual-level nouns. So words like *friendship* are possible, they claim, but **parentship* are not. Lieber (2004) argues against this constraint, however, citing words like *kinship, uncleship,* and *twinship*, all listed in Lehnert (1971), and all presumably based on individual-level nouns.

Plag (1999) suggests a more general restriction on the attachment of *-hood*. Discussing this suffix, he proposes that abstract-noun-forming suffixes should not attach to already abstract nouns. This appears generally to be true of *-hood*; we find forms like *puppyhood* but not *gloryhood*.

3.2.3 Verb-forming suffixes

English has several verb-forming suffixes: *-ize* and *-ify* are the most productive, both forming verbs from nouns and adjectives. The suffix *-ate* is less productive, often attaching to roots of indeterminate category, but also to nouns and adjectives. The deadjectival verb-forming suffix *-en* is rather unproductive, according to Plag (1999), attaching predominantly to adjectives, although it does appear on some nouns in *-th*:

(37)

	on N	on A	on root
-ize	unionize	legalize	evangelize
-ify	personify	purify	magnify
-ate	oxygenate	activate	vaccinate
-en	lengthen	blacken	

The productive affixes have been of some interest over the years, both because of their semantic and argument-structural properties, and because of morphological and phonological restrictions on their use.

Of primary interest has been the complex polysemy shared by this cohort of suffixes. Indeed, Beard (1995) treats *-ize* and *-ify* as realizations of the same transposition, along with noun to verb conversion. Detailed semantic analyses can be found in Lieber (1998) for *-ize*, Plag (1999) for all three productive suffixes, and Lieber (2004) for *-ize* and *-ify*. In all of these works, an effort is made first to untangle the semantic nuances of the suffixes, and then to examine the extent to which they can be said to have a unitary core of meaning. Lieber (2004: 77) illustrates the variety of meanings found with *–ize* and *–ify* as follows:

(38) *-ize*

	(Plag's terminology)	
'make x,' 'cause to become x'	causative	*standardize, velarize*
	resultative	*crystallize, unionize*
'make x go to/in/on something'	ornative	*apologize, texturize*
'make something go to/in/on x'	locative	*hospitalize, containerize*
'do/act/make in the manner of	similative	*Boswellize, despotize*

or like x'		
'do x'	performative	*philosophize, theorize*
"become x"	inchoative	*oxidize, aerosolize*

(39) *-ify* (Plag's terminology)

'make x,' 'cause to become x'	causative resultative	*purify, acidify* *yuppify*
'make x go to/in/on something'	ornative	*glorify*
'make something go to/in/on x'	locative	*syllabify, codify*
'do x'	performative	*speechify, boozify*
'do/act/make in the manner of or like x'	similative	no examples
'become x'	inchoative	*acidify, calcify*

Lieber (2004) does not discuss the semantics of *-ate*, but Plag (1999: 205) characterizes productive *-ate* formations as either ornative (e.g., *fluoridate* = cause fluoride to go into something) or resultative (e.g., *gelate* = to cause to become gel).

Plag and Lieber are generally agreed that at the core of the semantic representation of *-ize* and *-ify* is a causative frame, which Plag, using Jackendovian (1990) Lexical Conceptual Structures (LCSs) represents as in (40) (1999: 79):

(40) $\underline{\text{CAUSE}}$ ([ ]$_i$, [GO ([$_{\text{Property, Thing}}$]$_{\text{Theme/Base}}$; [TO [$_{\text{Property,Thing}}$]$_{\text{Base/Theme}}$])])

The causative or resultative meaning arises when the base noun or adjective is linked to the lowest open argument position (so *standardize* is decomposed to 'cause something to go to standard'). The ornative meaning results when the base is linked to the argument of GO (so *glorify* is decomposed as 'cause glory to go to something'). Inchoatives are dealt with by making the outer CAUSE argument optional, represented by underlining in (40). Plag attempts further to derive what he calls the performative and similative meanings of *-ize* verbs from the same LCS. While this is a plausible enough analysis of a similative like *Marxize* (which Plag decomposes as 'cause the doctrines of Marx to go to something'), Lieber (2004) argues that it is less plausible for performatives like *despotize* or *hooliganize*, which are not easily interpretable as causatives (*despotize* cannot be said to mean 'cause a despot to go to something' or 'cause something to go to a despot').

Lieber (2004), using her own framework of lexical semantic representation (see above), suggests the representation in (41):

(41) [+dynamic ([$_{\text{volitional - i}}$], [$_{j}$])] ; [+dynamic ([$_{i}$], [+dynamic, +IEPS ([$_{j}$], [+Loc ([ ])])]), <base>]

Lieber assumes the bipartite analysis of causatives argued for by Dowty (1979), Levin and Rappaport Hovav (1995), Rappaport Hovav and Levin (1998), Levin (1999); in such an analysis, causatives are broken down into two subevents which might be glossed as 'x does y' such that 'x causes y to become/go to z'. In Lieber's representation [+dynamic] represents an eventive function, [+dynamic, +IEPS][7] a change of state or position function, and [+LOC] a locational function. The causative, resultative, and ornative *-ize* and *-ify* verbs are dealt with much as in Plag (1999): for the first two, the base is linked to the [+LOC] argument, and the latter to the [+dynamic, +IEPS] argument. As in Plag, the inchoative *-ize* and *-ify* verbs are dealt with by making the causative function optional.

Unlike Plag, Lieber assumes that the performatives and similatives lie outside of the core of meaning for this cohort of suffixes, arising as a sense extension from that core. Specifically, she proposes that the similative and performatives arise when the second of the two subevents in the semantic representation of these affixes is dropped, leaving only the first subevent, the one that can be glossed roughly as 'x do y'. So a performative like *anthropologize* can be analyzed as 'x do anthropology' and a similative like *Boswellize* as 'x do like Boswell'. Lieber argues that because sense extensions are outside the core of the affixal meaning, forms with these meanings should occur less frequently than the core causative, resultative, and ornative meanings. This is certainly the case: for *-ize* forms there are few performatives and similatives; for *-ify* there are only a couple of performatives and no similatives; and for *-ate* there are neither.

The cohort of verb-forming suffixes in English has also been of interest because of the relatively intricate way in which they divide up the range of available nominal and adjectival bases. Kjellmer (2001), who looks only at the conditions on attaching verb-forming suffixes to adjectives, notes that *-ize* and *-ify* generally avoid attaching to complex adjectival bases, except for those ending in *-al*, *-ic*, and *-ian*. They are thoroughly averse to attaching to adjectives ending in native adjective-forming suffixes like *-ish* or *-y*, an observation which Aronoff and Fuhrhop (2002) would likely attribute to their Monosuffix Constraint (see section 2 above, and Bauer, this volume).

There are far more intricate phonological constraints on the attachment of these affixes, however, and a long literature trying to explain them. Plag (1999) gives an excellent history of this debate, citing both derivational analyses (Gussmann 1987, Schneider 1987, and Kettemann 1988), and constraint-based analyses (Raffelsiefen 1996). He proposes his own analysis of *-ize,* as well as the other verbalizing suffixes, couched within Optimality Theory. Orgun and Sprouse (1999) give a brief Optimality Theoretic analysis of *-ize* as well. I will not review the entire debate here, but briefly summarize what seem to be the main phonological constraints on the

[7] The feature [IEPS] stands for 'Inferable Eventual Position or State' and designates a path component of meaning. With the positive value, the feature signals the presence of a directed path. See Lieber and Baayen (1997) for explanation.

attachment of the productive verbalizing suffixes, basing this summary on Plag's excellent and detailed account.

Plag concurs with Raffelsiefen (1996) that *-ize* generally prefers consonant-final disyllabic bases with a trochaic stress pattern (e.g., *standard*). He points out, however, that the constraints on the attachment of this suffix are far more complex. Specifically, he notes that *-ize* can sometimes attach to vowel-final bases, as long as they are trochees (so *heroize* is possible but *memoryize* is not). Further, stress lapses (that is, sequences of two unstressed syllables) occur in *-ize* forms "only if a consonant precedes *-ize*" (so *federalize* is possible, but *memoryize* is not) (1999: 160), and only if the coda and onset of the final syllable of the base are different (so *federalize* is possible, but *femininize* is not) (1999: 164). Finally, *-ize* cannot attach to a schwa-final stem (so *patinaize* is impossible). Plag uses Optimality Theory to produce an analysis which goes a long way towards accounting for these intricate facts.

Further, Plag sets his account in the context of the rival verb-forming suffixes *-ify* and *-ate*, showing how they carve up the existing phonological territory of base nouns and adjectives rather nicely. Citing Mahn (1971), Gussmann (1987), and Schneider (1987) as previous accounts, he shows that *-ify* prefers bases with final stress, either monosyllabic or disyllabic with an iambic stress pattern. It will attach to bases ending in *-y* if that segment is deleted (*beautify*). Stress shift occurs only rarely (*syllabify*). Plag in fact proposes that *-ize* and *-ify* are phonologically conditioned allomorphs, essentially in a relationship of complementary distribution with each other (1999: 197). The suffix *-ate* on the other hand, behaves very much as *-ize* does, except that *-ate* allows for the truncation of stem-final consonants as well as vowels (e.g., *alluviate* ~ *alluvium* (1999: 214). Again, Plag accounts for these facts elegantly in the framework of Optimality Theory.

3.2.4 Adjective-forming suffixes

English has a wide variety of suffixes that create adjectives of various sorts. By far the majority of them are Latinate in origin. We will treat denominal and deverbal adjective-forming suffixes separately.

Denominal adjectives

Among the suffixes that create adjectives from nouns are *-al*, *-ed*, *-ed*, *-esque*, *-ful*, *-ic*, *-ish*, *-less*, *-ly*, *-ous*, *-some*, and *-y*:

(42)

-al	accidental, global
-ed	bearded, blue-eyed
-en	wooden, leaden
-esque	Kafkaesque, statuesque
-ful	shameful, tactful
-ic	historic, athletic
-ish	wolfish, childish
-less	shoeless, treeless

-ly	friendly, shapely
-ous	monstrous, poisonous
-some	toothsome, quarrelsome
-y	fruity, sandy

These vary in productivity from the privative *-less*, which is highly productive, to *-some* and *-en*, which are quite unproductive in present day English. These suffixes have received a fair amount of attention in the literature. They have been deployed in arguments concerning the overall architecture of the theory of word formation (e.g., Beard 1995, Spencer 1999), and examined with regard both to their semantic properties (Gorska 1984, Slotkin 1990, Hudson 1975, Ljung 1970, 1976, Beard 1976, 1991,1993, 1995), and their phonological properties, the latter especially within the theory of Lexical Phonology and Morphology. We start with semantic issues.

Beard (1991) studies the difference between relational (RAdj) and qualitative (QAdj) adjectives. Relational adjectives are distinguished by the fact that they do not occur predicatively, and cannot be modified with 'very' or 'more': so a *nuclear physicist* is not (under the most obvious reading) a physicist who is nuclear, nor can something be *very nuclear* or *more nuclear*. A typical qualitative adjective, on the other hand, can occur in those contexts: so in a phrase like *a minty taste*, *minty* can occur predicatively (*the taste is minty*) and can be modified by *very* or *more*. Although the point of this article is to show how a class of so-called bracketing paradoxes can be treated as matters of scope within a semantic analysis of attribute-head phrases (e.g., *nuclear physicist*, *structural linguist*), Beard is careful to point out that some denominal adjectives are subject to both the relational and qualitative reading and that the 'bracketing paradox' can occur with either reading; so for example, with the qualitative meaning, a *criminal lawyer* can be a lawyer who commits crimes or a person who specializes in laws which are criminal (they never should have been passed), the latter being one of the bracketing paradox readings. With the relational meaning, a *criminal lawyer* is some one who practices criminal law, the predominant bracketing paradox meaning.

The distinction between RAdjs and QAdjs is thus orthogonal to the problem of those bracketing paradoxes which arise with denominal adjectives. Beard solves this problem by appealing to a decompositional semantic representation. The difference in reading (and hence the perception of a bracketing paradox) arises because the adjectival meaning can combine with the meaning of the head noun in different ways; according to Beard (in an analysis prefigured by Marchand (1966)), if an adjective is qualitative, it combines as a predicate with some semantic feature of its nominal head; relational adjectives, in contrast, "after selecting the feature of the head noun they wish to compose with, serve as an argument, not predicate, of that feature" (1991: 220).

Although to my knowledge this issue has never been addressed in the literature, it is interesting to consider whether any denominal adjective can be qualitative or relational, that is, whether there is no affix which is limited to one meaning rather than the other. My (perhaps unsystematic) impression is that some affixes favor one reading or the other. The suffix *-al* and seems to favor relational meanings

(*architectural*, *alkaloidal*, *ancestral*, *diphthonal*), although qualitative readings are also possible (*criminal* is an example with both). The suffix *-ic* allows either reading fairly easily. Suffixes like *-ed*, *-esque*, *-ish*, *-ous*, *-some*, and *-y*, on the other hand, seem to me to produce almost exclusively qualitative readings.

Another issue regarding denominal adjectives concerns the interpretation of adjectives formed with the privative suffix *-less* and the suffix or combining form *-free*. Both Gorska (1984) and Slotkin (1990) note that derived forms with *-less* frequently have negative connotations, whereas forms with *-free* have a positive connotation; for example, describing a soft drink as *sugarless* suggests that sugar would have been welcome, whereas describing it as *sugarfree* suggests that the absence of sugar is a positive attribute. Gorska (1984) provides an analysis within the framework of Cognitive Linguistics that derives the negative connotation of *–less* forms from a connection with a metaphor of bodily possession (one generally does not want to be *legless* or *headless*), whereas more positive connotation of *-free* stem from a connection to a metaphor of possession over which an actor has control.

Another semantic issue that has received some attention is the combination of the suffix *–ed* with nouns of alienable or inalienable possession. Hudson (1975) notes that there seems to be a restriction on the attachment of *-ed*: it is only partly productive on single nouns (e.g., *bearded* but **legged*, **eyed*), but very productive on premodified phrases (e.g. *white-bearded*, *one-legged*, *blue-eyed*). Within the transformational framework that Hudson assumes, it is hard to see why there would be a difference in productivity: either way, the *-ed* form is derived from a sentence like *the child has eyes/blue eyes*. Further, *-ed* always designates inalienable possession, so *a bearded man* or *a red-roofed house* are good, but *a carred man* or *a green leafed path* are not. Ljung (1976) responds to these questions by teasing apart several different aspects of inalienable possession, as well as pragmatic constraints on the creation of *-ed* nouns, for example, that it would be pointless to coin the word *eyed* in a phrase *an eyed child* because all children have eyes, and the word would therefore not convey useful information. The issue of alienable and inalienable possession and its relationship to word formation is one which has not been revisited in recent years, but probably should be, in light of recent progress in lexical semantics.

The group of affixes which creates qualitative affixes (e.g., *-ly*, *-ed*, *-y*, *-ful*, *-ic*, *-ish*, *-ous*) has also figured in discussions of the architecture of morphology. Beard (1976, 1991, 1993, 1995), for example, discusses this cohort of denominal adjective-forming suffixes as another which supports his separation hypothesis. He points out that many of the relevant suffixes can carry two meanings, namely [X POSSESS Y] and [X SIMILAR Y]. So, for example, the adjective *sandy* can denote possession in a phrase like *a sandy beach*, but likeness in appearance in *sandy hair*. In English at least adjective-forming suffixes can generally carry either meaning. Beard suggests that the uniform semantics of this group of affixes supports the idea that adjectives are formed by a single rule of transposition, with particular affixes being matched with particular stems in a separate component of the morphology.

Beard (1993) complicates this picture somewhat by contrasting the situation in English with a number of other languages in which the possessional and the similtudinal adjective-forming function can be split between separate affixes. For

these languages, he suggests that two separate rules are needed, each providing a different semantic representation. He suggests that the situation in English supports what he calls a dual derivational route, where denominal adjectives can be formed either by transposition which merely involves category change, or by the addition of semantic material to a nominal base. See also Beard and Volpe (this volume).

Spencer (1999) is concerned with relational adjectives in English. He argues that relational adjectives are cases of pure transposition, and suggests that they be formed by adding an A argument (for the semantic function of 'attribute') which demotes the R (referential) argument of a base noun.

Finally, this cohort of affixes has been of some interest in discussions of morphophonology. Perhaps because there are so many denominal adjective-forming suffixes in English, they can be divided relatively neatly into those that are Latinate (*-al*, *-ic*, *-ous*, *-esque*) and those that are native (*-ful*, *-less*, *-ly*, *-ish*, *-en*, *-ed*, *-y*, *-some*). The former tend to have stress and phonological effects on their bases, whereas the latter do not. This division figured prominently in the theory of generative phonology at least from the time of SPE (Chomsky and Halle 1968), and formed the basis of the theory of Lexical Phonology and Morphology (Siegel 1974, Allen 1978, Kiparsky 1982, Mohanan 1986). It was of importance as well as in Selkirk's (1982) framework, where the former are added by root-level word structure rules, and the latter by word-level rules.

Although it is obvious that this cohort of affixes has received attention over the years, that attention has been somewhat fragmentary, most often concentrating on a few affixes at a time. The time seems ripe for a reconsideration of this group in light of recent theoretical developments.

Deverbal adjectives

Among the suffixes forming adjectives from verbs are *-able, -ive*, and *-ory*. The suffix *-ful* occasionally attaches to verbs, but this is not productive.

(43)	-able	washable, trainable, commendable, operable
	-ive	persuasive, inductive, decorative, coercive
	-ory	condemnatory, investigatory, contradictory

The first of these has received the most attention.

With respect to the phonology of *-able*, classic study is Aronoff's (1976) treatment in which he argues that this formative is in fact two separate suffixes. Using the notation and terminology of SPE (Chomsky and Halle 1968), he assigns one version of *-able* a '+' boundary; this is the suffix that attaches to roots, has phonological and stress effects when attached, and is frequently lexicalized. The other *–able* attaches to words, does not affect stress or segmental phonology, and gives rise to semantically transparent formations. Aronoff assigns this suffix a '#' boundary. It seems safe to say that this analysis is an artefact of the time in which it was written. It was superceded early on by one in which the suffix could attach either at the Root or Word level (Selkirk 1982), or in an update of the framework of Lexical Phonology and Morphology in which *-able* could be either a Level 1 or a

Level 2 suffix (see Giegerich 1999: 22). As Giegerich points out, it makes little sense to treat *-able* as two different affixes, given the semantic similarity between the Level 1 and Level 2 versions; rather it should be seen as a single affix with dual level membership.

Plag (1999: 79-80) discusses the phonological restrictions on the attachment of other suffixes which derive adjectives from verbs: to the extent that *-ful* attaches to verbs, it favors verbs of one syllable (*hopeful*) or of two syllables with final stress *(regretful*). The suffix *-ory* can attach only to Latinate consonant-final verb stems; *-ive* is even more restrictive, attaching to Latinate stems which end in /d/, /t/, or /s/.

With regard to syntax and semantics, the suffix *-able* has also figured prominently. Williams (1981) proposes that part of the rule which attaches this suffix affects the argument structure of the base verb such that the internal argument of the verb is externalized; so the object of a verb like *wash* (*He washed the shirt*) becomes the subject or external argument of the *-able* form (*This shirt is washable*). Roeper and van Hout (1999) argue for a syntactic derivation of forms in *-able*. They show first that these derivations have a passive interpretation, and then argue for a derivation in which *-able* is an adjective in a full AP projection which takes a VP as its complement. The VP then undergoes a passive-like operation which dethematizes the agent and allows the theme to raise to the specifier of the VP. The verb then raises to adjoin to the affix. As evidence for this analysis they claim that when forms in *-able* are further nominalized with the suffix *-ity*, they obey Burzio's generalization (i.e. that when the agent role of a verb is eliminated, the verb can also no longer assign case to its object). Their evidence for this claim is unclear, however, as nouns never assign case and the preposition *of* is always required as a case marker for complements of N.

The suffixes *-ive*, *-ory*, and *-ant* form relational adjectives. To my knowledge there have been no special treatments of their syntax or semantics in the literature. Marchand (1969: 316) notes that forms in *-ive* are often paralleled by nominals in *-ation*: *explosive ~ explosion*, *decorative ~ decoration*, and so on.

3.2.5 Collectives

The final cohort of suffixes I will treat here are the suffixes *-age* and *-ery*, which at first glance create abstract nouns on the basis of noun stems. In fact, this pair of affixes displays a complex pattern of polysemy which is discussed in detail in Lieber (2004). As noted by Marchand (1969), both of these affixes give rise to some forms which are collective, some which are place nouns, and some which might be glossed as 'behavior characteristic of' (examples from Lieber 2004: 148):

(44)

-ery	collectives: peasantry, tenantry, jewelry, machinery, crockery place nouns: eatery, brewery, nunnery, piggery, fishery behavior characteristic of: snobbery, prudery, savagery
-age	collectives: baggage, wreckage, poundage, plumage place nouns: orphanage, parsonage, hermitage behavior characteristic of: brigandage

Lieber (2004: 149) argues that the central meaning of these suffixes is the collective one: when they attach to singular count nouns like *peasant* or *jewel* they change the quantitative class of those nouns. The 'behavior characteristic of' meaning follows fairly straightforwardly from this central meaning if we assume that "they are formed on a particular type of nominal base – names for types of people, often derogatory ones – and if we assume further that those base nouns come to be construed metonymically." In other words a base like *snob* is taken as a metonym for *behavior of snobs*, and attachment of *-ery* then adds a collective meaning '*all those things that snobs do*'. The 'place' meaning arises from a different sort of sense extension from the collective meaning. It has frequently been pointed out that there is a common sense extension in the opposite direction from 'place' to 'collective' (e.g., Apresjan 1974, Nunberg 1996): in a sentence like *Seattle voted Democratic* the place name *Seattle* is taken to mean the collectivity of people in Seattle. Lieber (2004) suggests that this common sense extension can go in the opposite direction as well. From *swannery* as a collective of swans, we get the sense extension 'place where collective of swans is gathered'. What is interesting about the polysemy of these suffixes is that they exhibit exactly the same polysemy, suggesting that these sense extensions are natural ones.

3.3 Conclusion

There are obviously many prefixes and suffixes that I have not treated here. I have tried, however, to touch on most of the groups of affixes that have received attention in the word formation literature of the last forty years either because of their phonological , syntactic, or semantic properties. Obviously, there is still a great deal of research left to be done.

4. CONVERSION

Conversion – at least in analytical languages like English – is the process by which lexical items change category without any concomitant change in form. It has also been known in the literature as zero-derivation and functional shift (cf. Don 1993). In English, conversion is a particularly productive process: nouns frequently become verbs (*Google ~ to google*) and vice versa (*to throw ~ a throw*). Occasionally adjectives become verbs as well (*cool ~ to cool*). Conversion has been a subject of much discussion in the literature on word formation both from the standpoint of the nature of the morphological process involved and its relationship to affixation, and from the point of view of its semantics. In fact, one might view conversion as a sort of battleground over which various theoretical camps have fought over the years. Much of the history of conversion analyses up to the early 1990's can be found in Don (1993), so I will only briefly summarize here.

Marchand (1969) analyzes conversion as zero-derivation, that is, the addition of a phonologically null affix to a stem. His motivation is that the effects of conversion frequently seem to parallel that of overt affixation (1969: 359):

> If we compare such derivatives as *legalize, nationalize, sterilize* with vbs like *clean, dirty, tidy*, we note that the syntactic-semantic pattern in both is the same: the adjectives are transposed into the category 'verb' with the meaning 'make, render clean, dirty, tidy' and 'make, render legal, national, sterile' respectively. In the *legalize*-group, the content element is expressed by the overt morpheme *-ize* while in the *clean*-group the same content element has no counterpart in phonic expression. As a sign is a two facet linguistic entity, we say that the derivational morpheme is (phonically) zero marked in the case of *clean* 'make clean'. We speak of zero-derived deadjectival vbs.

See Pennanen (1971) for a detailed critique of the Marchandean view of zero-derivation.

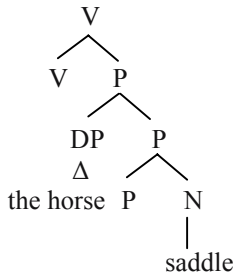
Allen (1978) is perhaps the earliest within the generative tradition to consider conversion to be the affixation of a phonologically null element; in such an analysis, the noun [$_N$ hammer] would be changed to a verb by the addition of a phonologically empty affix [$_V$ [$_N$ hammer] Ø]. Her motivation is primarily phonological. In order to explain the level-ordering properties of certain overtly derived forms, she must assume that zero-affixation takes place at level 2, after the affixation of level 1 affixes. Like Allen, Kiparsky (1982) justifies his zero-affixation analysis of conversion on the basis of phonological facts, this time facts concerning application of stress rules within a level-ordered phonology. As Don (1993: 35) points out, however, neither Allen's nor Kiparsky's analysis depends crucially on the postulation of an actual zero morpheme. Rather, their level-ordering facts fall out from any analysis in which conversion is a directional process, with verbs being derived from nouns or vice versa (as opposed to an analysis which merely relates conversion-mates non-directionally – see below).

Akin to zero-affixation analyses are those which postulate that conversion involves what might be called rebracketing or category-change with no concomitant affixation: in such an analysis, the noun [$_N$ hammer] would simply be changed to the verb [$_V$ hammer] with no apparent structural change. Strauss (1982) argues that this analysis is superior to the one in which a zero affix is assumed, since it is impossible in that analysis to prove whether the affix is in fact a prefix or a suffix. Assuming a category-changing rule simply finesses the issue, as no affixation is assumed. Williams (1981) advocates a similar analysis on the basis of different considerations. For him, items formed via a category-changing rule critically lack heads. This then can be used to explain why the converted verb *grandstand* takes the regular past inflection (*grandstanded*) rather than the ablaut form (**grandstood*). Inflectional features are only available for Williams via percolation from a head. Without a head, *grandstand* cannot access the verbal ablaut feature of the verb *stand* (from which the noun *stand* was originally derived), and therefore the converted verb must inflect regularly.

Hale and Keyser (2002) do not provide an analysis of conversion per se, but insofar as they are interested in the argument-structural properties of converted verbs like *shelve* and *saddle*, their analysis is relevant to the debate on the morphological derivation of conversion verbs. They propose that verbs like *shelve* are derived by a

process of 'conflation', which is a special form of incorporation (Baker 1988), "according to which the phonological matrix of a complement replaces the empty matrix of the governing head" (2002: 11). The verb *saddle* would be derived as in (45) (2002: 18):

(45)

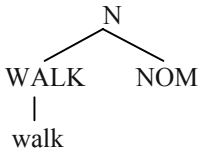


The noun *saddle* first conflates with the empty prepositional head, and then with the empty verb position. Hale and Keyser argue that constraints on syntactic movement (like the Head Movement Constraint) explain limitations on the semantics of conversion verbs, for example, that we could not have a verb *horse* above which would mean something like 'horse-put' in *They horsed the saddle*. As movement is only legitimate from a complement position, and *horse* in the structure above is in the specifier position of the empty P, it cannot be conflated with the empty verb.

Various process-oriented frameworks of morphology have also considered the nature of conversion. For example, within the Separation Hypothesis of Beard (1995), conversion is simply another form of lexical derivation, where lexical derivation is the process by which the semantic or lexical category of a word is changed. Affixation – that is, the addition of overt phonological material -- is separate from derivation, and one and the same lexical derivation can be marked either by overt affixation, as in the case of suffixing *-ize* or *-ify* to nouns to form verbs, or by adding nothing at all, as in the case of deriving the verb *hammer* from the corresponding noun.

Don (1993) attempts something of a synthesis between the structure-based analyses of conversion and the process-based ones. As in process-theories, he proposes that the process of affixation be split into a morpho-syntactic portion and a morpho-phonological portion. The difference between his theory and that of Beard, however, is that the morpho-syntactic portion of affixation is represented by an abstract structural element, which he represents in capital letters; the process which forms nouns from verbs is represented as NOM, for example. When affixation occurs, NOM is added (1993: 100):

(46)



An overt morpho-phonological affix such as *-al* or *-ment* may be mapped onto NOM (if, for example, the stem were *arrive* or *amuse*), or nothing may be mapped onto NOM. In the latter case, as in the case of *walk* in (46), we have conversion.

A final type of analysis of conversion is neither structure- nor process-based. This is the analysis developed in a number of ways in the work of Lieber (1980, 1981, 1992). Lieber provides arguments that conversion is not zero-affixation, nor indeed any directional process at all, but rather is a process of relisting in the lexicon. When nouns become verbs, they are simply reentered in the mental lexicon as new forms. The process is not derivational at all, in fact, but rather is more akin to coinage. Although semantically and historically it is frequently clear which form is original and which derived, synchronically conversion pairs lead separate lives. Her reasoning for this position is as follows: if conversion were zero-affixation, we would expect a putative zero-affix to behave exactly as a phonologically overt affix does. Phonologically overt affixes typically determine the gender, morphosyntactic features, argument structure, and category of their derived forms. But converted forms often display a variety of genders, morphosyntactic classes, or argument structures. Lieber (1981) illustrates this with data from German and Old English. Lieber (1992) gives similar evidence from English: whereas verbalizing affixes like *–ize* have relatively uniform effects on argument structure, converted verbs display a far wider range of argument structures than would be expected from a phonologically overt affix.

A separate but not unrelated thread of inquiry concerns the semantics of conversion from nouns to verbs. Clark and Clark (1979) remains an excellent and insightful treatment of the semantics of conversion. They argue that innovative noun-to-verb conversions constitute a semantic class of items distinct from either denotational items like *bachelor* or indexical items like *she*. The interpretation of these items, which they call 'contextuals', "depends on the context, especially the cooperation of the speaker and listener" (1979: 783). Clark and Clark propose a number of cooperative principles akin to Gricean conversational principles that speakers use in understanding a newly coined denominal conversion verb like *to teapot* (1979: 787):

> THE INNOVATIVE DENOMINAL VERB CONVENTION. In using an innovative denominal verb sincerely, the speaker means to denote (a) the kind of situation, (b) that he has good reason to believe (c) that on this occasion the listener can readily compute (d) uniquely (e) on the basis of their mutual knowledge (f) in such a say that the parent noun denotes one role in the situation, and the remaining surface arguments of the denominal verb denote other roles in the situation.

So if two speakers know that their friend has an unfortunate propensity to stroke peoples' legs with teapots (Clark and Clark's example), one can say to the other that

'Max was foolish to teapot a police officer', and know that mutual knowledge and context can be used to fix the meaning of the newly coined verb.

These theories seem compatible with that proposed by Štekauer (1996) in which conversion is viewed as conceptual recategorization (see also Štekauer, this volume).

Given this sort of semantic genesis, it is not surprising then that verbs formed by conversion from nouns and adjectives display a broader range of meaning than those formed by overt affixation. This has been pointed out both by Plag (1999) and by Lieber (2004). Plag shows that newly coined conversion verbs can fall into the locative (*jail*), ornative (*staff*), causative (*yellow*), resultative (*bundle*), inchoative (*cool*), performative (*counterattack*), and similative (*pelican*) classes that formations in *-ize* and *-ify* can (see section 2.2.3 above), but also into classes that he calls instrumental (hammer) and stative (*hostess*). Using Plag's corpus of 20th century conversion neologisms, Lieber finds even more categories (2004: 91): "Specifically there are many conversion verbs that have a motional meaning, with the base acting either as a manner component ('move in x manner') like *cartwheel* or *fishtail*, or as an instrumental component ('move using x') like *jet, lorry*, or *taxi*, or even location ('move at x location') like *quarterdeck*." Lieber uses this data to support her position – essentially that of Clark and Clark (1979) – that conversion involves coinage or relisting of nouns as verbs, rather than zero-affixation; if conversion were a process of zero-derivation, one would expect conversion verbs to be limited to the semantic range of overt verb-forming affixes. Instead, the semantic range of conversion verbs covers the entire range of verbs derived and underived.

5. CONCLUSION

It is impossible in an article of this length to cover all aspects of all word formation processes in English. For one thing, there are productive prefixes (e.g., *counter-*) and suffixes (e.g., *-ism*) that do not fall into any obvious cohort, and which I therefore have not discussed here. For another, there are marginal word formation processes like blending, clipping, and back formation which add to the lexical stock of English, but which I have omitted on grounds of their lesser productivity. What I have hoped to do in this chapter is to look at many of the most prominent means of word formation in English and highlight the ways in which they have figured in various theoretical developments in phonology, syntax, and morphology. The aim, of course, is to spark further thought about these processes, and to suggest ways in which our research agenda is by no means finished.

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REFERENCES

Adams, Valerie. 2001. *Complex Words in English.* Longman: London.

Algeo, John. 1971. "The voguish uses of *non*." *American Speech* 46, 87-105.

Allen, Margaret. 1978. *Morphological Investigations*. Ph.D. dissertation. University of Connecticut, Storrs.

Anderson, Mona. 1979. *Noun Phrase Structure*. PhD dissertation. University of Connecticut, Storrs.

Anderson, Stephen R. 1992. *A-Morphous Morphology*. Cambridge University Press: Cambridge.

Andrews, Edna. 1986. "A synchronic analysis of *de-* and *un-* in American English." *American Speech* 61/3, 221-232.

Apresjan, Jurij. 1974. "Regular Polysemy." *Linguistics* 142, 5-32.

Aronoff, Mark. 1976. *Word Formation in Generative Grammar*. MIT Press: Cambridge MA.

Aronoff, Mark and Sungeun Cho. 2001. "The semantics of *-ship* suffixation." *Linguistic Inquiry* 32, 167-173.

Aronoff, Mark and Fuhrhop, Nanna. 2002. "Restricting Suffix Combinations in German and English: Closing Suffixes and the Monosuffix Constraint." *Natural Language and Linguistic Theory* 20/3, 451-490.

Baker, Mark. 1988. *Incorporation: A Theory of Grammatical Function Changing.* University of Chicago Press: Chicago.

Barker, Chris. 1998. "Episodic *-ee* in English: A thematic role constraint on new word formation." *Language* 74, 695-727.

Bauer, Laurie. 1978. *The Grammar of Nominal Compounding with special reference to Danish, English and French*. Odense: Odense University Press.

Bauer, Laurie. 1987. "-ee by Gum!" *American Speech* 62, 315-19.

Bauer, Laurie. 1993. "More -ee words." *American Speech* 68, 222-4.

Bauer, Laurie. 1998. "When is a sequence of two nouns a compound in English?" *English Language and Linguistics* 2/1, 65-86.

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge: Cambridge University Press.

Bauer, Laurie. 2003. "English Prefixation – A Typological Shift?" *Acta Linguistica Hungarica* 50/1-2, 33-40.

Bauer, Laurie and Renouf, Antoinette. 2001. "A corpus-based study of compounding in English." *Journal of English Linguistics* 29/2, 101-123.

Beard, Robert. 1976. "Once more on the analysis of ed-adjectives." *Journal of Linguistics* 12, 155-157.

Beard, Robert. 1991. "Decompositional Composition: The Semantics of Scope Ambiguities and 'Bracketing Paradoxes.'" *Natural Language and Linguistic Theory* 9, 195-229.

Beard, Robert. 1993. "Simultaneous Dual Derivational Origin." *Language* 69, 716-41.

Beard, Robert. 1995. *Lexeme Morpheme Base Morphology*. SUNY Press: Albany, NY.

Bierwisch, Manfred. 1988. "On the grammar of local prepositions." In: M. Bierwisch, W. Motsch, and I. Zimmermann (eds.), *Syntax, Semantik, und Lexikon: Rudolf Ruzicka zum 65. Geburtstag*. Berlin: Akademie Verlag, 1-65.

Bierwisch, Manfred. 1996. "How Much Space Gets Into Language?" In: P. Bloom, M. Peterson, L. Nadel, and M. Garrett (eds.), *Language and Space.* Cambridge, MA: MIT Press, 31-76.

Bloomfield, Leonard. 1933. *Language.* New York: Holt, Rinehart, and Winston.

Booij, Geert. 1986. "Form and meaning in morphology: the case of Dutch 'Agent' Nouns." *Linguistics* 24, 503-17.

Booij, Geert. 1988. "The relation between inheritance and argument-linking: deverbal nouns in Dutch." In: M. Everaert, A. Evers, R. Huybrechts, and M. Trommelen (eds.), *Morphology and Modularity*. Dordrecht: Foris, 57-74.

Booij, Geert. 1992. "Compounding in Dutch." *Rivista di Linguistica* 4/1, 37-60.

Booij, Geert and Lieber, Rochelle. 2004. "On the paradigmatic nature of affixal semantics in English and Dutch." *Linguistics* 42/2, 327-357.

Booij, Geert and van Haaften, Ton. 1988. "On the external syntax of derived words: evidence from Dutch." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1988*. Dordrecht: Foris, 29-44.

Botha, Rudolf P. 1980. *Word-based morphology and synthetic compounding*. Stellenbosch Papers in Linguistics, No. 5, University of Stellenbosch.

Brekle, Herbert. 1970. *Generative Satzsemantik und transformationelle Syntax im System der englischen Nominalkomposition.* Munich: Fink.

Bresnan, Joan. 1982. "Polyadicity." In: J. Bresnan (ed.), *The Mental Representation of Grammatical Relations*. Cambridge, MA: MIT Press, 149-172.
Chomsky, Noam. 1970. "Remarks on Nominalization." In: R. Jacobs and P. Rosenbaum (eds.), *Readings in English Transformational Grammar*. Waltham, MA: Ginn, 184-221.
Clark, Eve and Clark, Herbert. 1979. "When nouns surface as verbs." *Language* 55/4, 767-811.
Comrie, Bernard and Thompson, Sandra. 1985. "Lexical nominalization." In: T. Shopen (ed.), *Language Typology and Syntactic Description, Volume III. Grammatical Categories and the Lexicon.* Cambridge: Cambridge University Press, 349-398.
Di Sciullo, Anna Maria and Williams, Edwin. 1987. *On the Definition of Word*. MIT Press: Cambridge, MA.
Dowty, David. 1979. *Word Meaning and Montague Grammar: the Semantics of Verbs and Times in Generative Semantics and Montague's PTQ*. Dordrecht: Reidel.
Don, Jan. 1993. *Morphological Conversion.* OTS Dissertation series. University of Utrecht.
Fabb, Nigel. 1988. "English suffixation is constrained only by selectional restrictions." *Natural Language and Linguistic Theory* 6, 527-539.
Fraser, Bruce. 1976. *The Verb-Particle Combination in English*. New York: Academic Press.
Fu, Jingqi; Roeper, Thomas; and Borer, Hagit. 2001. "The VP within process nominals: Evidence from adverbs and the VP anaphor *do so*." *Natural Language and Linguistic Theory* 19, 549-582.
Giegerich, Heinz. 1999. *Lexical Strata in English: Morphological causes, phonological effects*. Cambridge: Cambridge University Press.
Giegerich, Heinz. 2004. "Compound or Phrase? English noun-plus-noun constructions and the stress criterion." *English Language and Linguistics* 8/1, 1-24.
Gorska, Elzbieta. 1984. "Moonless nights and smoke-free cities, or what can be without what? A cognitive study of privative adjectives in English." *Folia Linguistica* 28/3-4, 413-435.
Gracia, Lluisa and Azkarate, Miren. 1998. *Prefixes, heads and word order*. Ms. University of Girona and University of the Basque Country.
Gracia, Lluisa and Lieber, Rochelle. 2000. "Sobre el prefijo ex-." Paper presented at the Fourth Congress of General Linguistics, Cadiz.
Grimshaw, Jane. 1990. *Argument Structure*. Cambridge, MA.: MIT Press.
Gussmann, Edmund. 1987. "The lexicon of English De-adjectival Verbs." In: E. Gussmann (ed.), *Rules and the Lexicon*. Lublin: Catholic University Press, 79-101.
Hale, Kenneth and Keyser, Samuel Jay. 2002. *Prolegomena to a Theory of Argument Structure*. Cambridge, MA: MIT Press.
Harley, Heidi and Noyer, Rolf. 2000. "Formal versus encyclopaedic properties of vocabulary: Evidence from nominalizations." In: B. Peeters (ed.), *The Lexcion-Encyclopedia Interface*. Amsterdam: Elsevier, 349-374.
Haspelmath, Martin. 1996. "Word-class Changing inflection and Morphological Theory." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1995*. Dordrecht: Kluwer, 43-66.
Heyvaert, Lisbiet. 2001. *Deverbal -er suffixation as morphological equivalent of the clausal Subject-Finite unit*. Katholieke Universiteit Leuven. Preprint 176.
Higginbotham, James. 1985. "On Semantics." *Linguistic Inquiry* 16, 547-594.
Hoeksema, Jack. 1985. *Categorial Morphology*. New York: Garland Publishing.
Hoeksema, Jack. 1988. "Head-types in Morpho-Syntax." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1988*. Dordrecht: Foris, 123-138.
Horn, Laurence. 1989. *Natural History of Negation*. Chicago: University of Chicago Press; reprinted 2001 by CSLI: Stanford.
Horn, Laurence. 2002. "Uncovering the Un-Word: A study in lexical pragmatics." *Sophia Linguistica* 49, 1-64.
Horn, Laurence. (Forthcoming). *An Un-paper for the Un-Syntactician*. Ms. Yale University.
Hudson, Richard. 1975. "Problems in the analysis of ed-adjectives." *Journal of Linguistics* 11, 69-72.
Jackendoff, Ray. 1990. *Semantic Structures*. Cambridge, MA.: MIT Press.
Jackendoff, Ray. 1996. "The Architecture of the Linguistic-Spatial Interface." In: P. Bloom, M. Peterson, L. Nadel, and M. Garrett (eds.), *Language and Space*. Cambridge, MA: MIT Press, 1-30.
Jespersen, Otto. 1965. *A Modern English Grammar on Historical Principles*. Part VI. Morphology. London: George Allen and Unwin Ltd.
Kastovsky, Dieter. 1969. "Wortbildung und Nullmorphem." *Linguistische Berichte* 2, 1-13.
Kayne, Richard. 1994. *The Antisymmetry of Syntax*. Cambridge, MA: MIT Press.

Kettemann, Bernhard. 1988. *Die Phonologie Morphologischer Prozesse im Amerikanischen Englisch.* Tubingen: Narr.
Keyser, Samuel Jay and Roeper, Thomas. 1992. "Re: The Abstract Clitic Hypothesis." *Linguistic Inquiry* 23, 89-125.
Kiparsky, Paul. 1982. "From Cyclic Phonology to Lexical Phonology." In: H. van der Hulst and N. Smith, (eds.), *The Structure of Phonological Representations*. Dordrecht: Foris, 131-175.
Kjellmer, Goren. 2001. "Why *weaken* but not *strongen* on deadjectival verbs." *English Studies* 2, 154-171.
Lakoff, George. 1987. *Women, Fire, and Dangerous Things*. Chicago: University of Chicago Press.
Landau, Barbara. 1996. "Multiple Geometric Representations of Objects in Languages and Language Learners." In: P. Bloom, M. Peterson, L. Nadel, and M. Garrett (eds.), *Language and Space*. Cambridge, MA: MIT Press, 317-364.
Lees, Robert. 1961. *The Grammar of English Nominalizations*. The Hague: Mouton.
Lehnert, Martin. 1971. *Reverse Dictionary of Present-Day English*. Leipzig: VEB Verlag Enzyklopädie.
Lehrer, Adrienne. 1995. "Prefixes in English word-formation." *Folia Linguistica* 29/1-2, 133-148.
Levi, Judith. 1978. *The Syntax of Complex Nominals*. New York: Academic Press.
Levin, Beth. 1999. "Objecthood: an event structure perspective." *Proceedings of the Chicago Linguistic Society* 35/1, 223-47.
Levin, Beth and Rappaport, Malka. 1988. "Non-event *-er* Nominals: A Probe into Argument Structure." *Linguistics* 26, 1067-83.
Levin, Beth and Rappaport Hovav, Malka. 1995. *Unaccusativity*. Cambridge, MA: MIT Press.
Lieber, Rochelle. 1980. *On the Organization of the Lexicon*. Ph.D. dissertation, MIT. [published by IULC, 1981 and Garland Press 1990.]
Lieber, Rochelle. 1981. "Morphological conversion within a restrictive theory of the lexicon." In: M. Moortgat, H. van der Hulst, and T. Hoekstra (eds.), *The Scope of Lexical Rules*. Dordrecht: Foris Publications, 161-200.
Lieber, Rochelle. 1983. "Argument Linking and Compounds in English." *Linguistic Inquiry* 14, 251-286.
Lieber, Rochelle. 1992. *Deconstructing Morphology*. Chicago. University of Chicago Press.
Lieber, Rochelle. 1998. "The Suffix *-ize* in English: Implications for Morphology." In: S. G. Lapointe, D. K. Brentari, and P. M. Farrell (eds.), *Morphology and Its Relation to Phonology and Syntax*. Stanford, CA: CSLI, 12-34.
Lieber, Rochelle. 2004. *Morphology and Lexical Semantics*. Cambridge: Cambridge University Press.
Lieber , Rochelle and Baayen, Harald. 1997. "A Semantic Principle of Auxiliary Selection in Dutch." *Natural Language and Linguistic Theory* 15/4, 789-845.
Lieber, Rochelle and Baayen, Harald. 1999. "Nominalizations in a Calculus of Lexical Semantic Representations." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1998*. Dordrecht: Kluwer, 175-198.
Ljung, Magnus. 1970. *English denominal adjectives*. Gothenburg Studies in English, Lund.
Ljung, Magnus. 1976. "-ed adjectives revisited." *Journal of Linguistics* 12, 159-168.
Mahn, Lothar. 1971. *Zur Morphologie und Semantik englischer Verben auf -IFY mit Berucksichtigung franzosischer und deutscher Entsprechungen*. Tubingen: Narr.
Marchand, Hans. 1966. "On attributive and predicative derived adjectives and some problems related to the distinction." *Anglia* 84, 131-149.
Marchand, Hans. 1966. "On the analysis of substantive compounds and suffixal derivatives not containing a verbal element." *Indogermanische Forschungen* 70/1, 118-145.
Marchand, Hans. 1969. *The Categories and Types of Present-day English Word Formation.* Munich: Beck.
Maynor, Natalie. 1979. "The morpheme un-." *American Speech* 54, 310-311.
Mohanan, K. P. 1986. *The Theory of Lexical Phonology*. Dordrecht: D. Reidel.
Nunberg, Geoffrey. 1996. "Transfers of Meaning." In: J. Pustejovsky and B. Boguraev (eds.), *Lexical Semantics, the problem of polysemy*. Oxford: Clarendon Press, 109-132.
Orgun, Cemil Orhan and Sprouse, Ronald. 1999. "From MPARSE to CONTROL: Deriving ungrammaticality." *Phonology* 16/2, 191-225.
Panther, Klaus and Thornburg, Linda. 1998. "The Polysemy of the Derivational *-er* Suffix in English." Paper delivered at the Cognitive Morphology Workshop, Ghent, Belgium, July, 1998.

Pennanen, Esko. 1971. *Conversion and Zero Derivation in English.*Tampere: Acta Universitatis Tamperensis. Ser. A vol. 40.
Plag, Ingo. 1999. *Morphological Productivity: Structural Constraints in English Derivation*. Berlin: Mouton de Gruyter.
Raffelsiefen, Renate. 1996. Gaps in Word Formation. In: U. Kleinhenz (ed.), *Interfaces in Phonology*. Berlin: Academie Verlag, 194-209.
Rappaport Hovav, Malka and Levin, Beth. 1992. "-ER Nominals: implications for the theory of argument structure. In: T. Stowell and E. Wehrli (eds.), *Syntax and Semantics* 26, *Syntax and the Lexicon*. New York: Academic Press, 127-153.
Rappaport Hovav, Malka and Levin, Beth. 1998. "Building verb meanings." In: M. Butt and W. Geuder (eds.), *The Projection of Arguments: Lexical and Compositional Factors*. Stanford: CSLI Publications, 97-134.
Riddle, Elizabeth. 1985. "A historical perspective on the productivity of the suffixes *–ness* and *–ity*." In: J. Fisiak (ed.), *Historical Semantics Historical Word-Formation.* Berlin. Mouton Publishers, 435-461.
Roeper, Thomas. 1988. "Compound Syntax and Head Movement." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology* 1. Dordrecht: Foris, 187-228.
Roeper, Thomas. 1999. "Leftward Movement in Morphology." In: *MIT Working Papers in Linguistics* 34, 35-66.
Roeper, Thomas and van Hout, Angeliek. 1999. *The impact of nominalization on passive, -able and middle: Burzio's generalization and feature-movement in the lexicon*. Ms. University of Massachusetts, Amherst and Utrecht University.
Roeper, Thomas and Siegel, Muffy. 1978. "A Lexical Transformation for Verbal Compounds." *Linguistic Inquiry* 9, 197-260.
Romaine, Suzanne. 1983. "On the productivity of word formation rules and limits of variability in the lexicon." *Australian Journal of Linguistics* 3, 177-200.
Ryder, Mary Ellen. 1999. "Bankers and blue-chippers: an account of *-er* formations in Present-day English." *English Language and Linguistics* 3, 269-297.
Schneider, Edgar. 1987. "Beobachtungen zur Pragmatik der verbbildenden Suffixe *–en, -ify,* und-*ize* im Englischen." *Sprachwissenschaft* 12, 88-109.
Selkirk, Elisabeth. 1982. *The Syntax of Words*. Cambridge, MA.: MIT Press.
Siegel, Dorothy. 1974. *Topics in English Morphology*. Doctoral dissertation, Massachusetts Institute of Technology.
Simpson, John (ed.). *The Oxford English Dictionary* (2nd edition). Oxford: Oxford University Press.
Slotkin, Alan. 1990. "Adjectival *-less* and *-free*: A case of shifting institutional currency." *American Speech* 65/1, 33-49.
Smith, Carlotta. 1997. *The Parameter of Aspect* (2nd edition). Dordrecht: Kluwer Academic Publishers.
Southerland, Ronald. 1994. "Derivatives in *pre-*: a persuasive morphological resource?" *American Speech* 69/2, 168-176.
Spencer, Andrew. 1999. "Transpositions and Argument Structure." In: G. Booij and J. van Marle (eds.), *Yearbook of Morphology 1998*. Dordrecht: Kluwer, 73-102.
Sproat, Richard. 1985. *On deriving the lexicon*. Ph.D. dissertation, Massachusetts Institute of Technology.
Štekauer, Pavol. 1996. *A Theory of Conversion in English*. Frankfurt: Peter Lang.
Štekauer, Pavol. 1998. *An Onomasiological Theory of English Word-Formation*. Amsterdam/ Philadelphia: John Benjamins.
Strauss, Steven. 1982. "On 'relatedness paradoxes' and related paradoxes." *Linguistic Inquiry* 13, 694-700.
Talmy, Leonard. 2000. *Toward a Cognitive Semantics*. Cambridge, MA: MIT Press.
Toman, Jindrich. 1983. *Wortsyntax*. Tubingen: Max Niemeyer Verlag.
Tyler, Andrea and Evans, Vyvyan. 2001. "Reconsidering prepositional polysemy networks: The case of *over*." *Language* 77/4, 724-765.
Tyler, Andrea and Evans, Vyvyan. 2004. *The Semantics of English Prepositions*. Cambridge: Cambridge University Press.
Van Marle, Jaap. 1985. *On the Paradigmatic Dimension of Morphological Creativity*. Dordrecht: Foris Publications.
Walinska de Hackbeil, Hannah. 1986. *The roots of phrase structure: The syntactic base of English morphology*. Ph.D. dissertation, University of Washington, Seattle.

Williams, Darrell. 1992. "English comparative compounds with OVER, UNDER, and OUT." Proceedings of ESCOL 1992, 272-281.
Williams, Edwin. 1981. "Argument Structure and Morphology." *Linguistic Review* 1, 81-114.
Williams, Edwin. 1981. "On the notions 'lexically related' and 'head of a word'." *Linguistic Inquiry* 12/2, 245-274.
Zimmer, Karl. 1964. *Affixal Negation in English and Other Languages*. Supplement to *Word*, Monograph No. 5.
Zubizaretta, Maria Luisa. 1987. *Levels of Representation in the Lexicon and in Syntax*. Dordrecht: Foris Publications.
Zubizaretta, Maria Luisa and van Haaften, Ton. 1988. "English *-ing* and Dutch *-en* Nominal Constructions: A Case of Simultaneous Nominal and Verbal Projections." In: M. Everaert, A. Evers, R. Huybrechts, and M. Trommelen (eds.), *Morphology and Modularity*. Dordrecht: Foris Publications, 361-394.

THE LATEST TRENDS IN ENGLISH WORD-FORMATION

BOGDAN SZYMANEK

1. INTRODUCTION

Let us begin by clarifying the terms which appear in the title of this chapter. 'The latest trends' should be understood as those trends, or tendencies, which became prominent in the English vocabulary, roughly, in the last quarter of the twentieth century and are still in use (although occasional referen ill be made to developments which took place in earlier decades). 'Trends in English word-formation' ought not be interpreted as, say, trends in theoretical or descriptive approaches to word-formation in English, but rather (simply) as trends in the creation and use of English complex words. In particular, we focus on those trends that are indicative of some, however minor, modifications in the grammatical system, of which the word-formation component is an integral part, i.e. trends that have a principled, regular basis. These will have to be juxtaposed with extra-grammatical cases of creative, individual word-coinage which are, linguistically, less revealing, no matter how trendy or voguish they are. Unless required by the facts and specifically mentioned, no overt distinction will be made concerning the varieties of English (British, American, etc.). However, in terms of register, our account will be somewhat biased, by focusing, in particular, on written (rather than spoken) language. This is partly due to the fact that our data mainly derive from printed sources. But there is another excuse for this lack of balance: "Derived complex words are on the whole more characteristic of written registers" (Adams 2001: 15). However, there are marked differences, across registers, concerning, for instance, the productivity of individual affixes (see Plag, Dalton-Puffer and Baayen 1999).

Much of the discussion to follow inevitably ties up with the contents of the immediately preceding chapters. Thus, one of the more obvious aspects of the evolution of a word-formation system relates to changes in the productivity of particular processes or formatives (affixes, etc.). This refers us back to the chapters 'Productivity' and 'English word-formation processes' in this volume. The 'Lexicalization' chapter in this volume may also seem a useful point of departure for the topic under discussion here; however, its significance is less obvious since, by definition, cases of lexicalization pertain to individual lexemes, i.e. they are idiosyncratic, unsystematic and hence can hardly be described in terms of any general tendencies.

Our topic imposes a unique approach on us: in part, it is synchronic, in line with the majority of recent descriptions of the system of English word-formation, as it

Štekauer, P. and R. Lieber (eds.), Handbook of Word-Formation 429—448.

deals with the present-day situation. But, in part, it is bound to be diachronic, since we intend to investigate changes within that system, although the time-span covered is uncharacteristically short. Diachronic, general studies of recent changes within English morphology are not numerous; however, see, e.g., Algeo (1998), Bauer (1994), Cannon (1987), Faiss (1992), Kastovsky (1986).

Some of the forces that have shaped English word-formation in the recent years are relatively prominent and easy to pinpoint. But there are also subtle tendencies, too weak or obscure to be acknowledged with absolute certainty, new trends in the making, whose real scope and significance will only become apparent with the benefit of hindsight. One should remember that, in general, language development is slow and is marked by continuity.

2. DERIVATIONAL NEOLOGISMS

One of the major aspects of new developments in the realm of word-formation is the emergence of new complex words, coined according to some well-established and productive patterns. Instances of this phenomenon may be termed *derivational neologisms*, if we wish to distinguish them from other neologisms, i.e. new words created *ex-nihilo*, with no activation of any morphological process, so-called *root-creations* like *blurb*, *googol*, or *quark* (see McArthur (1992: 876); on different motivations for neologising, see Cowie 2000; on an onomasiological theory of neologisms, see Štekauer 2002). The most obvious source of data and information on (derivational) neologisms are various dictionaries of new words and neologisms; see *Dictionaries* in the *References* section below.

Derivational neologisms may be classified and described according to the major types of word-formation processes operative in English (see the chapter 'English word-formation processes' in this volume). Thus one can trace new complex words which are products of compounding, prefixation, suffixation, conversion, etc. (see McArthur 1992: 685) and section 4 below for some discussion and examples). Alternative, or more general, divisions of new words are also available in the literature. Consider, for instance, the classification in Cannon (1987): 'shifts' (including functional shifts, i.e. conversion), 'shortenings' (including abbreviations, acronyms, back-formations and blends) and 'additions' (including affixation and compounding), plus 'borrowings', which are beyond the scope of this survey.

Derivational neologisms ought to be distinguished from so-called *hapax legomena*, i.e. word-types (as opposed to word-tokens) which appear only once in a given corpus. For instance, the verb *aluminiumise* is a hapax legomenon in the *Cobuild* corpus (version of July 1995; Plag 1999: 279). The significance of hapax legomena has been underlined in recent theoretical studies on morphological productivity (e.g. Baayen and Lieber 1991, Plag, Dalton-Puffer and Baayen 1999, Bauer 2001; cf. also L. Bauer (this volume)). Crucially, it has been found that "the number of hapaxes of a given morphological category correlates with the number of neologisms of that category, so that the number of hapaxes can be seen as an indicator of productivity" (Plag, Dalton-Puffer and Baayen 1999: 215). However, not every instance of a hapax legomenon is a genuine case of a neologism (some

hapaxes are simply old or even obsolete words, used only once and then forgotten) and, vice versa, not every example of a recent neologism will have the formal status of a hapax legomenon in a given corpus (since the particular word-type may appear more than once in the corpus, or it may be unattested).

3. ANALOGICAL FORMATIONS, LOCAL ANALOGIES

Generally speaking, regardless of the strength and productivity of a particular pattern, a new complex word may be created by analogy. An instance of this is called an *analogical formation* (Bauer 1983: 96): "a new formation clearly modelled on one already existing lexeme, and not giving rise to a productive series"; for instance, Adams (2001: 84) mentions the compound noun *whitelist* as an analogically coined antonym of *blacklist*, while Kastovsky (1986: 419) gives the example of the verb *to chaindrink*, modelled on *to chainsmoke*. Another example of this sort is the noun *earwitness*, based on *eyewitness*. In a similar vein, Plag (1999) speaks of *local analogy*. When discussing, for instance, the derivational history of derived verbs like *inactivate*, *radioactivate*, Plag (1999: 210) argues that they are modelled on the pair *active – activate*; more importantly, Plag (1999: 20) claims that "analogical formations should be distinguished from instantiations of productive word formation rules."

However, a single instance of analogical formation may sometimes give rise to a new, ultimately productive, pattern or affix (for examples, see section 5 below). Hence, it does not seem possible or appropriate to dissociate completely both concepts, i.e. analogy and (high) productivity.

4. CHANGES IN THE RELATIVE SIGNIFICANCE OF TYPES OF WORD-FORMATION PROCESSES

It is hard to assess and compare, in any global terms, the relative contribution of the different word-formation processes (see Lieber, this volume) to the stock of new vocabulary in English. However, there are some universal tendencies, and English is no exception here; cf. Sapir (1921: 59): "Some of these grammatical processes, like suffixing, are exceedingly wide-spread; others, like vocalic change, are less common […]", and "[o]f the three types of affixing – the use of prefixes, suffixes, and infixes – suffixing is much the commonest" (Sapir 1921: 67). These generalisations may be interpreted, in the context of our discussion, to mean that *suffixation* has been, and still is, the primary source of new complex words, in English and in many other languages. It has been argued recently (Bauer 2003) that, in English, the 'suffixing preference' is strengthened by the increasing tendency today (a typological shift) to use *combining forms* in word-initial position, rather than old Germanic prefixes (like *a-*, *be-*, etc.). Bauer concludes that "with the notable exception of *un-*, we have seen a whole class of prefixes vanish in English" or they have lost in productivity so much that "we can predict that they are likely to die out before very long" (Bauer 2003: 35). In their place, one finds a growing use of combining forms like *eco-*,

electro-, *hyper-*, *macro-*, etc. and several 'new' prefixes like *e-*, e.g. *e-education* (see below). Here are some examples of recent words derived by suffixation: *anagramable*$_{A}$, *bullyable*$_{A}$, *cannable*$_{A}$, *albumful*$_{N}$, *balloonful*$_{N}$, *Blairese*$_{N}$, *designy*$_{A}$, *arrangee*$_{N}$, *wrongish*$_{A}$, *yoofy*$_{A}$, *coffinette*$_{N}$, *inspectress*$_{N}$, *cosmopolitanise*$_{V}$, *tabloidification*$_{N}$. All the examples are cited from the collection of neologisms from the *Independent* (1997-99), available at www.rdues.liv.ac.uk/newwords.shtml.

Compounding has also contributed a lot of recent vocabulary items to present-day English; in particular, compound nouns of the endocentric type, like *cellphone* or *affinity card* (1986) 'a form of credit card that automatically subtracts a tithe of any transaction and donates it to the charity of the user's choice' (Green 1991: 4). In the field of computing we have nouns like *chipset*, *data cruncher*, *expert system*, *file transfer protocol*, and lots of others. If we focus on another semantic field, say, styles in (popular) music, one can mention *acid rock*, *art rock*, *punk rock*, etc., but there are also exocentric compounds like *acid house*, *Nu-metal*, *newgrass*. From a different domain, consider, e.g., *couch potato* 'an inveterate television watcher' (Green 1991: 61), i.e. 'a person who watches a lot of television and does not have an active style of life' (*CALD*) or just 'anyone who is inactive, i.e. prefers sitting around to exercising' (R. Lieber, personal communication).

The ease with which speakers can produce new compound nouns may be attributed, first of all, to the fact that this particular process is not heavily constrained by any grammatical restrictions (unlike the use of many affixes) save some general semantic requirements and (extra-grammatical) pragmatic factors like e.g. the *nameability requirement* (Bauer 1983: 86) which states that a lexical item "must denote something that is nameable" or, one may add, worth naming, from the point of view of the speaker. Secondly, the creation of N+N compounds is facilitated by a formal property of this process, known as *recursion*: a nominal modifier may be added to an already existing N+N(+N…) complex, which may produce lexical items of unprecedented length and complexity. Consider, for instance, the following example: *student film society committee scandal inquiry* (Spencer 1991: 48). As is well known, innovative, sometimes bizarre, and often difficult to interpret compounds are a feature of TV news bars, newspaper headlines and, generally, of newspaper discourse (for reasons of space, we must ignore this topic; see, e.g., Biber (2003), Ljung (2000) and references cited therein).

But the contemporary language user often resorts to other patterns of compounding as well. For instance, the past few decades have been marked by an increasing use of so-called *neoclassical compounds*, characteristically involving Latinate stems (also referred to as bound combining forms) as in the following examples, all beginning with *electro-* and denoting musical styles: *electroclash*, *electro-pop*, *electro-grind*, *electro-jazz*, *electro-goth*, etc. (Dent 2003: 43). Other recently popular initial combining forms are *eco-*, as in *ecobiology*, *ecolinguistics*, and *eco-terrorism*, *bio-*, as in *bio-terrorism*, *bio-diesel*, *biodiversity*, or *cyber-*, as in *cybernaut*, *cyberart*, *cybersurfer*, *cyberbar*, *cyber-pet*, etc. (Knowles 1998: 79). Occasionally, new combining forms arise; for instance, *nega-* (from *negative*), "used in words indicating a reduction or absence of the thing identified by the second element of the compound", as in *negademand*, *negatrip* (Knowles 1998: 206). Another example of the same sort seems to be *docu-*, which first appeared in the

blend *docudrama* (1960), from *docu*(*mentary*) + *drama* (Green 1991: 77) and since then has been used in various coinages (*documusical*, *docuhistory*, *docu-fantasy*, *docusoap*, etc.). Therefore, one can legitimately speak about "the present-day vitality of stem formations" (Adams 2001: 13).

Phrasal compounds seem to constitute another pattern on the rise. These are compounds which involve syntactic phrases in the pre-head (modifier) position. Consider, for instance, *a [floor of a birdcage] taste*, *a [slept all day] look*, *a [pleasant to read] book*, *a [connect the dots] puzzle* (Lieber 1992: 11). The following examples come from a recently published novel (Paling 1997): *a quiet, out-of-the-way pub*, *his late-but-tragic marriage*, *his […] laying-the-cards-on-the-table situation*. Needless to say, expressions of this type are, as a rule, spontaneous creations, not listed in dictionaries.

Occasionally, a formal type of compound word may strike us as novel in English. Such is the case with compounds of the structure N-*cum*-N (or Adj-*cum*-Adj, see Stein 2000: 277 ff): *arguments-cum-discussions*, *bar-cum-café*, *buttler-cum-chauffeur*, *pub-cum-hotel*, *grammarian-cum-lexicographer*, *philosophic-cum-economic*, etc. Stein (2000: 279) points out that this use of *-cum-* (which goes back to the Latin preposition *cum* meaning 'with, together with') "is neither described in any of the standard reference works on English word-formation nor in the books on recent neologisms", while the *OED* only gives a laconic description, defining *-cum-* as a 'combining word' and illustrating this usage with four examples (the first, *motor-bike-cum-side-car trips*, dates from 1913). According to Stein (2000: 284), "*-cum-* compounds have a linguistic position between syntactic structures and 'traditional' word-formations." Let us add that the element *-cum-* itself which, according to Stein (2000: 281), "is a bound lexical morpheme", clearly different in status from prefixes or suffixes since it "has no part-of-speech determination", is thus defined in one recently published dictionary (*CALD*, 2003): "*preposition* used to join two nouns, showing that a person or thing does two things or has two purposes; combined with: *This is my bedroom-cum-study*".

Products of *conversion* in English (see Lieber, this volume) have been described as 'contextuals' in the morphological literature (Clark and Clark 1979, Aronoff 1980) because the exact meaning of novel items representing this category is often unpredictable outside their sentential and pragmatic context. But this unpredictability does not, in any way, weaken the remarkable vitality of conversion in present-day English. Newly created, *ad hoc* examples of suffixless denominal verbs, in particular, may be found in everyday discourse, and in newspapers and fiction. Ayto (1989: *Introduction*, n.p.) points out that, today, conversion "continues vigorously, producing mainly verbs, from nouns and adjectives (*feeder*, *flan*, *gender*, *office*, *rear-end*, *silicone*, *source*, *stiff*, *Velcro*, *wide*) but also transforming verbs into nouns (*spend*)." Also, consider the following verbs, based on compound nouns: *to handbag* 'attack ruthlessly, vigorously – used of a woman, especially a politician' (cf. *handbagging* in Tulloch (1991: 145-6)), *to doorstep* 'for a reporter to wait on a person's doorstep in order to attempt to gain an interview when that person either arrives home or goes out' (Green 1991: 78).

I will disregard here the complex mechanisms which enable the listener/reader to compute the (often unpredictable) meanings of many unfamiliar items produced by

conversion. Likewise, I must gloss over the speaker's knowledge of the fact that the use of conversion is subject to constraints, so that not any noun can be turned, successfully, into a suffixless verb, in any context. For instance, even though the verb *to paint* means, roughly, 'to cover with paint' (not necessarily with a brush), a sentence like **Velázquez painted his brush* is ill-formed when the speaker's intended message is that Velázquez dipped his brush in a pot of paint (see Kiparsky (1997) for more discussion and examples).

We should not neglect back-formation, blending, and other, minor word-formation processes. They have also contributed substantially to the creation of some very recent words.

One pattern of *back-formation*, in particular, is worth mentioning in the context of the present discussion, as it has been marked by considerable growth over recent years. The pattern may be illustrated with the following established examples: *air-conditioning – to air-condition*, *window-shopping – to window-shop*. A complex verb is seen here to be derived from an action nominal, by means of dropping the final *-ing* ending. Alternatively, other examples which represent the pattern are relatable to either agentive or instrumental base-nouns: cf., respectively, *guest-conductor – to guest-conduct* and *tape-recorder – to tape-record*. Also consider the following verbs: *to brainwash*, *computer-generate*, *deep-fry*, *dive-bomb*, *drink-drive* (see Adams (2001: 101) for more examples). In fact, the exact nature of the process is debatable – some scholars argue that it is not back-formation that applies here but rather direct compounding; for a defence of the back-formation analysis of such data see Shimamura (1983) and Adams (2001: 100-101) who points out that "[v]erb compounding is a productive process in some languages, but English is not one of them" and so the formations under discussion "are generally felt to be products of backformation". However, see also the diachronic interpretation of the pattern in question offered in Kastovsky (1986: 419). Kastovsky predicts that English "is on the best way" here to develop a genuine compound verb type, "which then might very well be characterised as an instance of noun-incorporation". At any rate, established verbs of this type are listed in dictionaries with a later date of first occurrence than their corresponding nominals (e.g. the *OED* lists *sleep-walker* (1747), *sleep-walking* (1797) and *to sleep-walk* (1923)).

Blending constitutes another area of contemporary English word-formation where neologisms are fairly common (particularly in media language). As pointed out by Stockwell and Minkova (2001: 6), "it is not uncommon for new technical terms to be created by blending." This remark is echoed in Ayto (2003: 183): blending "is now a perfectly respectable method of creating new scientific or technical terminology"; "instances of blending multiplied exponentially in the twentieth century", with the 1930s probably offering the largest number of new instances, but the trend continues into the present. Here are a few fairly recent examples: *advertorial* (*advertisement* + *editorial*) 'an advertisement written in the form of an editorial, which purportedly provides objective information about a commercial or industrial subject' (*OED2*: 1961), *infotainment* (*information* + *entertainment*), *affluenza* (*affluence* + *influenza*), *screenager* (*screen* (of a TV/computer) + *teenager*) or, from the collection at www.ruf.rice.edu/~kemmer/words: *televangelist* (*television* + *evangelist*), *carjacking* (*car* +

hijacking), *spork* (*spoon* + *fork*), *Japanimation* (*Japan* + *animation*), *Netizen* (*Net*, i.e. *Internet* + *citizen*), etc.

The method of *clipping* (or shortening) stands behind another large portion of new colloquial vocabulary. However, like in the case of acronymization (see below), instances of this process may legitimately be regarded as just form reductions of their longer counterparts. Examples from the 1990s include the following items (www.ruf.rice.edu/~kemmer/words): *zine* (from *magazine*), *vator* (from *elevator*), *wac* (from *wacky*), *fro-yo* (from *frozen yogurt*).

Finally, *acronyms* and *initialisms* are also widely coined in present-day English. Consider, respectively, *AWACS – Airborne Warning and Control System*, *SARS – Severe Acute Respiratory Syndrome*, *dinky – dual income no kids yet*, *yettie – young entrepreneurial technocrat*, on the pattern of *yuppie* (Dent 2003: 32); *ATB – all-terrain bike*, *GPS – Global Positioning System*, *ABS – anti-lock brake system* or *Australian Bureau of Statistics*, or *The American Bureau of Shipping*, or *Animal Behaviour Society*, etc.. Another example from media language is *WMD – Weapons of Mass Destruction*, which may also stand for various playful variations on this phrase, like *weapons of mass deception* (for a complete list, see www.rdues.liv.ac.uk/newwords.html). A new phenomenon, identified in the recent literature (see Stockwell and Minkova 2001: 9) is the rise of so-called *reverse acronyms*: "the creators start with a word they want as their name, say, for example, CORE, and they work from those four letters to find four words which represent something like the idea they want to be associated with" (*CORE* stands for *Congress of Racial Equality*). Formations of this sort are also called *slogan acronyms* (McArthur 1992: 12); other examples are: *NOW* for *National Organisation of Women*, *PACE* for the *Police and Criminal Evidence Act*.

For a succinct comparison of the dynamic changes in the use of the different types of word-formation processes in English, over the period 1880-1982, see Bauer (1994: 38). For instance, focusing on the different categories of new words, the author notes an increase in the numbers of blends and 'abbreviations', as opposed to a decrease in the numbers of words derived by suffixation.

5. SECRETION OF NEW AFFIXES

Affix *secretion* may be defined as a case where a new affix has established itself because speakers start to perceive it in a group of borrowed words (see Marchand 1969: 211, Adams 2001: 134) or because speakers reinterpret a particular existing word (which can be native or foreign). In the latter case, according to Rundblad and Kronenfeld (2000: 28), the phenomenon may be seen as a special case of folk etymology: "opaque words are, where the forms permit, remarkably often interpreted as compounds or affixations consisting of two parts." Initially, the use of such a newly established affix may be attributed to analogy (see section 3). Some older and well-known instances of the process under discussion are presented in Marchand (1969: 211); for instance, the suffix *-teria* 'shop, store, establishment', originally secreted from *cafeteria* and then used (since 1930, chiefly in American English) more and more freely, in novel, analogical coinages (like *candyteria*,

chocolateria, *fruiteria*, etc.); the pattern seems to be still alive (see Baldi and Dawar (2000: 968) where the suffix, "naming retail outlets", is illustrated with further examples (*cookieteria*, *used-bookteria*). Today there are a number of newly emerged suffixes of this sort. To illustrate this development, one can mention word-final elements like *-(o)holic* (from *alcoholic*: *workaholic*, *chocoholic*, *leisureholic*, *chatoholic*, *webaholic*), *-gate* (from *Watergate*: *Irangate*, *Monicagate*), *-nomics* (from *economics*: *Reaganomics*, *Clintonomics*) or *-buster* (based on the 1984 blockbuster film *Ghostbusters* (Baldi and Dawar 2000: 968)): *crimebuster*, *drugbuster*, *debtbuster* 'a loan', *fat-buster* 'a diet') as well as word-initial elements like *agri-* (*agribusiness*, *agricorporation*) or *e-* (*e-mail*, *e-commerce*, *e-shopping*, *e-cash*, *e-money*, *e-business*, etc.). According to some sources, the elements in question should be termed, more appropriately, 'combining forms' (see section 4 above); consider, for instance, the entry for *-athon* in the *OED2*: "a combining form, barbarously extracted f. MAR)ATHON, used occasionally in the U.S. (*talkathon*, *walkathon*), rarely in Britain, to form words denoting something carried on for an abnormal length of time." However, *-gate*, according to the same source, is a suffix. Given the fact that every such pattern originated from scratch, initially with only a few examples, one may observe that, today, some of them demonstrate a remarkable gain in productivity, being represented by several dozen coinages.

6. 'LEXICALISATION' OF AFFIXES

By 'lexicalisation' of affixes I mean here a diachronic process by which affixes (or combining forms) acquire independent lexical status, i.e. start to function as free forms. One well-known (and quite old) case of this sort is the nominal suffix *-ism*, which may be transformed into the noun *ism* (cf. *isms* in the plural), meaning 'system of belief' (see, e.g., Adams (2001: 60) and Bauer (1983: 35) on the diachronic passage of an element from suffix to lexeme). It appears that the potential for independent use evidenced by *ism* is also shared by several other elements, which may suggest an interesting trait of contemporary vocabulary. Another example might be *ish*; cf. A: *Was it expensive?* B: *Ish*. Additionally, consider the adjective *mega* (*It's absolutely mega*), based on the combining form *mega-*. However, words like *hood* 'neighbourhood in the inner-city' or *dis*(*s*) 'show disrespect', which are also identical with affixes, should rather be regarded as products of abbreviation (clipping) of the respective base-forms.

7. CHANGES IN THE PRODUCTIVITY, RELATIVE PRODUCTIVITY AND SCOPE OF INDIVIDUAL AFFIXES

Morphological productivity (see Bauer, this volume)) has been investigated in numerous studies in recent years. However, the vast majority of the relevant literature deals with this issue from a synchronic perspective, meaning that, for instance, the vocabulary used throughout the twentieth century is taken, collectively, as a data-base for generalisations. Consider, for instance, the detailed analyses of

English verb-forming processes in Plag (1999) from which one can learn that, for example, on the basis of the number of attested 20th century neologisms in the *OED*, English verb-deriving affixes may be arranged according to the decreasing order of their productivity as follows (Plag 1999: 104): *-ize* (284 new types or neologisms), *-ate* (72), *-ify* (23), *eN-* (7), *-en* (2) and *be-* (0). That is to say, within the set, *-ize* is judged to be most productive while *be-* is completely unproductive. But this gives us a fairly static, summary picture of the facts, in the sense that no distinct calculations are being offered for shorter periods. Alternatively, diachronic investigations of productivity are available where the, loosely defined, present-day system of word-formation is juxtaposed with the situation in past centuries (e.g. Bauer 2001). Yet, for the purpose of this discussion we should focus, first of all, on those changes in productivity which are a feature of the last few decades: various remarks scattered in the literature demonstrate that, predictably, some affixes have been gaining in productivity recently while others have been losing their productive potential. A few facts, outlined below, will illustrate this possibility.

The story of the noun-forming suffix *-nik* (as in *refusenik*) in twentieth-century English may serve as a textbook example of the changing scope and productivity of some word-formation patterns that we use today. Consider the following quotations: "This suffix, originally from Russian via Yiddish, started to gain popularity in English in the 1950s, but it had only a short period of high productivity" (Huddleston and Pullum 2002: 1699); *-nik* "enjoyed a considerable vogue in the middle of the twentieth century but has since faded" (Carstairs-McCarthy 2002: 113). The changing fate of the element in question was investigated in detail in Bauer (1983: 255-266)) where it is argued that, in fact, we are probably dealing here with two *-nik* suffixes: one in a group of words modelled on Russian *sputnik* (*dudnik*, *jutnik*, *nutnik*, etc.), where "*-nik* apparently stopped being productive early in the 1960s" and the other, personal *-nik* in words like *beatnik*, where it often means either 'fan of a certain kind of music' (*folknik*, *jazznik*) or 'member of an anti-establishment group' (*draftnik*, *peacenik*). According to Bauer's (1983) account, "[t]he person suffix *-nik* as in *beatnik* is still productive" (Bauer 1983: 259); a decade or so later the assessment is modified somewhat: Bauer (1994: 48) speaks of a "decline in use" of the suffix (in both functions, or of both suffixes). However, personal *-nik* is still alive in Yiddish-English; for example, there is the common Yiddish-English word *nudnik* 'an annoying person', from the verb *to noodge* 'to bother'; another Yinglish formation is *no-goodnik* (R. Lieber, personal communication). The rapid decline in the productivity of *-nik*, in the major dialects of English, is additionally suggested by the fact that the most recent creations involving this suffix attested in the *OED2* are the nouns *computernik* (1973) and *refusenik* (1975). At any rate, given the fact that English *-nik* is a relatively recent example of affix secretion, followed by a sharp rise and then fall in its productivity, the case illustrates particularly well the almost complete life cycle for one type of affix. It is remarkable that this could have been observed in the short period of the last half century.

Several affixes have increased their productivity in the past few decades. For instance, Adams (2001: 39) mentions the colloquial 'point of view' adverb-forming suffix *-wise* (e.g. *weatherwise* in *October is usually a very good month weatherwise*,

OED: 1971), *acting-wise* in *Acting-wise, I like Katharine Hepburn …*, *OED*: 1981, *talent-wise* in *It was a poor show, talent-wise*), pointing out that "[i]n adverbs with this function, *-wise* appears to have become noticeably productive fairly recently, from the mid-twentieth century onwards". In Knowles (1997: 162) one may read that "[i]n the eighties and nineties, the suffixes *-ism* and *-ist* became particularly productive in the field of POLITICAL CORRECTNESS" (e.g. *ableism* 'discrimination in favour of the able-bodied or against the disabled', *bodyism*, *faceism*, *sizeism*, "concerned with inappropriate concentration on the physical appearance", *youthism* 'over-concentration by society on the rights and interests of the young'). Dalton-Puffer (1999) demonstrates, on the basis of data excerpted from the *British National Corpus*, that the nominal suffix *-ful*$_N$ (*mouthful*, *barrelful*, *potful*, *busful*, *officeful*, *canful*, *eyeful*, etc.) is used with remarkable productivity in present-day English, even though the total number of tokens with this suffix found in the corpus is almost 27 times lower than the number of tokens which represent its (now virtually unproductive) adjective-forming homophone (3,083 and 82,889, respectively; characteristically, the number of hapax legomena, i.e. types occurring only once in the corpus, is higher for *-ful*$_N$ than for *-ful*$_A$ (74 and 50, respectively).

A somewhat different picture of changing productivity emerges when one takes into account pairs (or sets) of so-called *rival affixes*. These are elements which, while being formally distinct, realise the same derivational function. Hence they should be linked to competing word-formation processes. For example, English deverbal abstract nominalisations reveal several rival suffixes, ranging from the completely unproductive *-ter* in *laughter* and *-th* (*growth*), through the "moderately successful" *-ency*, *-ancy*, *-ence*, *-ance*, *-age*, *-al*, *-ery*, *-ure*, *-y*, and *-ment*, up to the productive suffix *-ion* (for details, see e.g. Bauer 2001: 177 ff). As is well known, for the more widely used suffixes on the list, the scope of their application is largely delimited by complex conditions or constraints, so that, normally, for a single base, one does not find co-existent rival forms with the same semantics. But the scope of the rule attaching a particular suffix may be subject to change. In particular, the trade-off relation between the two suffixes, *-ment* and *-ion* (together with its variants: *-ation*, *-cation*, *-ution*, *-ition*), underwent modification in the not so distant past so that one may speak of a decisive change in their relative productivity. The investigation of a dictionary-based sample of English nominalisations conducted by Bauer (2001) demonstrates that the suffix *-ment* (as in *involvement*) "appears to have been productive between the mid-sixteenth century and the mid-nineteenth century" (Bauer 2001: 181). As a result, the trend in present day-English is to use, for deverbal nominalisations, either the appropriate variant of *-ion* or conversion (mainly for unaffixed verbs). In particular, comparison of the relevant data derived from the *OED* for the period 1600–1950 reveals "a rise in the productivity of the *-ation* variant as *-ment* declines in productivity" (Bauer 2001: 184).

8. SEMANTICS: CHANGES IN FORMATIVE FUNCTIONS

On a micro-scale, changes in formative functions may be detected when we observe some recent modifications in the semantic (and syntactic) behaviour of

individual complex words. However, unless the new element of meaning recurs in certain other forms representing a given morphological pattern, the change ought to be seen just as an isolated lexical innovation, an idiosyncrasy limited to one lexical item rather than as an expansion or shift in the semantics of a particular affix (for a useful typology of semantic shifts of the former type, see e.g. Algeo 1998: 69).

Let me illustrate this point with the English colour verb *to green*, derived by conversion from the corresponding adjective (for details and full documentation, see Fischer 2000). Just like with other colour verbs in English, derived either by conversion (*to white*) or by *-en* suffixation (*to whiten*), there are two principal and long-established senses of *to green*, crudely paraphrasable as (1) 'to become green' (intransitive) and (2) 'to colour or dye green' (transitive). However, as Fischer (2000) demonstrates, the semantic status of *to green* (and its nominalisation *greening*) is rather special, compared to other colour verbs, since, in the second half of the twentieth century, the verb developed two new senses: (3) 'to render (an urban area) more green or rural in appearance, esp. by planting trees, etc. and developing parkland; also, to reclaim (a desert area)' (first attestation 1979); and (4) 'to render (a person, etc.) sensitive to ecological issues; hence, to make (something) less harmful to the environment, to adapt along environmentally friendly lines' (first attestation 1985). Consider, respectively, *They greened inner cities* and *The electorates are being greened* (examples adapted from Fischer 2000: 82). Fischer argues that, today, "the new 'ecological' senses dominate all others". One may add that the 'ecological' function simply occurs more often because of pragmatic, extra-linguistic factors, i.e. its use in the media. Of course, it would be absurd to claim that the new 'ecological' senses are, by whatever mechanism, a new feature of conversion as a process; or that conversion may be held responsible for their development. They are evidently linked to one product of conversion only (actually, occasioned by a broadening of the semantics of the adjectival base *green* itself).

But there are also more widespread upheavals in the semantics of individual derivatives, serially occurring within a particular pattern, which may tell us something about the changing semantics of formatives as well. Such instances can be observed in the case of so-called multi-functional (polysemous) affixes, i.e. elements which, on a regular basis, render more than one function. One may hypothesise then that a particular meaning of a given affix may gain in prominence, while another one may be on the wane (therefore, as is argued e.g. in Bauer (2001: 199), "different meanings of the same form should be treated separately where questions of productivity are concerned"). This is exactly what has happened recently, for instance, to the noun-forming suffixes *-ship* and *-ee*.

The *OED2* gives, under the main entry for *-ship*, the following major meanings of the suffix (when used as a noun-forming denominal element): 'state or condition of being N' (e.g. *friendship*), 'office, position, dignity, or rank of N' (*ambassadorship*), 'state of life, occupation, or behaviour relating to or connected with N' (*courtship*) and, finally, there are *-ship* nouns "having a collective sense" (see also Marchand (1969: 345-6) for a more detailed classification). It is the last category that I want to focus upon here. Characteristically, the *OED2* does not list, under the entry for *-ship*, any modern usage examples showing the collective nouns in context. One finds only the comment that such nouns "were numerous in OE".

However, when we search through the individual entries for some *-ship* nouns, it turns out that the collective meaning is often acknowledged. It should be noted that the collective sense (when present) is attested with a later date than the remaining meanings (of state/condition/office, etc.). For example: *readership* (1923/1719), *membership* (1850/1647), *partnership* (1802/1576), *leadership* (ca. 1939/1821), *trusteeship* (ca. 1885/1730), plus one instance of an old collective use: *fellowship*. This seems to suggest that the collective sense is secondary, and posterior, with respect to the other functions of *-ship*, but this development is by no means exceptional. Granted, many *-ship* nouns have not developed the collective meaning at all (for instance, *professorship* (1641), *judgeship* (1677), *citizenship* (1611), *teachership* (1846)). For some other nouns, one can detect a slight tinge of the collective meaning. For instance, the principal meaning of *listenership* (1943), as defined in *Webster's Ninth New Collegiate Dictionary*, is collective: 'the audience for a radio program or record album', i.e. 'listeners, collectively', while the *OED2* only gives a qualified, narrower paraphrase: 'the estimated number of listeners to a broadcast programme or to radio'. On the other hand, one should add that, in present-day (British and American) English, one can find further examples of the collective use of *-ship* which are simply unaccounted for in the *OED2*, even if a suitable lexical entry exists in the dictionary. Such is the case with *butlership*, *contributorship*, *landownership*, *subscribership* (listed also in Adams (2001: 9, 64), as instances of collective nouns). Thus, for instance, under *landownership* we find, in the *OED2*, one clear text example (1867) suggesting that the meaning of the noun may be collective: "England's landownership will never be without the representatives …". On the basis of the evidence just presented one may conclude, then, that the English suffix *-ship* seems to be re-gaining its original (OE) significance as a marker of collectivity.

The noun-forming suffix *-ee* offers another spectacular example of recent changes in affixal semantics. The case is investigated in detail in Bauer (1994: 40-47); here, for lack of space, we only present the most significant facts and findings. Bauer presents a semantic comparison of two samples of *-ee* derivatives: one set of 100 items consisting of nineteenth century formations extracted from the *OED1* (nouns like *employee* (1850), etc.). The other sample, based on a variety of recently published sources, gives 60 twentieth century words using the suffix *-ee*, of which 11 are actually listed in the *OED2*. (Because today we are able to confront the latter sample with the contents of the *OED2*, it turns out that, in fact, 4 items should not have been included there since they are first attested in earlier centuries: *bribee* (1858), *dislocatee* (1827), *promissee* (1733), *pumpee* (1834)). The conclusions that follow from the comparison are quite instructive: in the nineteenth century (and earlier), the suffix *-ee* is used regularly and almost exclusively in personal nouns with a passive meaning, bearing the grammatical function of either direct object (e.g. *appointee*) or object of a preposition (e.g. *payee*) in relation to the base verb (only 2 nouns with subject function were recorded). In the twentieth century, the situation is markedly different. Most importantly, "the number of *-ee* words which act syntactically as the object of a preposition is falling in this century, while the number of subject formations is on the increase" (Bauer 1994: 46). This new trend may be illustrated with subject neologisms like *attendee*, *knockee*, *waitee*. Secondly,

Bauer points out that there is another, quite new (late twentieth-century) tendency whereby the suffix denotes inanimate entities. Several examples of recently coined terms in linguistics are given to illustrate this development: *advancee*, *causee*, *cliticee*, etc. To sum up, two conclusions may be drawn from the facts just presented: first, the suffix *-ee* is at least moderately productive in present-day English (as it occasionally gives rise to neologisms) and, secondly, its scope of use and semantics have undergone significant changes in the past decades (see also Adams (2001: 29-31) for more examples and discussion).

9. TRENDS IN THE FORM OF COMPLEX WORDS

9.1 Choice of rival affixes – morphological doublets

A type of formal variation evidenced by some currently used derivatives, which consists in the existence of so-called morphological doublets (rival forms) may be indicative of some change in progress. These are pairs of synonymous complex words which share the same base but involve distinct formatives, e.g. two different affixes (cf., for instance, the existence of attested doublets in *-ness* and *-ity*: *prescriptiveness* / *prescriptivity*, etc.). One may predict that this sort of formal fluctuation is not likely to persist for a long time; usually, one of the rival forms eventually takes over and becomes established (thus strengthening the derivational pattern it represents) while the other variant sinks into oblivion (or they acquire specialized meanings, as in *historic* / *historical*, *economic* / *economical*).

Let me illustrate the phenomenon sketched above with some complex words which are part of the familiar terminology of linguistics.

First, we may consider the pattern of denominal adjective formation. The two common suffixes are *-ic* and *-al*. When we limit ourselves to just a few standard names of linguistic disciplines, we get the following picture:

(1)

Noun		*Adjective*		
phonetics	–	phonetic	/	phonetical
syntax	–	syntactic	/	(syntactical)
semantics	–	semantic	/	(semantical)
phonology	–	(phonologic)	/	phonological
morphology	–	(morphologic)	/	morphological

As is well known, both *-ic* and *-al* have been productive, for a long time, in deriving denominal adjectives (e.g. *formal* vs. *atomic*). In a number of words, both suffixes appear in combination (e.g. *geographical*; also the forms in the right-hand column above). For two nouns on the list, *syntax* and *semantics*, the longer adjectives, with the affixal complex *-ic-al*, are, according to some sources, no longer in use (Adams 2001: 36), i.e. *syntactical* and *semantical* strike the ear as decidedly obsolete (current linguistic jargon uses *syntactic* and *semantic* almost exclusively,

though the *OED2* offers relatively recent (1978) citations for both *syntactical* and *semantical*). On the other hand, the longer forms in *-ic-al* prevail in current usage for nouns like *phonology* and *morphology*. Even though the *OED2* lists both *phonologic* and *phonological* under the main entry of *phonology*, the former is hardly ever found in linguistic texts published today (one not so recent counterexample occurs in the title of McCawley's (1967) paper: "Sapir's Phonologic Representation", but this is only because the term *phonologic* was used by Sapir himself). Next, the pair *phonetic* / *phonetical* illustrates yet another possibility, where both denominal forms are not only attested in dictionaries, but actually used in the standard language. So it is appropriate to view them as genuine by-forms or variants (although the longer form, *phonetical*, seems to have some slight tinge of obsoleteness and is, probably, less common than its rival).

The examples demonstrate that, when observing competition between some current morphological variants, it is not always possible to predict the development of a particular pattern because the evidence available today may not point in one direction, as far as future change is concerned, or the preferences of the speakers may be motivated by extra-grammatical factors (in particular, their choices concerning individual lexemes do not have to follow from any conceivable restructuring in the morphological system).

Secondly, let us consider a more complicated example, offered by the name of the major discipline, *linguistics*, and the personal noun that corresponds to it. So, what do you call somebody who specialises (or 'is versed') in linguistics? If you say 'a *linguist*' you are obviously right, although this is not the only meaning of the term as used today; cf. *CALD*: a linguist is "someone who studies foreign languages or can speak them very well, or someone who teaches or studies linguistics". In fact, the exactness of this dictionary definition may be questioned in the light of the following passage: "A 'linguist,' at least in academic disciplinary terms, is not a person who speaks many languages, but rather someone concerned with the scientific study of language more generally" (Anderson and Lightfoot 2002: 1). But you may be surprised to find that, according to the *OED1* (and also *OED2*) you are wrong, in a way: "One who is versed in linguistics" is the gloss of another personal noun, *linguistician* (last citation 1967 in the *OED2*). The meaning 'a practitioner of linguistics' is not listed at all under *linguist* in the *OED2*. However, one may surmise that it is implied in the subentry glossed as "a student of language; a philologist" (first citation 1641, last citation 1973); the more so since the association between *linguist* and *linguistics* is made explicit in one of the illustrative examples: "The general linguist, in the sense of the specialist or the student concerned with general linguistics" (R.H. Robins, 1964/1971).

Regardless of the confusing picture that one may get from the *OED*, everyday experience teaches us that, today, linguists never call themselves 'linguisticians' (or 'linguisters' – another obsolete formation to be found in the *OED*, usually meaning 'an interpreter'). The term now is obsolete and seems to sound humorous, although it was in (serious) use a few decades ago (for example, D. Jones, in 1957, referred to Edward Sapir as "the eminent American *linguistician*").

Similarly, if we focus on one part of linguistics (grammar), viz. *semantics*, it turns out that, according to the *OED*, there are two rival personal nouns

corresponding to it, i.e. either *semantician* or *semanticist* (listed under the main entry: *semantic*). Both are provided with usage examples from the twentieth century. However, it appears that the latter term, *semanticist*, is the preferred by-form in recent linguistic discourse. And vice versa, as a personal derivative from *syntax*, *syntactician* is more common today than its rival, *syntacticist* (both are listed under separate entries in the *OED*). Also, *phonologist* (from *phonology*) has completely ousted its older rival, *phonologer* (*OED*: 1864).

9.2 Phonological form – stress

The last few decades have witnessed interesting new developments in processes affecting the phonological form of complex words. The current changes are best visible in the domain of stress placement, certain aspects of which will serve as an illustration below (new trends in segmental phonology will be left undiscussed).

Certain cases of variation in stress placement observable today within a single variety of English may be a symptom of change in progress. I ran a simple test, to see if such a change is, in fact, taking place. Its objective was, first, to identify instances of complex words of unstable stress in present-day British English, which could be taken as revealing changes in speakers' preferences, i.e. in the content of some phonological rules of stress assignment. The relevant data were collected from the *Longman Pronunciation Dictionary* (*LPD*, = Wells 1990). Secondly, relevant examples of recently emerged stress patterns were compared with their more conservative pronunciation, recorded over thirty years ago, in the 13th edition of the *English Pronouncing Dictionary* (Jones 1967).

Naturally, there is a huge number of words with variant pronunciations in Wells (1990). However, among these, there is a relatively small number of entries about which even the editors could not decide on the predominant stress option. Therefore, as is explained in the introductory note (Wells 1990: xi), "[f]or nearly a hundred words of uncertain pronunciation, the *LPD* reports the preferences expressed in a postal opinion poll carried out among a panel of 275 native speakers of BrE from throughout Britain. […] The survey was carried out between November 1988 and February 1989."

I tried to locate in the dictionary and make a list of these "words of uncertain pronunciation", assuming that cases of fresh, unsettled variation may be indicative of recent change, or change in progress. Because I evidently missed a few items, 58 words appeared on the list. The list included both morphologically simplex and complex items, revealing segmental and suprasegmental differences (alternative pronunciations). Of the total of 58 words, 4 are adjectives in *-able* (*applicable*, *demonstrable*, *formidable*, *hospitable*). No other pattern of affixation is represented on the list with more than one example (e.g. *innovative*, *primarily*, *subsidence*), which seems to suggest that the class of *Xable* adjectives is a special case, characterised by the highest degree of fluctuation in stress contour. The results of the native speakers' opinion poll (Wells 1990) concerning these four words are presented below (Table 1), juxtaposed with the older, more conservative pronunciation preferences recorded in Jones (1967) and still reflected in, for

instance, *OED2*. The contrast is spectacular: in Jones, the recommended pronunciation is with stress on the first syllable, while the informants consulted by Wells prefer stress on the second (antepenultimate, third from the end) syllable. Wells abides by those preferences, except for *formidable* which, unexpectedly, is listed first with initial stress (contra the narrow margin of responses in favour of antepenultimate stress). Let it be added, however, that in a very recently published dictionary like *CALD* (2003), only the new preference (i.e. stress on the second syllable) is reflected in the transcription for *formidable*. Finally, the new, 16th edition of *EPD*, edited by Roach, Hartman and Setter (2003), is fully consistent with Wells in assigning priority to stress on the second syllable.

Xable	*EPD* (Jones 1967)	*LPD* (Wells 1990)
applicable	['æplikəb|l] [ə'plik-]	[ə'plɪkəbˌl] 77% ['æplɪkəbˌl] 23%
demonstrable	['demənstrəb|l] [di'mɔn-]	[dɪ'mɒnstrəbˌl] 63% ['demənstrəbˌl] 37%
formidable	['fɔ:midəb|l] [fɔ:'mid-] [fə'm-]	['fɔ:mɪdəbˌl] 46% [fə'mɪdəbˌl] 54%
hospitable	['hɔspitəb|l] [hɔs'pit-] [həs-]	['hɒ'spɪtəbˌl] 81% ['hɒspɪtəbˌl] 19% [hə-]

Table 1 *Four -able words with variant stress in Jones (1967) and Wells (1990)*

Apart from the four words given above, one may find several other adjectives in *-able*, in both dictionaries, where the same stress difference may be observed, although Wells does not quote any supporting evidence from the speakers' opinion poll. Take, for instance, *explicable*, for which the now recommended pronunciation is given with stress on the second syllable in Wells (1990: 260), while Jones (1967: 171) lists the initially stressed option first, together with the following note: "The pronunciations with stress on the second syllable are becoming common, and seem likely to supersede the other before long". The table reveals the confusing stress behaviour of the *Xable* words, and also suggests a possible source for it: during the past two or three decades there must have been a decisive shift in the preferences of the speakers, in favour of antepenultimate stress. But what is the exact nature of this recent trend? An answer to this question may be found in Bauer (1994).

Having presented the evidence in the form of a variety of Latinate words in English (derived and morphologically simple), together with the stress patterns they are assigned in late twentieth century (and earlier) reference works, Bauer (1994: 99) concludes that "[t]he change in every case is a change towards stress on the antepenultimate syllable". The author adds that this change has been taking place for a long period in the language in general (e.g. today *character* is stressed on the first (antepenultimate) syllable while it was stressed on the second syllable in the seventeenth century). It may be seen then that the currently observed changes in the preferred stress of *Xable* adjectives are a fragment of a more general diachronic

development. However, the interesting detail is that the forms in *-able* have succumbed to this long-lasting process of change relatively recently.

Changes in stress are of paramount importance because at least some new trends in the pronunciation of individual vowels and consonants in complex words may be attributed to stress shift (which is a well known fact about English phonology). For instance, it is a direct consequence of shifted stress that, today, the noun *subsidence* (derived from the verb *subside*) is pronounced at least as often with a short vowel [ɪ] in the root, when stress falls on the first (antepenultimate) syllable, as with the diphthong [aɪ], when stress is homologic, i.e. falls on the same syllable in the base and in the derivative (the latter is the older preference). But, for this particular item, speakers of British English are divided in their preferences. According to the results of the opinion poll cited in Wells (1990: 687), stress on the first syllable is preferred by 53% of informants, while stress on the second syllable is opted for by 47%. This lack of stability may be attributed to another current tendency mentioned in Bauer (1994: 101): "This is a tendency for the base in a morphologically complex word to remain transparent – more easily recognizable". Needless to say, the requirement of transparency is met when both the verb and the noun are stressed on the same syllable and contain the same vowel [aɪ]. The example of *subsidence* shows that, when the two tendencies are in conflict, alternative phonological by-forms may co-exist for quite some time before the drift takes a definitive direction.

In any case, the principle of formal transparency does not apply unequivocally to our examples listed in Table 1, since two of them (*formidable*, *hospitable*) are not, actually, synchronic derivatives (so the putative base is not recoverable, anyway) and one (*demonstrable* from *demonstrate*) is only partly transparent, because a process of so-called *truncation* is involved here. *Applicable* (with stress on the second syllable) meets both conditions. An analysis of a larger number of *-able* adjectives (see Bauer 1994: 159 ff) shows that they are stressed today according to several (sometimes conflicting) principles, some of them old and conservative and others new and innovative. Thus, the general rule stipulates that stress should be homologic in adjectives with a transparently recoverable base (e.g. *ac'cept – ac'ceptable*) as well as in those forms which involve truncation (*'operate – 'operable*). When these conditions are not met, "stress should fall two syllables before the *-able* suffix", e.g. *'veritable* (Bauer 1994: 160). But there are exceptions: for instance, words like *'admirable*, which attract stress two syllables before the suffix (i.e. on the fourth syllable from the end), even though they are relatable to an independently existing base (*ad'mire*); or words like some of those in Table 1 (*ho'spitable*, etc.), which show the new preference towards shifting stress from the fourth syllable from the end to the next (antepenultimate) syllable.

Recent studies of the differences in the stress placement of some *-able* adjectives show that such distinctions may be governed not only by formal transparency but also by semantic transparency (or compositionality). Thus, as pointed out in Giegerich (1999: 29), there are phonological doublets like *'comparable / com'parable*, *'reparable / re'pairable* (but cf. *in'comparable* vs. *uncom'parable*, *ir'reparable* vs. *unre'pairable*) where the forms which are phonologically

transparent (cf. *com*ˈ*pare*, *re*ˈ*pair*), i.e. do not involve stress shift, are also semantically transparent, so that *com*ˈ*parable* means 'able to be compared' while ˈ*comparable* means 'roughly the same'.

For reasons of space, I must leave undiscussed other types of what seem to be recent innovations in stress placement, concerning, for instance, certain other affixes (*-free* in ˌ*lead-*ˈ*free* vs. ˈ*carefree*) compounds (ˌ*ice*ˈ*cream* vs. ˈ*ice*ˌ*cream*) and products of conversion.

* * *

I hope to have demonstrated with this brief survey that English word-formation is doing quite well and keeps many people busy: first, the ordinary language user, the journalist or media man, the writer and the copywriter, and all those other individuals who like to test, from time to time, the limits of morphological creativity and, finally, the linguist, who must try to make sense of the new creations.

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REFERENCES

Adams, Valerie. 2001. *Complex Words in English*. Harlow: Longman.

Algeo, John. 1998. "Vocabulary." In: S. Romaine (ed.), *The Cambridge History of the English Language. Volume IV: 1776-1997*. Cambridge: Cambridge University Press, 57-91.

Anderson, Stephen R. and Lightfoot, David W. 2002. *The Language Organ. Linguistics as Cognitive Physiology*. Cambridge: Cambridge University Press.

Aronoff, Mark. 1980. "Contextuals." *Language* 56, 744-758.

Ayto, John. 2003. "Newspapers and Neologisms." In: J. Aitchison and D. M. Lewis (eds.), *New Media Language*. London and New York, 182-186.

Baayen, Harald and Lieber, Rochelle. 1991. "Productivity and English Derivation: A Corpus-Based Study." *Linguistics* 29, 801-843.

Baldi, Philip and Dawar, Chantal. 2000. "Creative Processes." In: G. Booij, Ch. Lehmann, and J. Mugdan (eds.), *Morphology. An International Handbook on Inflection and Word-Formation*. Berlin – New York: Walter de Gruyter, 963-972.

Bauer, Laurie. 1983. *English Word-Formation*. Cambridge: Cambridge University Press.

Bauer, Laurie. 1994. *Watching English Change. An Introduction to the Study of Linguistic Change in Standard Englishes in the Twentieth Century*. London and New York: Longman.

Bauer, Laurie. 2001. *Morphological Productivity*. Cambridge Studies in Linguistics, 95. Cambridge: Cambridge University Press.

Bauer, Laurie. 2003. "English Prefixation – a Typological Shift?" *Acta Linguistica Hungarica* 50, 33-40.

Biber, Douglas. 2003. "Compressed Noun-Phrase Structures in Newspaper Discourse. The Competing Demands of Popularization vs. Economy." In: J. Aitchison and D. M. Lewis (eds.), *New Media Language*. London and New York: Routledge, 169-181.

Cannon, Garland. 1987. *Historical Change and English Word-Formation. Recent Vocabulary*. New York: Peter Lang.
Carstairs-McCarthy, Andrew. 2002. *An Introduction to English Morphology*. Edinburgh: Edinburgh University Press.
Clark, Eve and Clark, Herbert H. 1979. "When Nouns Surface as Verbs." *Language* 55, 767-811.
Cowie, Claire. 2000. "The Discourse Motivations for Neologising: Action Nominalization in the History of English." In: J. Coleman and C. J. Kay (eds.), *Lexicology, Semantics and Lexicography*. Amsterdam/Philadelphia: John Benjamins, 179-207.
Dalton-Puffer, Christiane. 1999. "Screenfuls of Classifier Things: Noun Classes and Derivation in English." *VIEWS. Vienna English Working Papers* 8/1, 7-20.
Dent, Susie. 2003. *The Language Report*. Oxford: Oxford University Press.
Faiss, Klaus. 1992. *English Historical Morphology and Word-Formation: Loss versus Enrichment*. Trier: WVT Wissenschaftlicher Verlag Trier.
Fischer, Andreas. 2000. "The greening of *greening*." In: Ch. Dalton-Puffer and N. Ritt (eds.), *Words: Structure, Meaning, Function. A Festschrift for Dieter Kastovsky*. Berlin – New York: Mouton de Gruyter, 75-86.
Giegerich, Heinz J. 1999. *Lexical Strata in English. Morphological Causes, Phonological Effects.* Cambridge: Cambridge University Press.
Huddleston, Rodney and Pullum, Geoffrey K. 2002. *The Cambridge Grammar of the English Language*. Cambridge: Cambridge University Press.
Jones, Daniel. 1957. "The History and Meaning of the Term 'Phoneme'." Supplement to *Le maître phonétique* (reprinted in E. C. Fudge (ed., 1973), *Phonology*, Harmondsworth, Penguin Books, 17-34).
Kastovsky, Dieter. 1986. "Diachronic Word-Formation in a Functional Perspective." In: D. Kastovsky and A. Szwedek (eds.), *Linguistics across Historical and Geographical Boundaries. In Honour of Jacek Fisiak on the Occasion of His Fiftieth Birthday.* Berlin: Mouton de Gruyter, 409-421.
Kiparsky, Paul. 1997. "Remarks on Denominal Verbs." In: A. Alsina, J. Bresnan, and P. Sells (eds.), *Complex Predicates*. Stanford, CA: Center for the Study of Language and Information, 473-499.
Lieber, Rochelle. 1992. *Deconstructing Morphology. Word Formation in Syntactic Theory.* Chicago and London: The University of Chicago Press.
Ljung, Magnus. 2000. "Text Condensation in the Press: The Case of Compound Adjectival Premodifiers." In: Ch. Dalton-Puffer and N. Ritt (eds.), *Words: Structure, Meaning, Function. A Festschrift for Dieter Kastovsky*. Berlin – New York: Mouton de Gruyter, 205-215.
Marchand, Hans. 1969. *The Categories and Types of Present-Day English Word-Formation*. 2nd revised edition. München: C. H. Beck.
McArthur, Tom (ed.). 1992. *The Oxford Companion to the English Language*. London – New York – Sydney – Toronto: BCA.
McCawley, James D. 1967. "Sapir's Phonologic Representation." *International Journal of American Linguistics* 33, 106-111.
Paling, Chris. 1997. *Morning All Day*. London: Vintage.
Plag, Ingo. 1999. *Morphological Productivity. Structural Constraints in English Derivation*. Berlin – New York: Mouton de Gruyter.
Plag, Ingo; Dalton-Puffer, Christiane; and Baayen, Harald. 1999. "Morphological Productivity across Speech and Writing." *English Language and Linguistics* 3/2, 209-228.
Robins, R. H. 1964/1971. *General Linguistics. An Introductory Survey*. (2nd edn). London: Longman.
Rundblad, Gabriella and Kronenfeld, David B. 2000. "Folk-Etymology: Haphazard Perversion or Shrewd Analogy?" In: J. Coleman and C. J. Kay (eds.), *Lexicology, Semantics and Lexicography*. Amsterdam/Philadelphia: John Benjamins, 19-34.
Sapir, Edward. 1921. *Language. An Introduction to the Study of Speech*. New York: Harcourt, Brace and World.
Shimamura, Reiko. 1983. "Backformation of English Compound Verbs." In: J. F. Richardson, M. Marks and A. Chukerman (eds.), *Papers froms the Parasession on the Interplay of Phonology, Morphology and Syntax*. Chicago: Chicago Linguistic Society, 271-282.
Spencer, Andrew. 1991. *Morphological Theory. An Introduction to Word Structure in Generative Grammar*. Oxford: Blackwell.

Stein, Gabriele. 2000. "The Function of Word-Formation and the Case of English *-cum-*." In: Ch. Dalton-Puffer and N. Ritt (eds.), *Words: Structure, Meaning, Function. A Festschrift for Dieter Kastovsky*. Berlin – New York: Mouton de Gruyter, 277-288.
Štekauer, Pavol. 2002. "On the Theory of Neologisms and Nonce-Formations." *Australian Journal of Linguistics* 22, 97-112.
Stockwell, Robert and Minkova, Donka. 2001. *English Words. History and Structure*. Cambridge: Cambridge University Press.

Dictionaries

Algeo, John (ed.). 1991. *Fifty Years among the New Words: A Dictionary of Neologisms 1942-1991*. Cambridge: Cambridge University Press.
Ayto, John. 1989. *The Longman Register of New Words*. Harlow: Longman.
Barnhart, Clarence L., Sol Steinmetz, Robert K. Barnhart. 1973. *A Dictionary of New English*. London: Longman.
Barnhart, Clarence L., Sol Steinmetz, and Robert K. Barnhart. 1980. *The Second Barnhart Dictionary of New Words*. Bronxville, New York, etc.: Barnhart/Harper & Row.
Barnhart, Robert K. and Sol Steinmetz (eds.). 1990. *The Third Barnhart Dictionary of New English.* New York: H. W. Wilson.
Cambridge Advanced Learner's Dictionary. 2003. Cambridge: Cambridge University Press. *[=CALD]*
The Compact Edition of the Oxford English Dictionary. 1979. 2 vols. Oxford: Oxford University Press. *[=OED1]*
Green, Jonathon. 1991. *Neologisms. New Words since 1960*. London: Bloomsbury Publishing.
Jones, Daniel. 1967. *English Pronouncing Dictionary*. 13th ed. (edited by A. C. Gimson). London: J. M. Dent & Sons. *[=EPD, 13th ed.]*
Knowles, Elizabeth. 1997. *The Oxford Dictionary of New Words*. Oxford, New York: Oxford University Press.
Reifer, Mary. 1955. *Dictionary of New Words*. New York: Philosophical Library.
Roach, Peter; Hartman, James; and Setter, Jane (eds.). 2003. *English Pronouncing Dictionary. Daniel Jones.* Cambridge: Cambridge University Press. *[=EPD, 16th ed.]*
Simpson, J. A. and Weiner, E. S. C. (eds.). 1989. *The Oxford English Dictionary. Second Edition*. Oxford: Clarendon Press. *[=OED2]*
Spears, Richard A. 1991. *Dictionary of American Slang*. Lincolnwood, Ill.: National Textbook Company.
Tulloch, Sara. 1991. *The Oxford Dictionary of New Words. A Popular Guide to Words in the News*. Oxford, New York: Oxford University Press.
Webster's Third New International Dictionary of the English Language. 1961. Springfield, MA: Merriam-Webster.
Wells, J. C. 1990. *Longman Pronunciation Dictionary*. Harlow: Longman. *[=LPD]*

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