Foreign Accent: The Ontogeny and Phylogeny of Second Language Phonology

Second Language Acquisition Research
Theoretical and Methodological Issues

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Preface

From my earliest recollection, human speech sounds have intrigued me. It is not a surprise that I am a linguist with a particular interest in accents, both native and nonnative. Teaching in Brazil nearly 30 years ago, I was struck by how much Portuguese phonology I could learn by carefully listening to my students speaking English. However, I was startled and puzzled that some of their nonnative substitutions could not be explained by Portuguese phonology alone. Although I did not realize it at the time, this was the birth in my interest in the interrelationship between language transfer and universals, which is the heart of this book.

There are a number of colleagues, students, and friends whose contributions are too numerous to individually credit here. Rather, I extend my wholehearted thank you to: John Archibald, Barbara Baptista, Bob Bayley, Ellen Broselow, Ferenc Bunta, Bob Carlisle, Fred Eckman, Andy Edwards, Jim Flege, David Ingram, Allan James, Marysia Johnson, Bill Labov, Jonathan Leather, Björn Norström, Martha Pennington, Dennis Preston, Tom Scovel, Elly Van Gelderen, Martha Young-Scholten, and Henning Wode. In addition to these people, I want to thank the editors of the Lawrence Erlbaum series in which this work appears, Susan Gass and Jacquelyn Schachter, who gave me invaluable feedback at various stages, and the staff at Lawrence Erlbaum Associates, including Bill Webber, Art Lizza, and Marianna Vertullo.

Especially I would like to thank my wife, Mary Ann, who has been unfailingly supportive and encouraging. I cannot guess how many times she has cheerfully tolerated my jumping out of bed in the middle of the night to write down my thoughts.

Errata: In *Foreign Accent: The Ontogeny and Phylogeny of Second Language Phonology*, by R. C. Major, the third column heading in table 1.5 should be FaithBack. Also, the following figures should have appeared as shown here:

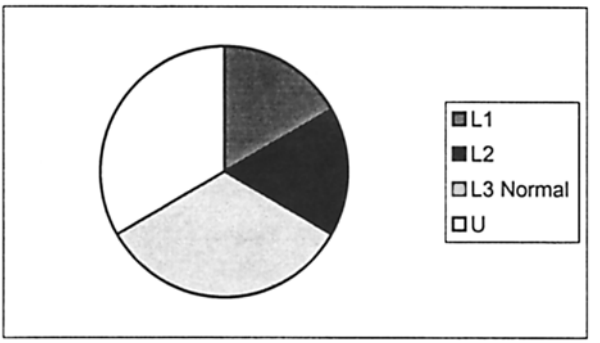

FIG. 4.31. L3 Acquisition. Normal phenomena.

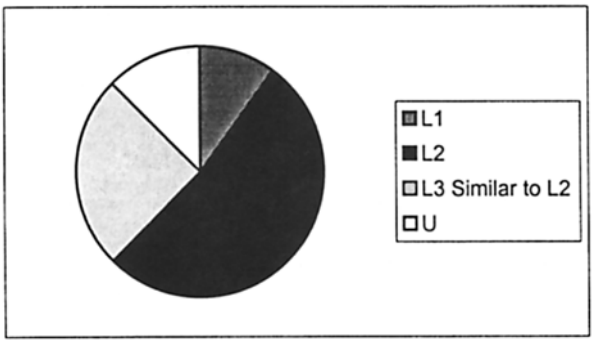

FIG. 4.32. L3 Acquisition. L2 and L3 with similar phenomena.

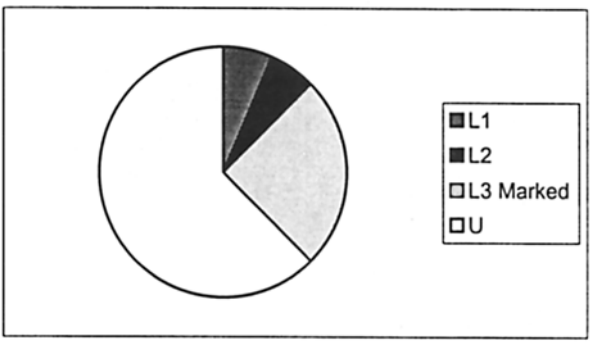

FIG. 4.33. L3 Acquisition. Marked phenomena.

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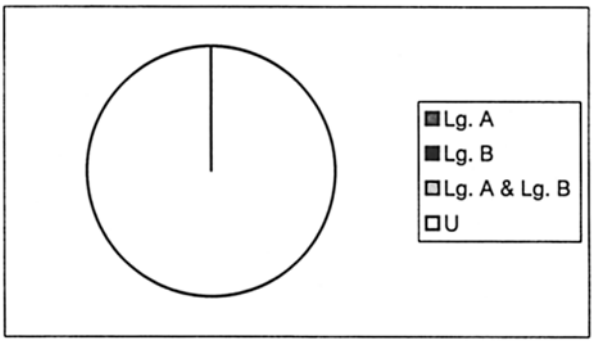


FIG. 4.39. Stage 1. Bilingual acquisition.

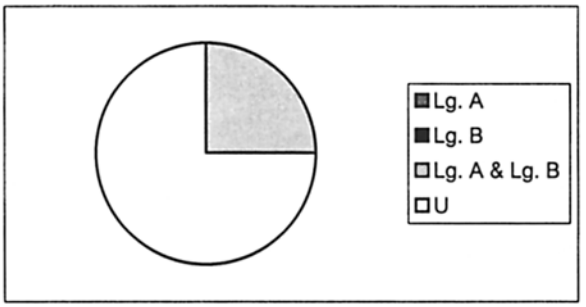
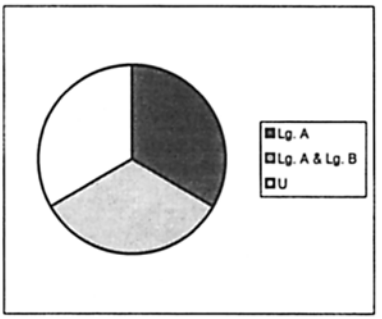


FIG. 4.40. Stage 2. Bilingual acquisition.



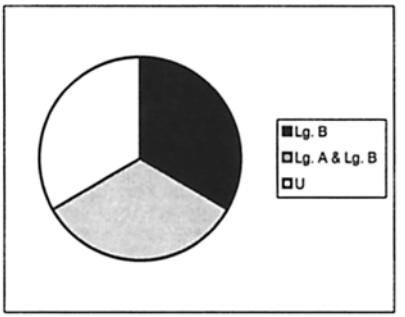


FIG. 4.41. Stage 3. Bilingual acquisition.

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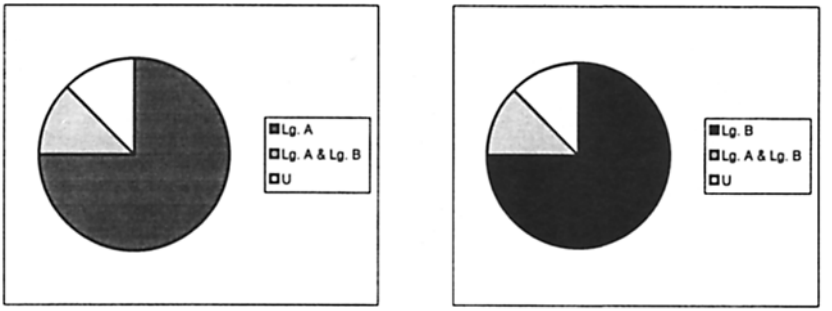

FIG. 4.42. Stage 4. Bilingual acquisition.

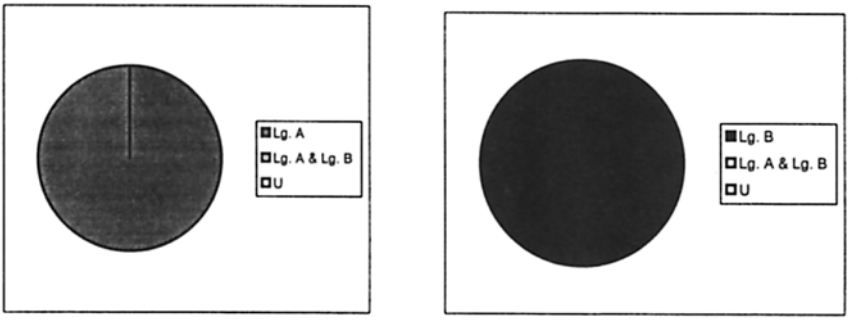

FIG. 4.43. Stage 5. Bilingual acquisition.

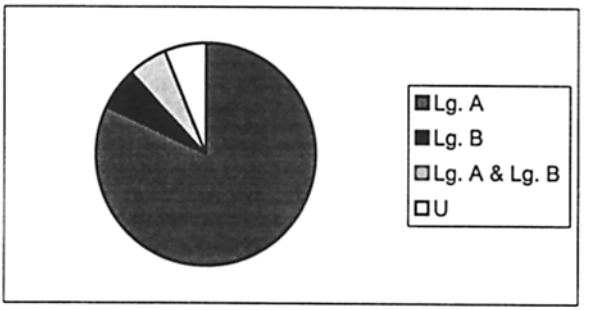

FIG. 5.7. Bilingualism. Language A: Neither A nor B dominant.

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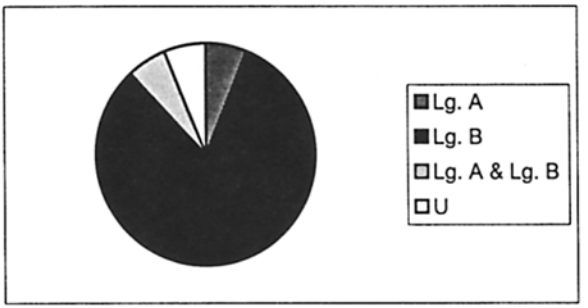

FIG. 5.8. Bilingualism. Language B: Neither A nor B dominant.

influenced by A, as A is dominant. This typically occurs in some Spanish-

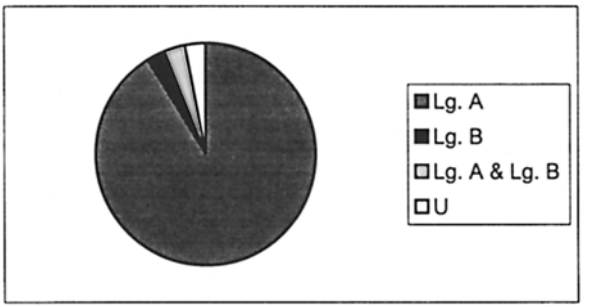

FIG. 5.9. Bilingualism. Language A: A dominant.

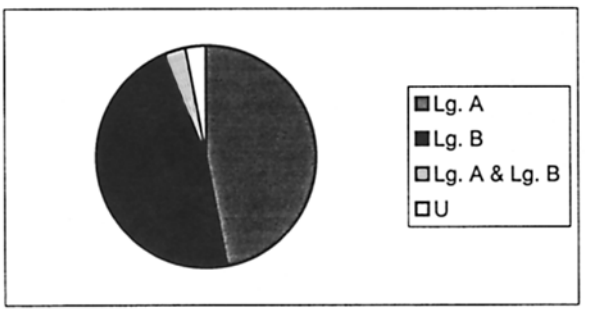

FIG. 5.10. Bilingualism. Language B: A dominant.

Chapter 1

Preliminaries to Research in Second Language Phonology

1.0 INTRODUCTION: INTERLANGUAGE

Adults learning a second or foreign language often produce errors or nonnative substitutions, including a foreign accent and nonnative grammatical utterances (e.g., an English speaker who fails to master the Spanish trill and subjunctive verb constructions). Although a learner's substitutions are often errors from the standpoint that they are not nativelike, they are representative of an underlying system, just as a child learning a first language has an underlying linguistic system, albeit different from adult native speakers of that language. For example, an adult French learner of English may substitute [z] for [ð] (the sound in *the*) but never [p], [b], [k], or [g]; the same learner may place the adjective after the noun ("I like that car green") but not place it randomly elsewhere (*"I green like that car" *"I like green that car"). An adult second language learner's linguistic system is termed the Interlanguage (IL) or simply the language of a nonnative speaker.[1]

The nonnative characteristics of the IL of an adult learner are often due to negative transfer or interference from the first language, that is, the system of the first language (L1) is transferred to the second language (L2). When the phenomena of the L1 and L2 are different, errors result. Transfer may occur at all linguistic levels: lexicon, phonology, morphology, syntax, semantics,

[1] The term *interlanguage* (IL) was first introduced by Selinker (1972). For an extensive discussion on the history of Interlanguage, see Brown, 1994; Cook, 1993; Ellis, 1994; Gass & Selinker, 2001; Larsen-Freeman & Long, 1991.

discourse, and culture. Table 1.1 gives examples from several languages and levels.

TABLE 1.1
Errors Due to L1 Transfer

L1	L2	Utterance	Explanation
Portuguese	English	I will decorate the phone numbers. (meaning memorize)	Portuguese *decorar* means to memorize.
English	Portuguese	[paw] *pau* "stick" for [pɐ̃w̃] *pão* "bread".	English does not have the sound [ɐ̃w̃] but has [aw].
English	German	Hunds for Hunde . ("dogs")	Speaker uses the English plural.
Spanish	Portuguese	Phoenix está em Arizona. (correct is "Phoenix é em Arizona." "Phoenix is in Arizona.")	Although both Spanish and Portuguese have two verbs "to be" (*ser* and *estar*) their use is somewhat different.
Arabic	English	That's the woman that I love her.	Arabic permits pronouns in this position.
Portuguese	English	Give a kiss to your daughter and a hug to your wife.[2]	Learner is transferring Brazilian culture. In the United States a more appropriate remark might be, "How are your baby and wife doing?"

[2] When my daughter was an infant and I was teaching in Brazil my students frequently said this to me, even though they had never met or seen my daughter or wife.

Negative transfer occurs when L1 and L2 phenomena are different, resulting in errors. However, positive transfer occurs when the phenomena are the same, resulting in nativelike utterances. Positive transfer can be called a free ride because the learner does not have to acquire anything new. For example, an English learner of French and Spanish does not have to learn the word order for subject, verb, and object (e.g., John loves Mary) because the unmarked case for all three languages is the same. A French learner of English does not have to learn [š] (as in *shoe*) in English because French also has this sound. In contrast, most Spanish speakers will show negative transfer, using [č] (as in *chew*) for [š] because most Latin American varieties of Spanish do not have [š]. However, a native of the Chihuahua, Mexico dialect will show positive transfer for [š], because this dialect has [š] but no [č]. Thus, for the same phenomenon, transfer can be positive or negative, depending on the native languages and dialects of the learners.

Although the IL can contain nonnative elements due to negative transfer and nativelike elements due to positive transfer, it can also be composed of nativelike elements that are not due to positive transfer, simply because the learner has correctly learned these L2 structures. For example, a French speaker who says "I'm reading a difficult book" indicates the learning of word order and the progressive, as French word order places the adjective after the noun and French does not have a progressive aspect.

In addition to the IL being composed of elements of the L1 and L2, there are elements that are neither, for example, a Chinese speaker of English who says "Does he goes to school?" Because Chinese has no verb inflections at all, this mistake cannot be attributed to L1 transfer, and certainly is not nativelike in the L2. Such errors may at first appear to be anomalous but further investigation demonstrates that they are a result of universals of language acquisition. Learners with a variety of language backgrounds often make the same mistakes in the L2; furthermore, children acquiring that same language as their first language also make these same mistakes. Thus, if L2 errors cannot be attributed to L1 transfer and these errors are the same as in L1 acquisition, then it is reasonable to conclude that these substitutions are due to universals. Some of these universals involve general cognitive processes, such as overgeneralization (e.g., *he hitted me, two foots*), whereas others are specifically linguistic in nature (e.g., all languages have syllables composed of consonant plus vowel; all languages have noun-like elements but not all languages have adjectives). Universal Grammar (UG) is also part of the set of linguistic universals. Although defined differently by different researchers, UG usually refers to the *principles* that describe the core grammar of all languages, which limits what and what is not a possible language, and the *parameters*, or the specific settings individual languages have. UG is often equated with the earlier term, the LAD

(Language Acquisition Device). Table 1.2 provides examples of errors caused by universals.

In summary, an IL is a product of and combination of parts of the L1, parts of the L2, and universals (that are not already part of L1 and L2). These multiple components of IL are shown in Fig. 1.1.

Ever since the introduction of the term IL, there has been considerable discussion whether all the characteristics of ILs are also characteristics of natural languages (e.g., French, German, Japanese, Xhosa) or whether some traits of ILs are different from natural languages. Debate has centered on whether or not L1 acquisition mechanisms, processes, strategies, principles, and

TABLE 1.2
Errors Due to Universals

L1	L2	Utterance	Explanation
Chinese, Vietnamese, French, Spanish	English	Does she likes me?	Overgeneralization: Learner uses the 3rd person singular ending in all contexts. Chinese and Vietnamese do not mark it, whereas French and Spanish mark it differently.
Japanese, Italian, Portuguese	English	[rot] for road	Although Japanese, Italian, Portuguese have both [t] and [d] they have neither sound in word final position. Universally for all language learners, both child and adult, it is easier to pronounce a final [t] than a final [d].

TABLE 1.2
(Continued)

English	Portuguese	Eu recebei ("I received"). (correct is "eu recebi")	Overgeneralization: Learner is using the regular verb ending for –ar verbs for all verbs.
Various		I used to go to the movies a lot. Now I use to rent videos. (meaning now I have the habit of renting videos)	Learner is using analogy: Because *used to* indicates the past then *use to* indicates the present.
Various	English	From two standpoints of view	Learner is blending part of two constructions: "points of view" and "standpoints"

parameters (or whatever one calls them) are shared by or available to the L2learner, in addition to whether the resulting ILs follow the principles of natural languages. Although an IL may not have all the characteristics of a fully developed natural language (especially beginning learners), researchers generally conclude that the characteristics of ILs are also characteristics of natural languages—the universals of ILs are universals of natural languages. Representative of this conclusion are Adjemian (1976, p. 298) who concluded, "...ILs are natural languages" and Eckman (1991) whose Structural Conformity Hypothesis (which has gained strong support) simply claims that ILs behave according to the principles of natural languages. In other words, nothing in ILs violate universal principles of language.

Because ILs are natural languages, they behave according to UG principles. However, there is considerable disagreement as to how much access

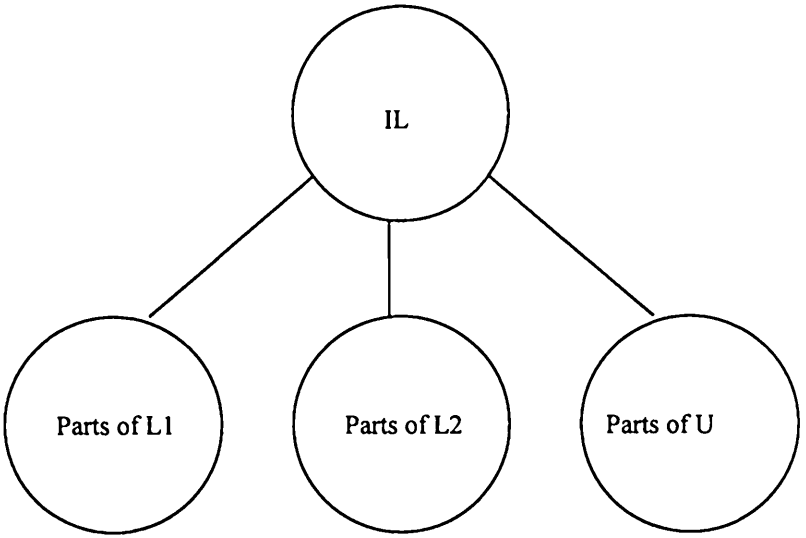

FIG. 1.1. Components of interlanguage.

the learner has to UG in SLA. Bley-Vroman (1989, 1990), Bley-Vroman, Felix, and Ioup (1988), and Schachter (1988) claimed that a learner does not have access to UG, that is, not already in one's L1 (i.e., the rest of UG is defunct or atrophied). This view is expressed quite forcibly in the Fundamental Difference Hypothesis (Bley-Vroman, 1989), which claims L1 and L2 acquisition are fundamentally different. On the other hand, White (1985, 1989, 1996) claimed the learner has full access to UG. In other words, the innate abilities present in children are alive and well in adult L2 learners. There are also various positions of compromise, such as partial access to UG (cf. Eubank, 1994a, 1994b; Vainikka & Young-Scholten, 1994).

1.1 AGE OF THE LEARNER

It is commonly observed that young immigrant children acquire a native accent, whereas their immigrant parents and older children do not. The age of the learner is a key factor. Both the learner's age of arrival (AOA, to the country as a resident) and the age of learning (AOL, age of learning or when the learner

was first exposed to the language) have been found to be important variables governing whether or to what degree a learner can acquire a nativelike accent.

The Critical Period Hypothesis claims that a person must be exposed to a language during a certain period of time (also called a *sensitive period* for those more sensitive to the term critical) in order to acquire that language natively; otherwise, if exposed to that language after the critical period (CP), nativelike competence cannot be achieved. Still under debate is whether or not there is a CP, and if there is one at what age it ends.

Biologists have long observed that there are certain critical periods in many animals for the learning of certain behaviors, including systems of communication such as bird songs (see Archibald, 1998a), nest building, food gathering, hunting, and courting behavior. Animals must be exposed to these behaviors (often previously thought to be instinctive) by a certain age; otherwise, they will not acquire them like their other native species members (i.e., they will have what we might call a non-member species accent). In recent years the widespread activity of raising wild animals in captivity has demonstrated that in rearing these animals they must be taught their species' specific behaviors or they will not survive in the wild when released. If other animals have critical periods (even rat nest building) for many of their most important and even life-dependent behaviors, it stands to reason that human beings must also, especially for the trait that is crucial for our existence—language.

The CP was first proposed for L1 acquisition. Lenneberg (1967) proposed a critical period starting from about age 2 to puberty. Lenneberg also connected the critical period to brain lateralization, claiming that lateralization[3] is complete by puberty, which would conveniently correspond to the end of the CP, according to his view. However, the arguments differ when lateralization is complete (Geschwind, 1970; Hill, 1970; Krashen, 1973; Lamendella, 1977; Paradis & Lebrun, 1983). There is some conflicting evidence from brain damage studies: For humans who have had physical brain damage, in right-brain damaged patients, there are more language disturbances in children (even up to age 10) than adults, thus indicating that the children's right-brains had more language functions than the adults. However, Penfield (1965) found children younger than 10 who suffered left-brain damage recovered their language abilities, but older children did not (indicating that lateralization by age

[3] In human brains the right and left sides are differentially specialized. A highly simplified description is that in most people (including bilinguals; see Vaid & Hall, 1991) language and analytical ability, such as mathematics, are centered in the left side, whereas the right side has other functions such as spatial configuration ability, perception of music, and other gestalt-like functions.

10 was not complete). Dichotic listening tests offer other evidence that brain lateralization may be complete before puberty. In a dichotic listening test a listener hears two different words in different ears and reports which word he or she hears. A listener who hears only the word in the right ear is evidence for having language in the left-brain; one who hears it in the left ear has language in the right-brain. The vast majority of both monolinguals and bilinguals have a right ear advantage for all their languages, meaning they more often report the word heard in the right over the left ear (Gordon, 1980; Obrzut, Conrad, Bryden, & Boliek, 1988; Piazza-Gordon & Zattore, 1981). This is because a sound in the right ear goes to the left-brain and immediately can be translated into language, but a sound to the left ear goes to the right-brain and has to pass over the corpus callosum to the left-brain in order to be translated into language. The time lag and information lost in this transport supposedly result in right ear advantage. However, in children ages 4 to 9 there are no significant differences in right ear advantage compared to adults, indicating that at this age lateralization may be complete.

Other kinds of evidence exist in support of a CP for L1 acquisition. The most cited case is the acquisition of English by Genie (Curtiss, 1974, 1977). Found by authorities at age 13 years 9 months, Genie had been severely deprived of basic human requirements. In addition to having no language she was unable to stand erect, chew solid foods, and to control her excretory functions. Under care she showed slow but steady acquisition of English but even as an adult never achieved nativelike competence. However, one wonders if it was the CP alone that was to blame for her lack of successful acquisition. Because she was deprived of almost every other human need perhaps Genie suffered some irreparable psychological damage that prevented her from acquiring language and other skills. The possibility has also been raised that Genie was retarded, although this is speculative because traditional assessment would be virtually impossible.

The CP is also claimed to exist for L2 acquisition: After the CP a person can no longer acquire a second language with nativelike proficiency. Certainly nativelike phonological acquisition of a second language is possible at an early age, especially if the two languages are acquired simultaneously, that is, bilingual acquisition (Bergman, 1976; Burling, 1973; Contreras, 1961; Fantini, 1985; Imedadze, 1967; Major, 1977; Ronjat, 1913; Schnitzer & Krasinski, 1994; and Swain & Wesche, 1973). Leopold's study of his daughter Hildegard's acquisition of English and German is perhaps the best known study of simultaneous bilingual acquisition (1939, 1944, 1949a, 1949b). However, nativelike phonological acquisition of a second language is possible even in older children. Kenyeres (1938) described his 6½-year-old daughter's acquisition of L2 French (her L1 was Hungarian), and reported that after only 3

months she had mastered the phonology. Wode (1981) provided us with a detailed description of his children's acquisition of English phonology (their L1 was German).

When we consider older learners and adults there is much debate over the CP for L2 acquisition (for recent views on the continuing debate, see Birdsong, 1999). The debate centers on whether or not there is a CP at all, and if so, at what age it ends. Most research suggests that there is a CP for L2 acquisition, although there are a number of difficulties in ascertaining the existence of a CP for both L1 and L2 (Eubank & Gregg, 1999, including the confounding factors that suggest alternative explanations [Bialystok & Hakuta, 1999]). Long (1990), Major (1997a), Neufeld (1979, 1980, 1988, 1997), Patkowski (1990, 1994), and Scovel (1969, 1981, 1988), all strongly argued for the existence of a CP. Abrahamsson (1994) and S. K. Lee (1997) also gave their support for the CP by discussing child/adult differences, and Flege's (1995) Speech Learning Model accounts for age-related limits to the production of native sounding consonants and vowels. Moyer (1996, 1999) examined the L2 German of highly motivated subjects who were graduate students in German in the United States. Although the subjects of both studies did not attain nativelike performance (except for one who was rated as native in the 1999 study), she concluded that age may not operate independently as a predictor of phonological attainment. Rather, it is confounded with numerous other significant factors that are often conflated with age, such as motivation, cultural empathy, desire to sound like a NS, and type or amount of input. Of these other factors the most significant variables were type of instruction and professional motivation. (See Coates, 1986, discussed in chapter 3, who found strong positive correlations between pronunciation proficiency, grade point average, and the need for achievement.)

Although research suggests that there is a CP in phonology, there is considerable disagreement on the age when the CP ends. Long (1990) claimed it is 6 or 7, Patkowski (1994, critiquing Long) said it is slightly later, and Scovel (1988) claimed it lasts through puberty. In addition to other evidence, Scovel's argument includes an appealing sociobiological explanation, an "adaptive value of accents for teens in the genes" (p. 80): Because puberty is the time when humans can contribute to the gene pool, it is important that members of a group are "capable of distinguishing mates who might enhance the chances of future genetic success from those who might inhibit those chances" (p. 81). One time-honored way humans select potential mates is on the basis of each other's speech. This explanation can explain both the cultural practices of endogamy and exogamy (marrying within or outside one's group): A potential mate has to sound the same (endogamy) or different (exogamy). Scovel also noted there are probably a very few exceptions to the critical period, learners past puberty who may master L2 phonology. An exception may be taken as strict

counterevidence, thus falsifying a generalization, or it may be viewed with more tolerance: It is a true generalization that ducks have two feet. But suppose a duck is born with three feet, a freak of nature. Is it still a duck and is the generalization that ducks have two feet still true?

A limited but increasing number of studies suggests that there is no CP. Bohn and Flege's (1992) study of /e/ and /æ/ found that experienced German learners of English showed no differences when compared to NSs. Thus they argued that there is no CP for acquiring new sounds,[4] at least before the age of 30 (the average age of the subjects). Flege, Frieda, and Nozawa (1997) proved evidence against the CP with their study of Italian speakers learning English in Canada and in turn suggested an alternative hypothesis having to do with the amount of L1 use. Although the children began learning English at an average age of 5 years 8 months (below the earliest cut off age indicated by any other research), some retained detectable accents in English, and this was correlated with a larger amount of L2 use relative to other speakers.

Ioup, Boustangui, El Tigi, and Moselle (1994) examined Egyptian Arabic production by three NSs and two NNSs (L1 American English). In a recorded stretch of spontaneous speech, quite remarkably 8 of 13 NS listeners judged the NNSs as native. Is this passing for native? Overall it is not, since the NSs performed even better: All 13 judges rated all 3 NSs as native. Bongaerts, Planken, and Schils (1995) gave further evidence against the CP, and Bongaerts, Van Summeren, Planken, and Schils (1997) examined a group of highly successful Dutch learners of English. The speech samples consisted of spontaneous speech, reading a text, reading sentences, and reading a word list. Quite remarkably, in all 4 tasks these Dutch learners performed as well as NSs when judged by NSs. Citing this as evidence against the CP, the researchers also concluded that learner characteristics and contexts can override the disadvantages of older learners. In another study, Bongaerts (1999) found some Dutch speakers also achieved nativelike pronunciation in French. Markham's (1997) extensive work provides further evidence against the CP. His research on eight NSs of Swedish performing imitation reading tasks of several different languages and dialects of Swedish showed that a number of speakers were judged nativelike by native listeners. Interestingly, his study also revealed that "dialectal influences are frequently heard as foreign and foreign influences heard as dialectal" (p. 253).

Although evidence is mixed regarding the existence or not of the CP, there is overwhelming evidence that age does influence acquisition. Even though there may be a small number of older learners who can attain nativelike phonology (thus calling into question the CP if stated as a yes/no proposition),

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[4] The concept *new sound* is Flege's term. See section 2.2 for research on this topic.

the vast majority of the research indicates that the younger the learner the more nativelike the pronunciation. Studies that support this include /r/ and /l/ acquisition by Japanese learners of English (Yamada, 1995), Brazilians reading a rehearsed passage in English (Mendes, 1991), and a study of intonation (Tahta, Wood, & Loewenthal, 1981a).

Oyama (1976) found a negative correlation between age of arrival for Italian immigrants to the United States and their global foreign accent (the older, the more accent). Asher and Garcia (1969) and Seliger, Krashen, and Ladefoged (1975) also found a similar correlation. Yavaş (1996) discussed VOT (voice onset time, i.e., the amount of aspiration) differences in early and later Spanish-English bilinguals (L1 Spanish/L2 English, AOA 5 to 6 or 11 to 12). He found that the VOTs for early bilinguals were greater (i.e., closer to NSs of English) than those of the later bilinguals, although they both were within the range for NSs. On this basis, Yavaş further suggested that although L2 pronunciation ability decreases with age, it is not lost by age 12.

Flege, in his considerable research on the effect of age and L2 proficiency, also found younger learners do better. Among them are studies on consonants (Flege, Munro, & MacKay, 1995), vowels (Munro, Flege, & MacKay, 1996), and VOTs (Flege, 1991). In their extensive study on vowels, Munro, Flege, and MacKay (1996) discussed productions of 11 English vowels of 240 native Italian speakers who had immigrated to Canada at age 2 to 23 and compared them to 24 NNSs of English. They found that for all 11 vowels, foreign accent increased with increasing age of arrival and the late arrivers produced no vowel consistently in a nativelike manner, even though they had been residents of Canada an average of 32 years.

Although most studies indicate younger learners have better acquisition success, Olson and Samuels (1973) gave evidence to the contrary. In addition, Snow and Hoefnagel-Höhle (1977) found pronunciation was better for older subjects but after about 10 or 11 months of learning, the younger subjects surpassed them.

Other studies dealing with L2 phonological acquisition and age include some articles in a volume by Singleton and Lengyel (1995), sociocultural factors linked to age (Banu, 1986; Kassai, 1990; J. P. Lee, 1994), and other factors (Loewenthal & Bull, 1984; Mayo, Florentine, & Buus, 1997; Moyer, 1996, 1999; Pilleux, 1980; and Young-Scholten, 1996).

In summary, research indicates that when acquiring L2 phonology, the younger the better, but how young and how much better remain unresolved. Thus the debate continues as to whether or not there is a CP and if so what the cutoff age is. The difficulty in resolving these two issues can be traced to two unresolved questions: (a) what constitutes evidence?, and (b) how is 'passing for native' defined?

Accepting data as evidence or not for the CP involves decisions about which speech styles to use and the size of the units of analysis. If one passes for native when reading a word list but not in conversation, is this evidence for or against the CP? It can be both, depending on one's point of view. Analyzing small units produced in a formal style may give evidence against the CP, whereas using larger units produced in casual speech may support the CP. With much practice, probably every adult learner can produce /ma/ natively in some L2 (if /ma/ is a word in that language) but most L2 learners will not pass for native in an L2 when calling the fire department because their houses are burning down.

The notion *pass for native* is not a simple matter either. Does it mean fool some of the people some of the time, all of the people some of the time, or all of the people all of the time? To further complicate the issue, even some NSs do not pass for native. The greater the difference between the speaker's native dialect and the listener's dialect the more likely the listener will judge the speaker as NN (cf. Markham, 1997, discussed earlier, found dialectal influences could be heard as foreign and foreign influences as dialectal). Further consider this scenario: Imagine an L2 learner of English (knowing no English at the time of arrival) who came to the United States at age 15 and then spent the following 15 years living exclusively in Chicago. If native Chicagoans say "I know you're American but I know you're not from Chicago," is this passing for native? In a way it is and in a way it is not, because the only English the person has been exposed to is what other Chicagoans have also been exposed to, and presumably a 30-year-old native of Chicago is recognized as a Chicagoan, not from somewhere else in the United States. Thus, passing for native is not an either/or proposition but a matter of degree and definition. (See §1.2.4 for discussion on global foreign accent.)

1.2 LEVELS OF INVESTIGATION

Mastering the phonology of a language involves (a) individual segments (e.g., being able to produce French /ü/ in *tu*), (b) combinations of segments, which produce syllables (e.g., being able to produce a syllable with an onset of three consonants in *strong*, and a syllable with a coda of four consonants in *worlds*), (c) prosody (stress, rhythm, tone, intonation), and (d) global accent, or the overall accent of a speaker. A global foreign accent is the result of a nonnative combination of (a), (b), and (c). If one masters nativelike pronunciation of one or two but not all three levels, then a foreign or nonnative accent results. Table 1.3 shows the various possible combinations, only one of which results in a native accent.

TABLE 1.3
Combinations Producing Native and Nonnative Accents

Level	Level	Level	Result
Segment+	Syllable+	Prosody+	Native Accent
Segment+	Syllable+	Prosody-	Nonnative Accent
Segment+	Syllable-	Prosody+	Nonnative Accent
Segment+	Syllable-	Prosody-	Nonnative Accent
Segment-	Syllable+	Prosody+	Nonnative Accent
Segment-	Syllable+	Prosody-	Nonnative Accent
Segment-	Syllable-	Prosody+	Nonnative Accent
Segment-	Syllable-	Prosody-	Nonnative Accent

Note. + = nativelike, - = nonnative, for example, Syllable- = nonnative syllable structure.

1.2.1 Segments

Words are made up of segments and syllables. Segments refer to the individual sounds, for example, the word *two* is made up of /t/ and /u/. The learner needs to master the individual characteristics of the sounds, that is, English /t/ (which is made by placing the tongue on the ridge behind the top teeth, the alveolar ridge, but not against the teeth as speakers of French, Italian, Portuguese, and

Spanish do), as well as the allophonic processes or the rules of how sounds change in different contexts. In the English word *two* the /t/ is aspirated (i.e., a long-lag VOT); however, in Spanish *tu* "you, familiar" the /t/ is not aspirated. Likewise in English *stew*, the /t/ is unaspirated. Another example of how pronunciation varies by position is /r/: /r/ in initial position has much more lip rounding than in final position, for example, compare the two /r/s in *rare*.

Segmentals have been the most thoroughly studied area in L2 phonology. Recent studies on segments include Bunta (1999), Flege, Frieda, Walley, and Randazza (1998), Riney and Flege (1998), and Wayland (1997).

1.2.2 Syllables

The next higher unit is the syllable, a unit of timing. Although there have been a number of attempts to define the syllable exclusively on the basis of acoustic analysis, these attempts have largely failed because the concept of syllable is largely a NS intuition. Thus, the Spanish word *adios* to a NS of Spanish has two syllables, but to an English-speaking listener it has three syllables. Even more striking is that the Japanese word for syllable is a loan word from English (*shirabu*) because the native Japanese unit of timing is the mora,[5] not the syllable. All languages have syllables composed of consonants and vowels. Many languages can also have syllables of only vowels, (e.g., English *owe*) but only a very few languages can have syllables and even whole words composed exclusively of consonants, (e.g., Berber *trkst* "hide," *txdmt* "gather wood").

The most commonly accepted view of the syllable is that it is composed of subunits shown in Fig. 1.2. Onsets are composed of consonants or glides. For example, *two* and *you* have onsets of /t/ and /y/ respectively but *off* has no onset. The rhyme is the rest of the syllable, which contains a nucleus or peak (the center of the syllable, usually a vowel) and coda (a consonant or glide). The word *top* contains an onset /t/, nucleus /a/, and coda /p/; *owe* has neither onset nor coda but only a nucleus /o/. Phonotactics deals with the syllable structures in a language (the different possible combinations of consonants, vowels, and glides in a syllable), that is, what possibilities exist for onsets, rhymes, nuclei, and codas. There are language universals that can be expressed in terms of implicational hierarchies. (Because onsets and codas are usually consonants and nuclei are vowels, I use the standard abbreviations of C for consonant and V for vowel.) All languages have CV syllables but they may or may not have

[5] A mora is a unit of quantity referring to the number of segments in the rhyme but not the onset (see Fig. 1.2). Thus, English *owe*, *say*, *stay*, and *stray* have 1 mora; *foe*, *for*, *fort*, *forts*, and *worlds* have 1, 2, 3, 4, and 5 morae, respectively.

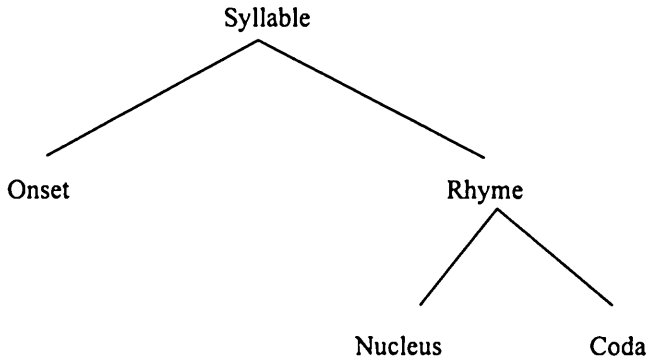

FIG. 1.2. Syllable Structure.

syllables without onsets or syllables with codas, with the following restrictions: If a language has syllables of the type VC it also has CVC and CV syllables (e.g., English *oat, boat, toe*) but not vice versa. That is, if a language has CVC it also has CV but not necessarily VC (Yawelmani). Further, if a language has CV (all languages do) it may have neither VC nor CVC (Hawaiian).

L2 learners typically modify syllable structures to fit their L1 structures. Loan words (a rudimentary form of L2 acquisition) are often incorporated into the L1 by modifying the syllable structures. For example, Japanese syllables have to end with vowels (except for /n/ in words with geminates); thus words like *McDonald's* and *Big Mac* are modified to [makudonarodo] and [bigumaku]. An extreme example of how syllable structure is modified is the Hawaiian *melekalikimaka* "Merry Christmas." The popular belief is that this is the Hawaiian expression or words meaning Merry Christmas,[6] but in fact it is the Hawaiian language's pronunciation of the English words of *Merry Christmas*, following Hawaiian phonology, (just as Americans often add an initial vowel in African names starting with *nk*, e.g., *Nkruma*). Hawaiian only has V and CV syllables. Furthermore, it only has the vowels /i e a o u/; it has no /r/ but has /l/; it has no /s/ or /t/ but has /k/ (in fact the only consonants are /p k ʔ m n l w h/. Taking this into account, it follows that [melekalikimaka] is a perfect example of pure transfer: Starting from English [mɛrikrɪsməs] the following is an abbreviated derivation:

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[6] A former student of mine, a native of Hawaii, told me he thought *melekalikimaka* were the Hawaiian words meaning *Merry Christmas*.

Vowel substitution:	ɛ → e, ɪ → i, , ə → a	[merikrismas]
Consonant substitution:	r → l, s → k, e → i	[meleklikmak]
Vowel epenthesis:	ø → a, i	[melekalikimaka]

L2 research on syllable structure began seriously in the 1970s and 1980s. Recent research includes Broselow, Chen, & Wang (1998), Carlisle (1998), Hancin-Bhatt and Bhatt (1997), Major (1996), and Osburne (1996).

1.2.3 Prosody

The prosody of a language includes stress, length, tone, intonation, and rhythm and timing. Prosody is also referred to as the suprasegmentals (especially in the older literature), suggesting phenomena above the segmental.

1.2.3.1 ***Stress.*** Stress is the perceived prominence, that is, the loudness of a syllable. It correlates with vowel duration and also pitch change, but it may not always correspond to acoustic intensity, as some sounds are intrinsically more intense than others, for example, low vowels have more intensity than high vowels, fricatives more intensity than stops, and so on. For example, in the word *diva* an English listener hears the first syllable *di* as louder (i.e., stressed) than *va*, when in fact the *va* will usually show more intensity when measured on an intensity meter. Stress is fixed in some languages (no contrastive stress); French has stress on the last syllable and Czech and Hungarian on the first syllable. Stress patterns tend to be transferred in L2 acquisition, for example, a French speaker may say *problém* or an English speaker *próbleme*. Extensive studies of L2 stress have been conducted by Archibald (1993a, 1993b, 1997a, 1997b, 1998a) and Young-Scholten (1993).

1.2.3.2 ***Length.*** The length of segments can have different linguistic statuses. Vowel length in English is not contrastive, because it is predictable: Vowels are short before voiceless consonants and long elsewhere (the [i]s in *see* and *seed* are both about 50% longer than the [i] in *seat*). Although these length differences are predictable (allophonic), an L2 learner of English failing to make them can be misheard, as it has been well documented that vowel length is a more salient feature to indicate consonant voicing than the actual voicing, that is, a speaker saying [si:t] for *seat* can be heard as *seed* and [sid] for *seed* can be heard as *seat*. German has contrastive vowel length: *Stadt* [ʃtat] "town", *Staat* [ʃta:t] "state". In Hungarian both vowel and consonant length are contrastive: *kor* [kor] "age", *kór* [ko:r] "disease", *had* [hɒd] "army", *hadd* [hɒd:] "let". Mixe has three distinct vowel lengths: [poš] "guava", [po:š] "spider" [po::š] "knot." (See Hoogshagen, 1959, as cited in Ladefoged & Maddieson, 1996). Estonian

has three-way contrasts in both consonants and vowels: Both consonants and vowels can be short, long, and overlong. (See Lehiste, 1966, 1970). Although there has not been much investigation of the acquisition of length in SLA, one noteworthy recent study is Giannini and Costamagna (1997), who investigated L2 acquisition of Italian consonant length.

1.2.3.3 ***Tone and Intonation.*** Tone refers to pitch and intonation refers to pitch differences. The unit of analysis for tone is the syllable, whereas the unit for intonation can vary from a syllable to a whole sentence composed of many words. In a tone language, if the pitch is varied on a syllable it can result in a different word. Thus, in Chinese /ma/ with four different tones can mean "horse," "hemp," "mother," or "scold." Intonation refers to the changing patterns of pitch that signal syntactic, discourse, and semantic differences; for example, English intonation differences can signal a yes/no question, surprise, a command, self-assuredness, or insecurity. Using nonnative tone or intonation can cause considerable communicative problems: An American may use the wrong tone in Chinese and refer to his or her "horse" instead of "mother"; in Hawaiian English, a declarative intonation pattern often sounds like question intonation to a mainlander; in Brazilian Portuguese a yes/no question may have rising intonation as in English but it also can have a rising/falling pattern (similar to the English doubting, intonation *You like snails*? indicating "I don't believe you").

There is a dearth of SLA research in tone and intonation. In a recently published volume containing 44 articles on L2 phonology (Leather & James, 1997), only two deal with tone and intonation (Husby, Komar). Other L2 research in tone and intonation has been conducted by de Bot, 1994; Holden, 1993; Juffs, 1990; Leather, 1983, 1987, 1997; and Tahta, Wood, & Loewenthal, 1981a. Although not dealing directly with SLA, Cruttenden (1997) discussed various theoretical models for tone and intonation, such as the Tone and Break Index (Beckman & Ayers, 1994) and autosegmental phonology (Goldsmith, 1976, 1979, 1990). Cruttenden's work thus provides useful theoretical frameworks for the SLA researcher.

1.2.3.4 ***Rhythm and Timing.*** When we hear a language spoken from a distance but cannot understand any of the words, we often can recognize it as our NL or a FL (it could be our NL but with a foreign accent). Often one of the identifying elements is the rhythm and timing. Rhythm and timing are the repetitive patterns of stress and length. To make an analogy, one may change the rhythm of a song like "Happy Birthday" and make it into a waltz or samba without changing the melody.

Languages are traditionally classified into three basic rhythmic types (although no language fits perfectly): syllable-timing, stress-timing, and mora-timing. A syllable-timed language, for example, Spanish, has syllables roughly of equal length regardless of stress. This gives the impression that the language has equal beats and in rapid speech it sounds like rapid machinegun fire. In a Spanish sentence such as *Roberto está en mi casa* ("Roberto is in my house") the syllables are roughly of equal length and thus the durations between stressed and unstressed syllables are approximately equal.

In contrast, a stress-timed language, for example, English and Brazilian Portuguese, has stressed syllables much longer than unstressed syllables and has equal beats between major stress groups (regardless of the number of intervening syllables). A well-worn frame sentence from English illustrates these characteristics (stress is marked over the words): *This is the house that Jack built, this is the house that Kénny búilt, this is the house that Kénnedy búilt* (see Lehiste, 1970, 1977). The durations between the major stresses are roughly equal in length even though the number of intervening syllables varies. In order to accomplish this, English lengthens stressed syllables and shortens or reduces unstressed syllables (often to schwa [ə] as in *give it to* [tə] *me*). Limericks take advantage of this rhythm so that *there was a young man named Dave* and *there was a young man from Nantucket* have the same rhythm even though the number of syllables in the last word varies in these two lines. One of the main features of a stress-timed language is vowel reduction. However, in Hawaiian English the rhythm seems much more syllable timed than standard English, as evidenced by the much less frequent vowel reductions, for example, in standard English *I cannot go to the movie* is typically reduced to *I can't go* [tə] *the movie* (or if *cannot* is not reduced the accent is on the *not*) but in Hawaiian English it is often *I* ['kænnət] *go* [tu] *the movie.*

In a mora-timed language the unit of timing is the mora; morae are of equal length, for example, a syllable with two morae is twice as long as a syllable with one mora. Japanese is a prime example, where both vowel and consonant length is contrastive and can result in morae of different lengths. In *kitte* "postage stamp" the first syllable [kit] (two morae) is twice as long as the first syllable in k*ite* "come" [ki] (one mora); similarly, the second syllable in *obaasan* "grandmother, old woman" has two morae, whereas the second syllable in *obasan* "aunt, middle-aged woman" has one mora. Japanese learners of English have a tendency to lengthen heavy syllables in English, for example, the first syllable in *worldly* (four morae) might be four times as long[7] as the first syllable in *woody* (one mora), whereas for a NS of English the syllables are

[7] Of course, if the speakers cannot produce consonant clusters, they may insert vowels, thereby making this two-syllable word into a five-syllable word: *wor*[o]*l*[o]*d*[o]*ly.*

approximately equal in length. The difficulties that British learners of Japanese experience with mora-timing was investigated by Nagai (1997).

For research on rhythm and timing see Bilá (1997), Flores (1993), Husby (1997), Kaltenbacher (1997), Setter (1997), and Wenk (1986).

1.2.4 Global Foreign Accent

When listeners hear another person speaking the listeners' NL, consciously or unconsciously they make judgments whether the person is a NS or NNS of their language. The overall impression concerning NSs form whether or not and to what degree a person sounds native or nonnative is called *global foreign accent.*

A foreign or NN accent can usually be detected much more easily the longer and more informal the stretch of speech, for example, a 10-minute informal conversation versus a word list. Some speakers pass for native for a brief period but sooner or later they are recognized as NN (but see Ioup et. al., 1994, cited earlier, who reported on a NNS of Arabic who passed for a native English speaker in a stretch of conversation (8 out of 13 judges). The reason why a foreign accent is much more easily detected in a longer stretch of speech is that in a short utterance, for example, uttering one word such as *no*, the speaker can avoid a number of segmental and prosodic phenomena (in this case no stress, minimal intonation, no /r/, /l/, /θ/, /ð/, /æ/, no consonant clusters, etc.). However, in a longer stretch of speech, avoidance is impossible: Imagine talking for 10 minutes and avoiding all words with /r/ and /l/. In syntax and discourse, the skillful speaker can avoid certain phenomena and go undetected as a NNS (of course, certain basic structures are impossible to avoid unless one uses only one-word utterances). The well-known former United States statesman, Henry Kissinger, a German immigrant to the United States at age 14, is known for his eloquent use of English but also for his German accent. He is often cited as an example of the critical period existing for phonology but not syntax (i.e., "the Joseph Conrad phenomenon," Scovel, 1988.). However, Kissinger's command of English is probably deficient in certain areas that other NSs command simply because he was an adolescent when he arrived in the United States. He probably avoids certain discourse phenomena (e.g., I doubt very much he could express in detail the symbolic significance of a child's experience of Halloween or Thanksgiving). Thus, in syntax, semantics, and discourse one chooses and avoids certain phenomena, whereas in phonology avoidance is virtually impossible.

Although measuring global foreign accent is interesting in its own right as a diagnostic of overall pronunciation proficiency, it is usually measured so that it can be correlated with other phenomena, such as age of acquisition (Oyama, 1976), language attitudes (Dalton-Puffer, Kaltenboeck, & Smit, 1997; Delamere,

1996), comprehensibility (Major & Fitzmaurice, in press; Major, Fitzmaurice, Bunta, & Balasubramanian, in press; Munro & Derwing, 1995a, 1995b; 1997; Pihko, 1994), and other linguistic phenomena. These other linguistic phenomena include (a) VOT (Major, 1987a; Riney & Takagi, 1999), (b) speaking rate (Munro, 1998a), (c) voice quality and articulatory setting (Collins & Mees, 1995; Erazmus, 1984; Esling & Wong, 1983; Thornbury, 1993; Wenk, 1983), (d) noise (Munro, 1998b), and (e) various other linguistic phenomena (Anderson-Hsieh, Johnson, R., & Koehler, 1992; Derwing & Munro, 1997; Flege, 1988a; Koster & Koet, 1993; Munro, 1995).

The measurement of global foreign accent is important in order to provide a base for which stages of development can be assessed. A central concern in SLA is order of acquisition, that is, stages of development of a variety of L2 characteristics. Because the vast majority of SLA research is cross-sectional (at one point in time, also called latitudinal) rather than longitudinal (studying learners over a period of time), this means that in order to extrapolate stages the researcher must know the competence level of the learners. When doing L2 research in syntax, there are numerous standardized tests measuring various aspects of syntactic competence (e.g., the TOEFL). However, as there is very little correlation between TOEFL score and pronunciation accuracy, global foreign accent measurement is crucial. The closest thing to a widespread standardized test of pronunciation is the TSE (Test of Spoken English), although it also measures a number of other things.

1.3 THEORETICAL APPROACHES TO PHONOLOGY

Some basic knowledge of different theoretical phonological frameworks is necessary in order to understand and evaluate research. This section is purposefully brief; the reader interested in a fuller account should consult the references cited or consult an introductory phonology textbook (Carr, 1993; Gussenhoven & Jacobs, 1998; Kenstowicz, 1994; Roca & Johnson, 1999; Spencer, 1996). The theoretical frameworks employed in L2 phonology have historically paralleled those used in mainstream phonology. For example, the structuralist and Classical Phonemics approach used in the 1940s, 1950s, and to some extent in the 1960s and 1970s has been modified and replaced by other theories leading up to Optimality Theory in the 1990s and 2000s.

1.3.1 Structuralism, Classical Phonemics, and Contrastive Analysis

Structuralism concentrated on distribution of sounds, particularly the version referred to as Classical Phonemics in the United States. The phoneme was

viewed as a mental representation of the minimal sound unit. This was typified in Sapir's famous article "The Psychological Reality of Phonemes" (1933/1949). Allophonic distributions used to describe NS phonology were also used in Contrastive Analysis, for example, Stockwell and Bowen's (1965) contrastive analysis of Spanish and English. Thus, a NS of Spanish might correctly use [b] for [b] in English in word initial position but [β] after a vowel, following Spanish rules. However, by this time (1960s) empiricism and behaviorism had become influential, and any psychological reality arguments were dismissed as not empirically based. Meanwhile in Europe, phonologists were concerned with distinctive features or how languages used features for contrasts (Jakobson, 1941/1968; Trubetzkoy, 1939/1967), for example, English contrasts voicing in word initial, medial, and final positions but German only in initial and medial positions. Thus, an L2 learner might contrast place of articulation features but not voicing.

1.3.2 Generative Phonology

Certain aspects of generative phonology in the 1950s and 1960s are similar to structuralism because generative phonology essentially replaced the statement "occurs in" with "becomes" or with arrows, in shorthand notation. For example, in English /l/ a velarized allophone [ɬ] occurs at the end of a syllable. In generative phonology this simply would be expressed as /l/ → [ɬ]/——$ (other feature notations were also frequently used). Thus, distributions were stated as rules or processes. *The Sound Pattern of English* or SPE (Chomsky & Halle, 1968) became a standard phonology textbook. SPE dismissed the notion of the phoneme as a significant level and instead replaced it with the systematic phonemic representation, a much more abstract level (e.g., *mouse* was represented as //mūs//). Soon after its publication, SPE was criticized for being too abstract because it used underlying representations more as diachronic characterizations than as synchronic descriptions of NS competence. Thus, in SPE *mouse* and *mice* were represented as //mūs// and //mūsi// respectively. Generative phonology also introduced the notions of rule ordering, such as bleeding and feeding, and successive applications of processes (see Kenstowicz, 1994 for a thorough description). In L2 phonology, a generative description would account for the output [lix] for *league* by Japanese speaker as the result of spirantization and devoicing. These are unordered, as either order would produce the same output: /lig/ → [liɣ] → [lix] or /lig/ → [lik] → lix].

1.3.3 Natural Phonology

Natural Phonology (Donegan & Stampe, 1979; Stampe, 1969, 1979) views L1 acquisition as the suppression of natural processes. According to this theory, an adult's grammar is the remnant of childhood processes, and historical change is the result of successive generations of adults who as children were not quite successful in achieving the adult target. For example, an adult NS of English has overcome final obstruent devoicing, but a NS of German has not because in the adult standard final obstruent devoicing occurs. Natural Phonology claims that in L1 acquisition the child's Underlying Representation (UR, which roughly corresponds to the traditional phonemic level) is usually the same as that of the adult; however, output can differ due to natural processes causing deviations from the adult target. These outputs change from stage to stage due to suppression and reordering of processes and the surfacing of new ones. For example, in the pronunciation of *dog*, a young child may first delete final consonants: [dɔ], then epenthesize: [dɔga], then suppress epenthesis but devoice: [dɔk], and then finally reach the adult target [dɔg]. Natural Phonology never developed the following that generative phonology did, perhaps in part due to Natural Phonology's rejection of overly formal descriptions that have characterized phonology up to the present. At times formalisms can be a procrustean bed of machinery.

In Natural Phonology, L2 acquisition can also be conceptualized by successive suppression of processes. For example, a Japanese speaker at first says [babu] for Bob, then [bap], and then finally [bab]. The first utterance is caused by transfer but the second is caused by the (up until then) latent process of terminal obstruent devoicing, which an adult NS of Japanese never has had to learn to suppress because Japanese has no word final obstruents. Studies of Natural Phonology in L2 phonology have been limited probably because Natural Phonology has never been in the mainstream (but see Abrahamsson, 1996; 1997; Major, 1987e; Yavaş, 1982).

1.3.4 Nonlinear Approaches

The realization that each linguistic level interacts with other levels in part contributed to the demise of autonomous levels in linguistics. Autonomous levels gave rise to nonlinear phonology. It is called nonlinear because it expresses relationships among various levels in terms of hierarchies. Another reason nonlinear approaches have become popular is perhaps human nature: Many human conceptualizations are categorized in hierarchies (e.g., city, state, country, continent, planet, solar system, etc.).

Standard syllable theory utilizes a hierarchical relationship (see Fig. 1.2). Autosegmental Phonology (Goldsmith, 1979, 1990) develops the notion of *skeletal tier*, which can account for vowel length, geminates, and morphology. One aspect of syllable structures is *autosegmental licensing*, which relates the autosegmental representation to the hierarchical syllable structure. Another nonlinear approach is metrical phonology, which uses *metrical trees* and *metrical grids* to demonstrate how syllables are organized into higher prosodic units.

Geometrical phonology, or feature geometry, expresses a hierarchical relationship using tree structures with various nodes for the different features. For example, in a typical model, the supralaryngeal feature governs the consonant place of articulation feature, which governs the peripheral, which governs labial or dorsal.

1.3.5 Connectionism

Connectionists deny the need for rules altogether (Optimality Theorists do, too), claiming that competence is a result of different input probabilities. Connectionism claims learning is the result of relative strengthening and weakening of neural pathways, due to varying input. Structures with high frequencies are acquired earlier than less frequent structures. Ellis (1996) argued that connectionism can account for L2 phonology and vocabulary acquisition. Ellis and Schmidt (1997) used this approach for morphology, and Hancin-Bhatt (1992) proposed a model for L2 phonology based on current theories of phonology and a connectionist cognitive motor view of language processing. Connectionism flies in the face of universals in the sense that it denies innate processes and rules. Connectionists would certainly not deny universals, but only deny the way they have been traditionally stated in linguistics. Connectionism may offer some explanations of certain aspects of phonology; for example, in L1 acquisition, some segments are acquired earlier in one language than in another probably because of different frequencies; however, connectionism fails in other respects. In L1 acquisition of English frequencies cannot account for certain acquisition orders. /ð/ is very common but it is acquired late; closed syllables are more common than open syllables in English words yet they are acquired after open syllables (as they are in all languages).

1.3.6 Optimality Theory

Optimality Theory (OT, Prince & Smolensky, 1993, 1997) views phonological systems as a result of rankings of universal constraints. (For an edited volume

on OT see Archangeli & Langendoen, 1997.) Its seemingly radical approach completely discards the time-honored concept of rule, replacing it with a set of constraints. These constraints are not learned but rather are innate and universal. They may be thought of as natural tendencies in languages, for example, there is a constraint against having voiced codas. The grammars of languages contain constraints on the well-formedness of structures, but these constraints often conflict with one another. The resolution of these constraints comes about by ranking them, and the variation among languages is due to language specific rankings. Thus, in English the constraints of no coda and no consonant clusters are outranked by faithfulness (pronounce everything as it is), but in Hawaiian no coda and no consonant clusters outrank faithfulness. Thus, *Meg* and *Chris* would be pronounced [meki] and [kaliki]. The basic operation of OT is as follows: The input (underlying form or Underlying Representation in traditional generative phonology) goes into the generator (GEN), which creates possible candidates; then the evaluator (EVAL) evaluates these. By ranking constraints in different orders different optimal candidates or optimal outputs are created. There are two major types of constraints, which can conflict: structural (markedness) and faithfulness (input = output). This distinction is reminiscent of the long-noted dual functions of phonology: Make utterances pronounceable and make them understandable. These can also be at cross-purposes: Reducing final consonant clusters in English makes words easier to pronounce but harder to understand.

Hammond (1997) noted that all the possible syllable structures allowed by

TABLE 1.4
Syllable Structures in the Languages of the World

Constraint Rankings	Syllable Types
FAITHFULNESS >> ONSET, NOCODA	(O)V(C)
ONSET, NOCODA >> FAITHFULNESS	OV
ONSET >> FAITHFULNESS >> NOCODA	OV(C)
NOCODA >> FAITHFULNESS >> ONSET	(O)V

Note. O = Onset, V = vowel, C = Coda(s).

the languages of the world are generated by the various rankings of faithfulness (input = output), onset (begin syllables with a consonant), and no coda(s) (end syllables with a vowel). (See Table 1.4.)

By OT convention, *tableaus* depict various rankings of constraints and the optimal candidates. Examples of tableaus in OT are given in Tables 1.5 and 1.6, from Bunta's Hungarian learners of English (1999). The chart points a finger at the optimal designee and the other candidates do not surface. *! (emphatically ungrammatical) indicates a fatal violation of one of the constraints; these candidates die out even before they have a chance to make a brief appearance. Thus, in Table 1.5 /æ/ becomes /ɛ/ (straight L1 transfer) because FAITHLOW

TABLE 1.5
/æ/ becomes [ɛ]

Input: /æ/	LOWBACK	LOWBACK	FAITHLOW
[æ]	*!		
☞ [ɛ]			*
[a]		*!	
[ɒ]		*!	

Note. Bunta, 1999.

TABLE 1.6
/æ/ becomes [a] (Bunta, 1999)

Input: /æ/	LOWBACK	FAITHLOW	FAITHBACK
[æ]	*!		
[ɛ]		*!	
☞ [a]			*

Note. Bunta, 1999.

outranks the other two constraints, and in 2.4 /æ/ becomes [a] because FAITHBACK outranks the other two.

OT bears a suspicious resemblance to Natural Phonology, which had appeared almost 25 years earlier (Prince & Smolensky, 1993; Stampe, 1969), although this parallel has not been acknowledged in the OT literature. In Natural Phonology, OT constraints can be viewed as processes, and rankings as ordering of processes. Furthermore, a reranking of constraints is synonymous with suppression and/or reordering of natural processes. Thus, a child who says [dɔ] for dog, later [dɔk], and then [dɔg] can be similarly stated in OT and Natural Phonology:

[dɔ]:	OT: NOVOICODA, NOCODA >> FAITHFULNESS Natural Phonology: Coda deletion
[dɔk]:	OT: NOVOICODA >> FAITHFULNESS >> NOCODA Natural Phonology: Coda deletion suppressed, final obstruent devoicing surfaces
[dɔg]:	OT: FAITHFULNESS >> NOVOICODA, NOCODA Natural Phonology: Final obstruent devoicing suppressed

1.4 LINGUISTIC THEORY AND SECOND LANUGAGE ACQUISITION THEORY

The relationship between linguistic theory and second language acquisition theory is a two-way street: Linguistics informs SLA and vice versa. Undertaking SLA research using frameworks of modern linguistics is valuable because new theoretical perspectives can inform our understanding of formerly unexplained SLA phenomena. SLA syntactic research has utilized the principles and parameters approach and government and binding theory (Bley-Vroman, 1989; Bley-Vroman & Chaudron, 1988; Clahsen & Muysken, 1986; Flynn, 1987; Flynn & Lust, 1990; White, 1989; see also Hyams, 1985). Linguistic theory has also been utilized for studies of order of acquisition (Eckman, 1977, 1991; Krashen, 1977, 1985; McLaughlin, 1978; Pica, 1983), sociolinguistics (Bayley & Preston. 1996; Labov, 1996; Preston, 1989; Tarone, 1988), discourse and functional syntax (Givón, 1984), language contact phenomena (Bickerton, 1981; Hyltenstam & Viberg, 1993; Schumann, 1978a, 1986), and phonology (Archibald, 1993a, 1998a; Carlisle, 1994; Eckman, 1977, 1991; James, 1996; Leather & James, 199, 1996; Major, 1998). In phonology, Optimality Theory has been used to explain why, in words ending with obstruents, Mandarin speakers of English have a tendency to devoice or delete the final consonant in bisyllabic words, but in monosyllabic words with these

same consonants, they epenthesize a vowel, thereby creating bisyllabic words (Broselow et al.,1998).

Although SLA research uses mainstream linguistics theory, SLA should not be subordinate to mainstream linguistic theory; that is, it should not base all its research by mimicking general linguistic theory, as much of linguistic theory is based on a narrow view of what language is: adult monolingual speakers (even though over half the world's population is bilingual). According to Klein (1991) "Fully developed languages should be seen only as a borderline case of learner varieties" (p. 184); thus, applying linguistic theory to SLA can sometimes be misleading. He further warned that SLA researchers should not try to receive glamour from other disciplines but that in fact SLA is a legitimate field by itself.

SLA studies can inform linguistic theory. If mainstream linguistic theories stand up to all data except to L2 data then one of two things should follow: (a) The theories are wrong, or (b) L2 data do not count as evidence for linguistic theory. However, the latter point of view is tantamount to ignoring the speech of over half the world's population. Ferguson very early on (1963, 1989) argued that SLA research can be a rich source of data for linguistic theory construction, testing, and modification. Huebner (1991), proposed that SLA offers a "litmus test" for theory. The relevance of SLA to linguistic theory has just recently been recognized in the United States: Only since the mid-1990s has the Linguistic Society of America Linguistic Institute offered courses in SLA.

1.5 EVERYONE SPEAKS AN INTERLANGUAGE

The statement that everyone has an IL may at first sound preposterous, as there certainly are monolinguals in the world (although probably less than half the world's population) and IL has been defined as a combination of L1, L2, and universals. However, if we think of IL in a more general sense—a combination of (a) one's NL (the L1), (b) outside linguistic influences on one's L1, which everyone is subject to (the L2, be it different dialects or other languages[8]), and

[8] The difference between a language and dialect has long been disputed, especially by non-linguists. The language contact linguist Einar Haugen reportedly said that the difference between a language and dialect is that a language is a dialect with an army and navy. This point of view emphasizes that the concepts are based more on political, ethnic, and social criteria than on purely linguistic criteria, such as genetic classification or mutual intelligibility (but how intelligible? 95%? 50%? 10%?). Thus, Hindi and Urdu are separate languages because NSs say they are, even though they are mutually intelligible and very similar linguistically; Cockney and rural Mississippi English are the

(c) universal principles governing language acquisition and change—then everyone can be said to speak an IL.

One's L1 system is continually undergoing change due to outside influences. Therefore, logically it is impossible to find a pure NS or one who is not subject to outside language influences, that is, an L2—be it a completely unrelated language (Chinese and English), a different dialect (a native of Scottsdale, AZ talking to neighbors who have moved to Scottsdale from New York City), a nonnative dialect (NSs talking to NN immigrants). I recall a former student of mine, at the time in his mid-20s, who was born and raised in Mesa, AZ and is still living there (as was his family for over four generations). He recalled that when he was a child he only used "pop" to refer to a carbonated beverage but now he uses both "pop" and "soda." Although this is a minute example, it is an example just the same of acquiring a second dialect, that is, an L2. (See Trudgill,1986, for large scale studies on dialects in contact.) The danger in using IL in such a broad sense is that it is too encompassing. Although very minute influences and changes are not usually the concern of the researcher, my point is that the mechanisms of even minute and trivial changes are the same as larger and more traditional IL mechanisms, such as the acquisition of English /r/ and /l/ by Japanese learners of English.

The parallels between dialect variation, historical change, and language contact phenomena are not usually made to SLA, but in fact they should be. When languages change through migration and language contact, they always involve adults; thus, SLA occurs. Even studies of language change can be considered SLA studies because adults are acquiring a new variety, for example, Labov's classic 1963 study of Martha's Vineyard, where adults changed their pronunciation to show identity with the island.

1.6 CONCLUSION

Mastering the phonology of a second language involves segments, syllables, as well as the prosodic aspects of the language. When learning a second language for the first time as an adult, rarely if ever does an individual achieve nativelike phonology in all of these aspects. The theoretical frameworks employed in L2 phonology studies have paralleled mainstream linguistics, from structuralism in the 1930s up to Optimality Theory in the 1990s and 2000s. In the traditional sense, the IL is the language system of a nonnative speaker; however, I have argued that an IL can also be considered a system that is changing due to the

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same language because NSs think they are, even though they may not always be mutually intelligible.

influence of other varieties, regardless of whether they are different languages or dialects. In this sense, everyone speaks an IL, because everyone is subject to the influence of different varieties, and these different varieties exert their influence via second language acquisition processes. Accordingly, SLA is central to linguistic theory, because synchronically and diachronically languages have been constantly subject to SLA dynamics.

Chapter 2

Linguistic Explanations for Second Language Phonological Systems

2.0 INTRODUCTION

This chapter deals with research on some of the key issues in L2 phonology that have been investigated over the past few decades. Among them are transfer, the role of similarity between the L1 and L2 systems, universals, perception, and first language loss.

Rather than being selective in coverage, the range of studies presented here is broad, thus less detailed. I have surveyed a great number of studies, without delving into much detail (for the most part). My purpose here (as it is in chapter 3) is to present a wide range of studies that readers can consult if they wish to pursue the topics in more depth. My intention is to survey the field rather than to scrutinize certain parts of it.

2.1 TRANSFER AND CONTRASTIVE ANALYSIS

Transfer is an important factor in many types of learning, not just language, as demonstrated by the early research of a number of learning theory specialists and psychologists (Ausubel, 1963, 1967; Ausubel, Novak, & Hanesian, 1978; Ausubel & Robinson, 1969; Gagné, 1977; Schultz, 1960; Travers, 1977). When one approaches a new learning situation, the tendency is to transfer similar patterns already acquired to the new situation, for example, a baseball player

may at first attempt to use a baseball swing when learning to play hockey but quickly discovers that a different swing is required.

The tendency to transfer is especially powerful in second language acquisition. One of the most important components in the IL, especially at the beginning stages, is L1 transfer. Transfer has probably been the most thoroughly studied area in second language phonology. Although Trubetzkoy is not noted for his work on L2 phonology, he claimed that L2 perception is "filtered" through the "sieve" of the L1 (1939/1958). The result of this filtering on production is most noticeable when one is said to have a language x accent, as it is largely recognizable due to L1 transfer. Thus, a French accent may be recognizable from word final stress patterns and uvular /R/; a German accent by the lack of /w/ – /v/ distinctions; a Spanish accent by the rhythmic characteristics and lack of vowel reduction; an American accent by the /r/ and marked vowel reduction; and a Japanese accent by the lack of /r/ – /l/ distinctions. Contrastive Analysis (CA) utilized the notion of transfer by comparing and contrasting languages. By noting the differences, CA could supposedly predict and explain all L2 errors because of the prevailing belief that all errors were due to transfer. For example, Japanese has one liquid (/ɾ/) and English two liquids (/r/ and /l/); therefore, it can be predicted that Japanese learners of English will have difficulty with /r/ and /l/.

Even before Lado's (1957) influential work on CA, Weinreich (1953) detailed the types of transfer (using the term interference) involved in language contact situations, which is a type of SLA (as I have argued in chapter 1). At the sound level Weinreich described transfer at the segmental, phonotactic, and prosodic (suprasegmental) levels, which include the following:

1. Sound Substitution. An L2 learner uses the nearest equivalent in the L1. For example, when learning English /θ ð / Spanish speakers typically use their dental /t̪ d̪/ but French speakers use/s z/; for English alveolar /t d/ Spanish and French speakers substitute /t̪ d̪ / but Hindi speakers substitute their retroflex /ʈ ɖ /(even though Hindi also has / t̪ d̪/); when learning French /ü/ English speakers use /u/ but Brazilian Portuguese speakers use /i/.
2. Phonological Processes. Allophonic processes are also transferred, for example, a German speaker's tendency to devoice final obstruents in English *hat* for *had*), an English speaker's tendency to use a velarized or dark [ɬ] for final clear [l] when speaking Spanish or French (*eel* [iɬ] vs. *il* [il] "he", *l* [ɛɬ] vs. *el* [el] "he").
3. Underdifferentiation. The L2 has distinctions that the L1 does not, for example, a French speaker using /i/ for English /i/ and /ɪ/, or a Portuguese speaker using /ɛ/ for English /ɛ/ and /æ/.

4. Overdifferentiation. The L1 has distinctions that the L2 does not. Although this does not usually cause nonnative pronunciation, it results in a different mental representation from that of a NS (see Zampini, 1994). English /d/ and /ð/ are separate phonemes whereas in Spanish they are allophones (/d/ → [ð] after vowels). An English speaker thinks of the [d] in *dia* "day" as a different sound from the [ð] in *nada* "nothing," whereas the Spanish speaker thinks of them as one sound, because they are allophones of the same phoneme. The reasons for these psycholinguistic differences are that allophones are usually not at the level of consciousness of a NS, but phonemes are. Thus, an English speaker thinks of the [d] in *do* and [t^h] in *two* as different sounds because they are separate phonemes, but [t^h] in *two* and the [t] in *stew* as the same sound because they are allophones of one phoneme. In contrast, in Hindi all three sounds are separate phonemes (in fact there are also voiced aspirated stops, for example, /d^h/).
5. Reinterpretation of Distinctions. In standard distinctive feature theory, some features are considered primary, therefore distinctive, with others secondary or redundant. In American English, the qualitative tense/lax distinction is considered primary (for example, *beet* vs. *bit*), whereas the quantitative difference, length, is a redundant or concomitant feature, and in fact a NS of English does not even hear the length differences: [bi:t], [bɪt]. However, in German length is primary and quality secondary (for example, *bieten* [bi:tən] "to offer," *bitten* [bɪtən] "to ask"). Thus, a German speaker reinterprets the contrasts and thinks the primary difference between English *beet* and *bit* is length rather than vowel quality.[1]
6. Phonotactic Interference. When the sound patterns of L1 and L2 are different the syllable and word structures are modified to fit L1 patterns. For example, a Spanish speaker may insert the vowel [e] in [e]*student* because Spanish has no initial /st/ clusters; the loan words *ping pong* and *picnic* in Brazilian Portuguese are pronounced *pin*[gi] *pon*[gi] and *pic*[i] *nic*[i] because syllables cannot end in stops.
7. Prosodic Interference. When prosodic patterns of L1 and L2 are different they tend to be transferred, for example, a French speaker

[1] A German student of mine once commented that he was unaware that the vowel qualities of *beet* and *bit* were different; he thought the only difference was length. It should be noted that in many varieties of British English the qualitative differences between tense and lax vowels are usually much less than in American English; in contrast, for some southern American varieties the qualitative differences are very striking: *bit* [bɪt] versus *beet* [biyt] or [bɛyt].

> stressing the last syllable in English words, an American using English intonation patterns when speaking Chinese (rendering it as unintelligible as when the wrong segmentals are used in English), and a Spanish speaker using syllable-timing in English.

Haugen (1956), also in connection with language contact phenomena, rephrased some of Weinreich's earlier categories: Haugen termed sound substitution as simple identification, underdifferentiation as divergent, and overdifferentiation as convergent.

CA has been extensively applied to language teaching. Lado's landmark work (1957) typified the faith in CA:

> The plan of the book rests on the assumption that we can predict and describe the patterns that will cause difficulty in learning, and those that will not cause difficulty, by comparing systematically the language and culture to be learned with the native language and culture of the student. (p. vii)

Later, Lado (1964) defined CA as:

> the comparison of any two languages to discover and describe the problems that the speakers of the languages will have in learning the other. These comparisons are also applicable to the preparation of language texts, machine translation, and language variations in bilingual areas. (p. 215)

Typical of the CA approach for explaining errors was Moulton (1962), who described a taxonomy of error types based mainly on contrasting German and English : (a) phonemic errors, (b) phonetic errors, (c) allophonic errors, and (d) distributional errors (phonotactics). Note how similar these classifications are to Weinreich's (1953) and Haugen's (1956). Another well-respected work of its time on CA was Stockwell and Bowen's (1965) contrastive analysis of Spanish and English, which also included an elaborate and detailed hierarchy of difficulty. Brière, in an oft-cited work (1966, 1968), hypothesized a model of *proactive interference* from a behaviorist perspective based on L1 habits: Stimuli identical in L1 and L2 elicit correct responses, whereas those that are different cause learning difficulties. He based his hypothesis on American students' ability to imitate Arabic, French, and Vietnamese.[2]

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[2] Numerous other works employing CA include Redard (1973), who contrasted Italian with Dutch, English, French, German, Greek, Hungarian, Portuguese, Romanian, Russian, Slovene, and Spanish. She then predicted phonological difficulties by Italian

The fundamental tenet of these and other works on CA was that transfer explained it all, and furthermore that it was possible to predict errors based on CA. However, the predictive power of CA was soon criticized, as many learners did not make all the errors predicted (e.g., some Japanese learners of English have no /r/ and /l/ difficulties). In order to salvage CA, Wardhaugh (1970) introduced the *strong* versus the *weak* versions: The strong version predicted errors (and supposedly had already been discredited), whereas the weak version explained errors after the fact. Because all errors were presumed to be due to transfer, CA seemed to be saved. In defense of the strong version, it should be pointed out that very few theories claim exceptionless predictions, for example, an extremely gifted learner would discredit all theories claiming predictions of any kind because the learner might miraculously acquire everything on the first attempt. In this light, consider 1,000 speakers of Japanese who have never studied any English. It can be reasonably predicted that a great number of them (not all but perhaps at least a majority) will experience difficulties with English liquids and syllable structures. This type of statement can perhaps be called a population version (or an *in general version*) of the strong form of CA.

Although CA seemed to be able to explain errors after the fact, a further criticism of CA surfaced: It did not predict which areas should be more difficult than others—and the weak version of CA was of no help here. Brière (1968) found after training NSs of English to produce Arabic, French, and Vietnamese sounds that by merely comparing the phonemes of the respective languages, CA could not account for relative difficulty in producing the different sounds. Only by looking at phonetic details could an explanation be found. Although many works incorporated degrees of difficulty, these "predictions" were based on intuitions and explanations after the fact rather than on theoretical grounds. This was certainly the case in the popular work of Stockwell, Bowen, and Martin's (1965) and their *hierarchy of difficulty* (see also Whitman, 1970).

An attempt to remedy this lack of predictive power was Oller and Ziahosseiny's (1970) *moderate version* of CA, which incorporated degrees of similarity between the L1 and L2 (further discussed later in §2.2.). Their claim was that similar phenomena cause more difficulty than dissimilar phenomena because "whenever patterns are minimally distinct in form or meaning in one or more systems, confusion may result" (p. 186). They based their hypothesis on a study of spelling errors, finding that speakers whose native languages did not use the Roman alphabet made fewer spelling errors than speakers whose

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learners of these languages. Other CA studies include Anan (1981) for L1 Japanese/L2 French, Paik (1977) for L1 Korean/L2English, Purcell and Suter (1980, reanalyzing the data of Suter, 1976), Soudak (1977) for L1 Czech/L2 English, and Tomaszczyk (1980) for the Polish of Polish Americans.

languages did. A tempting implication of the moderate version of CA might be that languages that are more dissimilar should be easier to learn than similar ones. However, this is not implied at all because the moderate version of CA applies to individual phenomena, not necessarily to whole languages. In SLA, transfer operates—both positive and negative transfer. This means that in the acquisition of similar languages (e.g., Portuguese and Spanish) there will be more positive transfer than in dissimilar languages (e.g., Portuguese and Chinese). As a result, in dissimilar languages there is more overall learning that has to be accomplished (fewer free rides) than in similar languages.

Although the weak and moderate versions saved CA from some criticisms, a growing concern in the 1960s and 1970s was that not all errors were due to transfer—the fundamental claim of CA.[3] Nemser (1971b) pointed out that some nonnative English substitutions by Hungarian learners were not due to L1 transfer. Kohler (1971) also demonstrated that CA could not explain all errors. Following these and other criticisms it became fashionable in the 1970s to claim that CA had been disproven.[4] Representative of this type of thinking was Whitman and Jackson's (1972) study of 2,500 Japanese learners of English testing the predictions of CA. They found CA "inadequate, theoretically and practically, to predict the interference problems of the learner" (p. 40). What had been disproven was not CA *in toto* but rather the notion that transfer was the source of all errors. The other important source was universal factors, which had not been considered by CA advocates.

However, in the 1980s and continuing into the 1990s there has been a resurgence of interest in transfer with the admission that even though universals are important, transfer exerts a very strong influence in SLA and perhaps is a permanent component of IL. Whole volumes on transfer appeared, for example, Gass and Selinker (1983, 1992), Kellerman and Sharwood Smith (1986), and Odlin (1989). Sharwood Smith (1996) noted that interest in crosslinguistic studies has been revived in the last 10 years because researchers have linked linguistic theory with the psychology of language learning in a way that avoids a simplistic behaviorist view. He further claimed that "In the mid-seventies, given the disapproval lavished on it by creative constructionists, it seemed that no more serious words would ever be written about language transfer. In fact, the real story has only just begun" (p. 81).

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[3] This belief was slow in dying. In the late 1980s an anonymous reviewer criticized a manuscript of mine (later published), claiming that all errors are due to L1 transfer.

[4] However, not everyone followed this trend. In 1976 Scovel delivered a paper entitled: "Contrastive Analysis is Alive and Well and Living in Phonology."

Numerous phonological studies emphasizing the importance of transfer continue to be undertaken. Among them are studies on the role of transfer on segmentals (Hancin-Bhatt, 1994; Zampini, 1996), syllable structure (Basson, 1986; Broselow, 1984; Eckman & Iverson, 1994; Flores & Rodrigues, 1994), metrical structure (Archibald, 1992), rhythm (Wenk, 1986), and general phonological phenomena (Singh & Ford, 1985). Loan phonology is often considered a prime example of transfer. Interest in this widespread phenomenon has reappeared (for example, Yip, 1996). Van Coetsem (1988) devoted a whole volume to this topic by discussing what he calls "the" two types of transfer: borrowing and imposition. Borrowing occurs if the agent is the recipient language, for example, a Japanese speaker using English words when speaking Japanese; imposition occurs if the agent is the source language, for example, a Japanese speaker having a Japanese accent when speaking English. These and other studies on transfer bring home the fact that our NL has an inescapable influence on our L2. In other words, the formative years of our language lives permanently affect the rest of our language lives.

2.2 SIMILARITY AND DISSIMILARITY BETWEEN THE FIRST AND SECOND LANGUAGE

The moderate version of CA, which claims similar phenomena are harder to learn than dissimilar phenomena, has fostered a widespread research agenda in L2 phonology, more than for other linguistic levels. Perhaps part of the reason is that in phonology, the notions of similar and dissimilar are easier to define than at other levels, particularly in semantics and discourse. With acoustic, articulatory, perceptual, and structural descriptions there are many clear-cut cases for classifying sounds as similar or dissimilar. (There are problematic cases that I discuss later.) For example, on the basis of phonetic space (formant measurements), who would argue with the claim that French /ɛ/ is more similar to English /ɛ/ than it is to /æ/? On the basis of a structuralist description, that is, looking at the phoneme inventory of German and French, it is clear that French /p/ is more similar to German /p/ than it is to German /b/ (as both languages have a series of voiceless and voiced stops), even though phonetic details show that in word initial position German /b/ can actually be a devoiced stop [b̥] (i.e., more like [p]). However, for non-phonological levels of linguistic analysis, similarity criteria are harder to define. It would be difficult to find well-agreed on criteria to argue that Standard English fiction story telling discourse (if there is a standard) is more or less similar to Navajo fiction story telling than it is to Navajo oral folk history.

The psycholinguistic reason why similar sounds tend to be more difficult than dissimilar sounds seems to be that gross differences are more often noticed, due to perceptual saliency, whereas minimal differences are less likely to be noticed, resulting in non-learning. Thus, an English speaker may not notice the difference between English aveolar aspirated /t/ and French unaspirated dental /t̪/, and when speaking French the speaker uses the English sound. However, the same speaker may soon notice that the *r*s are different in the two languages and after first using English /r/ may immediately show progress toward making the French uvular /R/. One reason why the acquisition of French /R/ and /t̪/ are different has to do with transfer. Psychologists and learning theorists have shown that transfer operates when there are relevant phenomena to transfer. Thus, Ausubel, Novak, and Hanesian (1978, discussed previously in §2.1) claimed that past experience has an "impact on relevant properties of cognitive structure" (p. 165), that is, transfer operates. The key is "relevant properties." When the two entities are very different there is very little that can be transferred. Andersen (1983) discussed conditions of transfer, claiming there has to be a corresponding existing structure for transfer to operate: There has to be "transfer to somewhere." Transferring a tennis swing to badminton seems likely, but transferring shot put technique to the sport of curling seems less likely. Transferring English /s/ to Spanish /s/ seems more likely than transferring English /t/ (or any other English sound) to a Zulu voiceless palato-alveolar click. When transfer is less likely to operate, learning is more likely to take place. Learning does not imply nativelike achievement, only that a stage beyond straight transfer has been reached.

Wode (1978, 1983a, 1983b) investigated the role of similarity in L2 phonology. He claimed (1983a) that L1 transfer operates only when "crucial similarity measures" (p. 180) obtain between L1 and L2 phenomena and that these L2 phenomena have to meet "specifiable similarity requirements" (p. 185). Similar does not necessarily mean identical, but at least in the mind of the learner the sounds have to be similar enough so that L2 sounds can be replaced by L1 sounds. L2 phenomena not meeting similarity requirements are acquired following the same developmental sequences that characterize L1 acquisition, such as German speakers of English using [w] for English /r/, rather than the L1 substitution German /R/. His other examples of transfer for German speakers of English include clear [l] for velarized [ɫ], [ɛ] for /æ/, and /s/ and /z/ for /θ/ and /ð/. Wode's claim about similarity requirements predicts that different or dissimilar phenomena will be easier to learn than similar ones because negative transfer predominates for similar phenomena, the result being non-learning. However, because transfer is less likely to operate for dissimilar phenomena, developmental processes and substitutions occur (similar to L1 acquisition). These substitutions can be considered learning because the IL is going through

stages on its way to L2 NS norms, regardless of whether NS norms are achieved or not.

Young-Scholten (1985) came to a similar conclusion in a study of German second graders whose teacher spoke Swabian German, finding that errors in phonology and morphology depended on crucial similarity. She further claimed that errors due to transfer will persist due to similarity. From this it follows that similar sounds are acquired with more difficulty. James (1983), in a study of stylistic variation of L1 Swabian German and L2 English, found that similarity led to differences in the amount of Swabian versus standard German in the speakers' English. Major (1987b) found that not only was a similar sound harder to acquire than a dissimilar sound, the similar sound often became progressively worse. His study of L2 English and L2 Brazilian Portuguese showed that as global foreign accent decreased, accuracy for the dissimilar sound /æ/ increased, whereas accuracy for the similar sound /ɛ/ decreased (Portuguese has /ɛ/ but no /æ/).

Flege has probably done more extensive work on the role of similarity than any other researcher. Introducing the term "equivalence classification," he has made many detailed instrumental phonetic studies involving similarity between L1 and L2, along with the role of age and ultimate achievement. One of his main claims is that "equivalent" or "similar" sounds are difficult to acquire because a speaker perceives and classifies them as equivalent to those in the L1 and no new phonetic category is established, whereas "new" (dissimilar or different) sounds are easier to learn because the speaker perceives these differences and establishes new phonetic categories. The culmination of much of Flege's research on similar and dissimilar sounds is nicely captured in several of his postulates and hypotheses in his Speech Learning Model[5] (1992, 1995). Among them:

> A new phonetic category can be established for an L2 sound that differs phonetically from the closest L1 sound if bilinguals discern at least some of the phonetic differences between the L1 and L2 sounds. (1995, p. 239)

> Category formation for an L2 sound may be blocked by the mechanism of equivalence classification. When this happens, a single phonetic category will be used to process perceptually like L1 and L2 sounds (diaphones). Eventually, the diaphones will resemble on another in production. (1995, p. 239)

[5] See Flege, 1988b, for an earlier version of some of the ideas in this model, though not called the Speech Learning Model.

A number of Flege's studies support these claims. For Americans learning French /u/ and /ü/, he found (1987b) that advanced learners produced /ü/ authentically (the dissimilar or "new" sound), but produced /u/ unauthentically (the similar or "equivalent" sound). Other studies of Flege's and his associates lend further support to his hypotheses (1987c, 1990, 1993). Bohn and Flege (1992) found that even with extended L2 experience German speakers did not produce the similar English sounds /i ɪ ɛ/ authentically (as determined by formant frequency measurements) because of "equivalence classification." In contrast, these same speakers produced the dissimilar sound /æ/ authentically.

The data on the importance of similarity are quite convincing. A learner consciously or unconsciously makes classifications of an L2 sound on the basis of whether it is similar or dissimilar to an L1 sound and acquisition proceeds accordingly. However, the definitions of similar and dissimilar are not always clear-cut. In 1981 Wode pointed out that we do not have a good definition of similarity requirements and it seems today that we still do not have universally agreed upon criteria. For example, is the Japanese liquid more similar to English /r/ or /l/? The evidence is mixed. Criteria typically include perceptual, acoustic, articulatory, NS and NNS intuitions, and sometimes orthographic evidence. Because the criteria vary for different researchers and different phenomena we have to guard against circular reasoning: *x* is difficult to learn because *y* is similar. How do we know *y* is similar? Because it is more difficult to learn.

Although the vast majority of research does show greater achievement for dissimilar sounds, there are some exceptions. Some of the speakers in Bohn and Flege's study of German speakers of English (1992) actually did better with the similar sound. Major (1987b) found that the advanced speakers performed better with the dissimilar sound than with the similar sound, but for beginning learners the situation was the opposite; in fact, the beginning learners performed better than the advanced speakers for the similar sound. Kim (1994) found both beginning and advanced Korean learners of English performed better for the similar sound. Considering these data, what does easier or harder mean? Major and Kim (1996) claimed that the notion of "difficulty" is indeed the wrong notion. Their claims about similarity and dissimilarity concern rate: The Similarity Differential Rate Hypothesis (SDRH)[6] simply claims that dissimilar phenomena are acquired at faster rates than similar phenomena, and markedness slows rate. Their study involving Korean learners of English supports the SDRH: The similar sound /j/was produced better by both beginning and

[6] As noted in the original article, some of the data were from Kim (1994) but the SDRH is exclusively the idea of Major.

advanced students (beginners did better) than the dissimilar sound /z/, but by comparing the beginning and advanced students it was clear that the rate of acquisition for the dissimilar sound was faster than for the similar sound (which actually showed a negative slope). Major (1997b) gave further evidence for the SDRH by analyzing data from five other studies that were not originally designed to test the SDRH. They include a cross-sectional study of Russian speakers of English (Chabanova, 1997), a longitudinal investigation of a Haitian Creole speaker of English (DeGaytan, 1997), a longitudinal study of three Korean speakers of English at three different proficiency levels (M-J. Lee, 1997), a cross-sectional study of Korean speakers of English at two different proficiency levels (Hong, 1997), and a longitudinal investigation of Japanese speakers of English (Riney & Flege, 1998). Riney and Takagi (1999) also claim their study of VOTs (voice onset time, i.e., the amount of aspiration) in Japanese learners of English supports the SDRH (as well as Flege's SLM).

Using the notion of rate, the SDRH calls into question some poorly defined yet time-honored concepts in L1 and L2 studies. Specifically, what level of achievement is needed for a phenomenon to be "acquired"? What does it mean for x to be acquired before y? If we look only at a hypothetical Stage I where x = 20% accuracy and y =10%, we could say x is acquired before y and is less difficult; in contrast, if we look only at hypothetical Stage II where x = 30% and y = 90% we could say y is acquired before x and is more difficult. Because these cases prove problematic with any theory using the notion of difficulty, the SDRH simply claims that difficulty is the wrong factor to look at—rate is the significant factor. In the example, at Stage I x is higher than y but at Stage II y is higher than x. However, what is missing from this perspective is rate: The rate of acquisition of y is faster than x.

In L1 research , although order of acquisition has been a perennial concern (e.g., Jakobson, 1941/1968, according to David Ingram (personal communication, 1998), rate has not been a major focus in L1 phonology. Although Ingram himself (1990) has discussed gradual and abrupt rates, he notes there is no explanation for these variable patterns. Likewise in L2 acquisition, rate has not been a major focus. However, I would argue that rate is an important area of research for both L1 and L2 acquisition because rates have predictive implications. Because L1 and L2 phenomena have an impact in a wide range of contexts, for example, historical change, languages in contact, and dialect variation, these predictive implications may be used as models for language variation and change.

IL has the components L1, L2, and universals. Although the role of similarity seems clear by the bountiful research already discussed, none of it discusses the relative importance of each component in an acquisition model (i.e., the relative proportions of L1, L2, and U), that is, how do the relative

proportions of each component change over time when a similar sound is involved versus a dissimilar sound? How do these cases compare with unmarked cases? Flege's SLM (1995) implies that L1 persists for similar sounds but he did not address the role of other language universals. Major's SDRH claims the rate is slower for similar sounds also because transfer persists. However, neither the SLM nor the SDRH addresses the role and proportion of universals in relation to L1 (i.e., the universals that do not already characterize L1 and L2). These issues will be addressed in chapter 4.

2.3 UNIVERSALS OF LANGUAGE

The universals of language in include a wide range of properties, including Universal Grammar (UG). To Chomsky and his followers, UG is composed of principles and parameters: Principles are what all languages have in common (i.e., the core grammar) and the parameters are the specific settings for these universals; for example, all languages have vowels and verb-like elements but the specifics of Japanese and English vowels and verbs differ. However, language universals are more encompassing than UG—they include the whole universal set of language properties, such as: (a) learnability theory (see the *projection problem*, Baker, 1979), (b) markedness (Greenberg, 1966, 1978), (c) underlying representations (Chomsky & Halle, 1968), (d) rules and processes (Chomsky & Halle, 1968; Donegan & Stampe, 1979; Stampe, 1969, 1979), (e) constraints (Prince & Smolensky, 1993, 1997), and (f) stylistic variation (Bayley & Preston, 1996; Tarone, 1988). The varied nature of universals is seen in the following examples: (a) any L2 learner acquires voiced obstruents in initial position before final position because of markedness, (b) any L2 learner may exaggerate the pronunciation of American English /r/ because of hypercorrection, (c) any L2 learner of English whose L1 does not have final consonants may pronounce league as [lix] because the /g/ devoices and spirantizes (Yasuta, 1996, found this in Japanese learners of English), (d) any L2 learner whose L1 does not distinguish between /b/ and /v/ will tend to produce the distinction more accurately in a word list than in conversation, and (e) because of constraint rankings, any L2 learner without final obstruents may produce monosyllabic words with final voiced obstruents as disyllabic words, but devoice these same obstruents in disyllabic words (Broselow, Chen, & Wang, 1998, found this in Mandarin speakers of English). All of these examples are the result of universals, not products of language specific transfer.

All of these reflections of universals also occur in L1 acquisition, regardless of the language being acquired. This is not to say that everything in L1 acquisition also occurs in L2 acquisition and vice versa. The reason for this is

that there are important differences between an adult and child, such as maturational differences and the fact that an adult has already acquired a language. However, these L2 phenomena are universals just the same. An L1 English – L2 French learner probably will not devoice final obstruents, even though L1 learners of both languages do. This is simply because adult NSs of both languages have already acquired final voiced obstruents. However, L2 learners whose L1 is Japanese, Mandarin, or Korean will devoice final obstruents both in English and French, just as L1 learners do. On the other hand, no adult L2 learner of English will probably ever say [gaga] for *dog* because no natural language has obligatory consonant and vowel harmony and reduplication; furthermore, all adults have progressed beyond these maturational stages that probably all children experience.

2.3.1 Markedness

Markedness universals deal with occurrence relationships. Markedness has been defined in various ways (Carr, 1993; Chomsky & Halle, 1968; Greenberg, 1966, 1978; Hawkins, 1984; Hyman, 1975; Lass, 1984). The strictest definition is based on implicational hierarchies: *x* is more marked than *y* if the presence of *x* implies the presence of *y* but not vice versa. For example, final voiced obstruents imply voiced obstruents in initial and medial position but not vice versa (see Eckman 1977, 1984, 1985; Eckman & Iverson, 1994). In addition, possible syllable structures are related in a hierarchical relationship: If a language has syllables of the type CVC it also has CV syllables. Thus, English has both CV and CVC syllables but Hawaiian has only CV.

A less-restricted definition is based on statistical frequencies, for example, the type of /r in American English (IPA [ɹ]) is more marked than the type of /l/ in American English, because in the languages of the world, [ɹ] represents only 5.6% of the liquids but [l] 42.6% (Maddieson, 1984). Frequencies also pertain to individual sounds when compared to all other sounds, for example, pharyngeal fricatives are very marked because they occur in very few languages, whereas /p/ is very common. From frequency occurrences arise the notions of naturalness and tendencies; marked means unnatural or not likely. For example, it is more natural to voice obstruents intervocalically than word initially, and there is a tendency to devoice word final obstruents. Markedness can also refer to whole systems, for example, Arabic has a marked stop system: It has voiced and voiceless contrasts for dental, velar, and uvular places of articulation, but only a voiced bilabial /b/ and no /p/. Comparing the hierarchical and frequency definitions, one notes that frequency differences do not always obtain in a hierarchical relationship. For example, in the languages of the world /p/ is much more common than /ʕ/ but the presence of /ʕ/ does not imply the presence of /p/,

as is the case in Arabic. However, an instance of a hierarchical markedness relationship always holds true in the frequency sense, for example, three-member onsets imply two-member onsets and in the languages of the world two-member onsets are more common than three-member onsets. Markedness also deals with L1 acquisition order, for example, children acquire front unrounded vowels before front rounded vowels; and historical change, for example, loss of front rounded vowels is more common than loss of front unrounded vowels.

Eckman's (1977) Markedness Differential Hypothesis (MDH,) put markedness on the map for SLA. He introduced it partially in an attempt to salvage CA (note title of article). A notable trait of much of Eckman's work is the elegance of its claims in terms of simplicity. The MDH simply states that unmarked phenomena are acquired before marked phenomena. Thus, he gave predictive power to CA, something it had lacked previously (but see Lado, 1957). The upshot of this work was that markedness, irrespective of CA, came to the forefront in SLA research. Markedness predictions have been found to hold true when applied to voicing contrasts (Major & Faudree, 1996; Yavaş, 1994; but Edge, 1991, questions Eckman, 1981), epenthesis in initial consonant clusters in Egyptian learners of English (Broselow, 1983), predicting difficulty in general (Eckman, 1981) and for predicting L2 acquisition of Spanish phonology (Castino, 1992), fossilization in Brunei English (Mossop, 1996), final consonant cluster reduction of a Vietnamese speaker of English (Osburne, 1996), L2 pedagogy (Eckman, 1985), and speech pathology (Edwards & Shriberg, 1983; Gierut, 1986; Hodson & Edwards, 1997).

In most if not all of Eckman's work, markedness is used in the strict implicational hierarchical sense. Thus, Eckman and Iverson's investigations of onset clusters (1993) and coda consonants (1994) supported markedness in this strictest sense: The presence of more marked clusters and codas implied the presence of less marked ones, but exact frequencies were not their concern. Note that it is conceivable that some data could violate frequency criteria but not hierarchical criteria. Suppose L2 learners had 40% success with three onset consonant clusters but only 30% success with two onset clusters, then data would violate frequency predictions but still would be in accordance with hierarchical considerations, because both onset clusters occurred. Thus, a hierarchical definition of markedness may not always be the strictest definition. It should be noted, however, that none of Eckman and Iverson's data violated markedness universals in either sense.

Markedness is reflected in syllable structures across languages, in both frequency and hierarchical relationships. In onsets, for example, onsets of length n imply onsets of length n-1 (Greenberg, 1978), except when $n = 1$ (thus a language may not have syllables that begin with no onset but all languages have syllables with one onset). Studies on markedness relationships on syllable

structure onsets are numerous. Sato (1984) found that in a longitudinal study two Vietnamese children reduced two-member onsets to one-member onsets. Anderson (1987) looked at Egyptian, Amoy, and Mandarin speakers' modifications of English who modified single and double onsets and found more modifications in double onsets (either epenthesis or deletion). Weinberger (1987), in a study of both onsets and codas, suggested recoverability is a factor for adult L2 learners preferring epenthesis. That is, if a vowel is inserted the consonant is maintained but if the vowel is deleted it is more difficult to be recovered in perception. (General recoverability principles are further explicated by Weinberger, 1994.)

Carlisle has done extensive work that supports markedness relationships in L2 phonology (1986, 1988, 1991a, 1991b, 1992, 1994, 1997, 1998). His research mostly deals with consonant clusters of Spanish-speaking learners of English. In one study involving two- and three-member onsets (1997), he found that NSs of Spanish modified the three-member English onsets more frequently than the two-member onsets. In another study, a longitudinal study of 10 Spanish-speaking English learners producing /sk/, /skr/, /sp/, and /spr/ onsets (1998), he found that out of the possible 20 tests for markedness, 10% supported markedness[7] and the other 90% were consistent with it, with no counterevidence. In further studies of /sn/, /sm/, and /sl/, Carlisle (1988, 1992) found that all of these onsets abided by markedness principles.[8]

When markedness is defined in terms of statistical frequencies, multivariate analysis such as VARBRUL nicely captures these relationships. VARBRUL analysis can take several variables at once and establish a statistical probability of occurrence, that is, a pecking order. (This should not be confused with a p level of significance, used in traditional statistical levels of significance, such as ANOVA; for example, if $p = 0.01$ this means that the data have 1/100 chance of just being an accident.) Thus, in VARBRUL, the smaller the p the smaller the probability of occurring, and thus the more marked. For example, if $p = 0.2$ in the languages of the world, it means the phenomenon has a 20% probability of occurring and is more marked than if $p = 0.6$, meaning the phenomenon has a 60% probability of occurring. Thus, claims about markedness relationships can

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[7] Actually Carlisle used his data to test Eckman's Structural Conformity Hypothesis (1991, discussed later in §2.2.8.2); however, all of Carlisle's discussion deals with markedness relationships of onsets.

[8] Other research on markedness includes work on consonant clusters in Brazilian learners of English: Baptista and da Silva (1997) on coda consonants and Rebello (1997) on onsets. Abrahamsson (1999) looked at epenthesis in onsets for Spanish/Swedish interphonology. Cebrian (1997) investigated markedness and the prosodic domain of voicing rules in Catalan English.

be tested by comparing probabilities. The Bayley and Preston volume (1996) has a number of studies using VARBRUL, as well as a hands on detailed users guide. In my own study (Major, 1996) using VARBRUL for Brazilians learning English, I found that most but not all initial and final consonant clusters conformed to markedness predictions; however, taking into account the reductive processes occurring in running speech in Portuguese, many of the inconsistencies were resolved. Because markedness is usually stated with reference to underlying forms or citation forms—not running speech—any data on natural running speech may in fact violate markedness universals. However, it stands to reason that because there are universals for underlying and citation forms, there must also be universals for running speech—it would be hard to imagine that some area of phonology had no universals. Phonological universals of running speech (and especially casual speech), as they relate to markedness, have not received much attention in any area of phonology, not just L2 phonology.

Both markedness and similarity (see 2.2.) have been used as predictors of difficulty. The two factors can work together, for example, if *x* (when compared to a sound in L1) is more similar and more marked than *y*, then *x* will be acquired after or at a slower rate than *y*. However, markedness and similarity can work at cross purposes. Suppose *x* is more similar but less marked than *y*. Which phenomenon will prevail? For example, English has /h/ but no /ħ/ or /ʕ/ (pharyngeal fricatives). Phonetically [h] is more similar to [ħ] than it is to [ʕ] because both [h] and [ħ] are voiceless; however, [ʕ] is more marked than [ħ] because voiced obstruents are more marked than voiceless obstruents.[9] One study that yielded data related to this conflict is Riney and Flege (1998), although their study was not intended to investigate this conflict. They looked at acquisition of Japanese learners of English liquids. By most accounts, the Japanese liquid (usually transcribed as [ɾ]) is more similar to English /r/ but /r/ is more marked than /l/. They found that clusters with /l/ (the dissimilar phenomena) were acquired at a faster rate than those with /r/ (interpreting the slopes as rate of acquisition). Thus, in this study dissimilarity seemed to be a more powerful factor than markedness. However, to the best of my knowledge there are no studies that explicitly investigate the relative importance of markedness versus similarity. Studies of this nature are needed; however, it would seem that we need criteria for degree of similarity and degree of markedness in order to predict the relative strength of each factor. At present

[9]Although he did not investigate [ʕ], Alshalawi (1998) found that [ħ] was more difficult than [x] for NSs of American English. His data simply show that a marked and similar sound is more difficult than a less marked and dissimilar sound.

we do not have any predictors of this interaction. This issue will be addressed in Chapter 4.

2.3.2 Other Universal Factors

Imagine the following interchange between a Brazilian and an American:

	Brazilian		American
1.	I hooch da legi.	[ayhučdalɛgi]	Huh?
2.	I hoota da lega.	[ayhutədalɛgə]	Come again?
3.	I hurt my leck.	[ayhərtmaylɛk]	Your lake?
4.	I hurt my leg.	[ayhərtmayleg]	Oh, that's too bad.

This hypothetical conversation represents stages of development and stylistic variation,[10] where each successive repetition by the Brazilian represents a closer approximation to native English. All of these stages follow logically from the interaction of transfer and universal factors.

1. follows mostly from transfer: [ur] is substituted for [ər] and [a] for [ə]; [i] is epenthesized, as syllables cannot end in stops; the [i] palatalizes the [t] and then deletes; [r] is deleted because of the universal factor of consonant cluster deletion (cf. r-less dialects of English); *the* is substituted for *my* (in Portuguese when referring to one's own body parts, a speaker normally uses the definite article); [d] is substituted for [ð].
2. [ə] replaces [i] in epenthesis. As [ə] epenthesis is not part of Portuguese phonology, it must be a universal factor.
3. r-deletion and vowel epenthesis are overcome but word final obstruent devoicing occurs, not a Portuguese phonological rule. The Brazilian also learns the possessive is used instead of the definite article. But the American hears [lɛk] as [lek] due to phonological similarity and because of semantics, also universal factors (*lake* is a word, but not *leck*).
4. Finally, the speaker pronounces the sentence like a NS of English.

The phonetic realizations in this interchange demonstrate the interaction of a number of factors, including transfer, similarity, markedness, stylistic variation, and other universal factors. Any explanation that tries to account for

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[10] Stylistic variation occurs in this interchange, because each successive time the NNS utters *I hurt my leg*, we might assume that he or she is increasingly paying attention to form.

these data with only one factor may be successful in explaining one form of one stage but fails to account for the data as a whole because these different factors exert their influence in different environments and at different stages. The following research falls into the category "other universal factors" because it does not neatly fit into one category alone. In many instances the researchers tie together a number of interacting factors in formulating a coherent explanation or theory. Perhaps some of the researchers discussed in the following do not like to think of themselves as the "other" category, but I mean this as a compliment, as these works encompass many of the other factors discussed previously, including mutual interaction.

A number of early works demonstrated that universal developmental factors influenced L2 acquisition because errors could not be traced to the NL, but rather were the same errors that children experience when acquiring that language as a first language. Nemser (1971b) reported that Hungarian learners attempting English [θ] produced [sθ], which does not occur in either native English or Hungarian. In L2 learners of Swedish, Johansson (1973) noted that many of the substitutions were due to transfer but many were not. She discussed the processes of overgeneralization and approximation. For example, some Czech and Polish speakers overgeneralized using one Swedish sound for another (e.g., [ü] for [ɯ]). American English and German speakers approximated sounds that occurred in neither Swedish nor their NL (e.g., [ʉ] for [ɯ]). Johansson also claimed to have found counterevidence to some of Jakobson's universals (1941/1968); for example, there were more deviations in /e/ than in /ø/, seemingly going against the claim that front unrounded vowels are acquired before front rounded vowels. However, even though the Americans substituted [ɛ] or [ey] for Swedish [e] in 52% of the utterances and [ʊ] for [ø] in only 7%, this does not contradict Jakobson's claim, because front unrounded vowels were substituted in all cases.

A number of other L2 studies have indicated the presence of developmental processes (Benson, 1988; Dreasher & Anderson-Hsieh, 1990; Piper, 1984; Williams, 1979; Wode, 1980). Early studies were largely limited to the segmental level. However, Leather (1983, 1987) investigated tone and James (1986) showed a relationship between the suprasegmental phonology and segmental form in Dutch speakers of English. His later works also include an integration of various levels from the segmental to prosodic (James, 1988, 1989). In addition to purely phonological factors shaping L2 phonology, discourse factors can be related to L2 phonological proficiency (Pennington, 1992). Musau (1993) studied the L2 acquisition of Swahili segmentals, syllable structure, stress, and tone by NSs of Bukusu, Kamba, Kikuyu, Massai, Nandi, Somali, and Luo. Because Swahili is not a tone language but the NLs of the learners are, an interesting interaction occurred between tone and stress. He

concluded that the most important factors in the overall acquisition of L2 Swahili were L1 transfer, overgeneralization, hypercorrection, approximation, language universals,[11] and variability.

One of the prime examples of a developmental process is the well-documented occurrence of final obstruent devoicing (Altenberg & Vago, 1983; Edge, 1991; Flege & Davidian, 1984; Hodne, 1985; Riney, 1989). It has been known for some time that the devoicing is favored when voicelessness follows (either the next word beginning with a consonant or utterance final). However, recently it has been shown to depend on vowel height. Yavaş (1997) found more devoicing after high vowels than low vowels, due to sonority (high vowels are less sonorous than low vowels).

Hecht and Mulford (1982) discussed the interaction of transfer and developmental factors. They claimed that when both transfer and developmental factors produce the same substitution, the substitution is likely to persist longer than a substitution having a single source. A good test case would be final obstruent devoicing in German versus Japanese learners of English. The prediction is that devoicing would persist longer in German NSs because it also occurs in native German but not native Japanese. This was perhaps the first attempt to make predictions based on the interaction of transfer and developmental factors. It did not, however, predict which factor, developmental or transfer, would be the stronger under different conditions.

The extensive research demonstrating the role of developmental factors was used as fuel against CA, although almost all studies still admitted transfer was a factor. Hammarberg (1988, 1993, 1997) discussed factors determining the strength of transfer, among other factors, and the effect monitoring has on them. Even though researchers demonstrated that both transfer and developmental factors were important, and had been aware of them for nearly 20 years, remarkably, prior to1987 there was no model or theory explicitly describing their interaction. The Ontogeny Model (OM) does just that (Major, 1987c; described in detail in Archibald, 1998a; James, 1988; O'Grady, Dobrovolsky, & Aronoff, 1997). The OM (Fig. 2.1) claims that over time transfer processes decrease; concurrently, developmental processes are at first infrequent, later increase, and then still later decrease. A further claim is that as style becomes more formal, the same patterns obtain. Evidence for the model (Major, 1987d) was presented from general learning theory as well as an empirical study. Although the model was proposed for phonology, it has also been used to

[11] It is curious why he put language universals into a separate category, as the factors other than transfer are usually considered universals; most likely, Musau meant other universals.

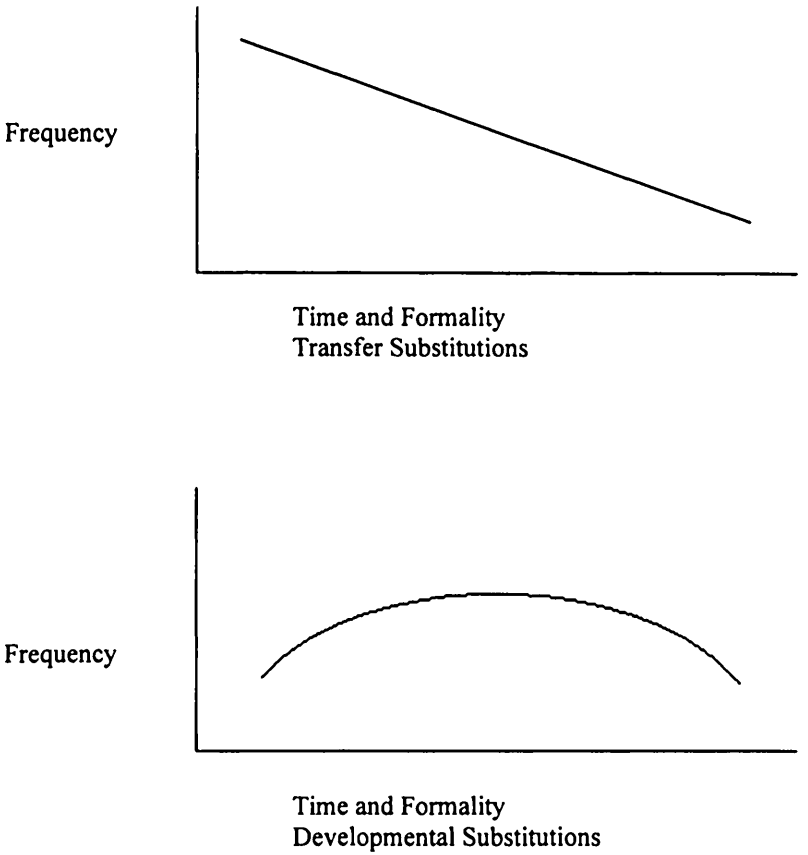

FIG. 2.1. The Ontogeny Model (Major, 1987d).

describe L2 acquisition in general (Archibald, 1998a; O'Grady, Dobrovolsky, & Aronoff, 1997). A hypothetical illustration of the transfer/developmental interrelationship is seen in the dialog at the beginning of this section. Going from 1 to 4, transfer decreases but developmental substitutions increase and then decrease. The OM, as originally proposed, deals with NN errors but does not make any claims about targetlike productions or the relative proportions of transfer substitutions, developmental substitutions, and targetlike productions. Furthermore, although markedness and similarity are addressed, they are not explicitly part of the model. These shortcomings are addressed in chapter 4.

Eckman (1991) pointed out problems with the MDH: It has to make reference to both the L1 and L2, not just to universals. Furthermore, he found

(1984) Farsi speakers devoiced word-final obstruents in English, even though Farsi has voicing contrasts in this position. In order to remedy the problems with the MDH, Eckman (1991) proposed the Structural Conformity Hypothesis (SCH), which simply and elegantly claims that interlanguages obey primary language universals. In support of the SCH, Eckman (1991) examined NSs of Cantonese, Korean, and Japanese producing English onsets and found only one falsification of a markedness implicational hierarchy (using a criterion level of 80% accuracy as being "acquired"). Specifically, there was only one case out of 132 where a triple onset was present without any double onsets. Note, however, that this is not a counter example of markedness in the frequency sense, ass subjects were much more successful with the two member onsets. Eckman's own discussion of the SCH deals strictly with markedness in the hierarchical sense, but the implications of the SCH go far beyond this. The SCH claims ILs behave according to principles of natural languages. Thus, markedness (whichever definition one prefers) and all other universals are necessarily implied. To date, there have been no convincing data violating the claim, but there is strong evidence to support it (Carlisle, 1997, 1998). However, if violations of the SCH should be found, perhaps the universals themselves are false as presently stated if they cannot account for IL (see chapter 1).

Other approaches to L2 phonology include the role of orthography in acquisition (Young-Scholten, 1995, 1997), a feature competition model (Hancin-Bhatt, 1994; see Archibald, 1998a for a thorough review), lexical phonology (Eckman & Iverson, 1997), and lexical factors. Flege et al. (1998) examined the lexical factors of familiarity, age of acquisition, imageability, and relatedness to NL words, and found none of these factors affected the VOTs of NSs of Spanish producing English. Acquisition of Xhosa clicks by NSs of English reveal some interesting data because clicks are not speech sounds in native English. Lewis (1994) found a prevalence of developmental substitutions as expected because there are no similar phonemes in English, but also variable success with different clicks, indicating there may be markedness relationships even for clicks.

Although since the 1980s and up to the present, research on segmentals has continued, there has been an increase in research on units larger than the segment. This interest parallels mainstream linguistics with the introduction of new theories, especially nonlinear theories, so termed because they involve hierarchical levels of representation such as tree structures. These include lexical phonology (Kiparsky, 1982), autosegmental and metrical phonology (Goldsmith, 1979, 1990), CV (consonant vowel) phonology (Clements & Keyser, 1983), geometrical feature representations (Clements & Hume, 1995), and Optimality Theory (Prince & Smolensky, 1993, 1997). Different theoretical approaches were discussed in 1.3.

In the nonlinear tradition, there has been extensive work on prosodic domains usually involving the notion of parameter setting, where the parameters of the L1 are reset as a result of exposure to the L2 (Archibald, 1992, 1993a, 1993b, 1993c, 1993d; Broselow & Finer, 1991; Yip, 1990; Young-Scholten, 1996; Zampini, 1997). Archibald (1993a) devoted a whole volume to the acquisition of metrical parameters, including his own study of English acquisition of NSs of Polish and Hungarian (also see Archibald, 1998a, chapter 6). He found that the data were in accordance with the universals of metrical phonology. He also examined the acquisition of English stress by speakers of tone languages (1997b). Parrondo-Rodrigues (1997) described the L2 acquisition of syllable structures in terms of a subset-superset parameter approach. Zampini (1997, in press) examined spirantization in L1 American English-L2 Spanish. In the 1997 study of two groups of learners (2nd semester and 4th semester Spanish), she concluded that learners acquire the prosodic domain of L2 phonology in various stages according to prosodic hierarchical principles. Thus, most spirantization occurred at the word level for both groups, both groups spirantized word initial stops in clitic groups, but spirantization in the phonological phrase occurred primarily in the advanced learners. Young-Scholten (1996) reviewed research involving parameter settings and concluded that perhaps there is differential access to subcomponents of phonology, that is, some parameters may or may not be transferred at early stages of acquisition. Furthermore, there may be biological factors (i.e., the CP) limiting parameter access.

Geometrical phonology posits a hierarchical representation of different features, for example, the laryngeal node is a much higher node than place of articulation. Archibald (1998b) employed this theoretical model in his study of L2 learners of English who are NSs of Arabic, Hungarian, Korean, Polish, and Spanish. Addressing mental representation, Archibald posited the necessity of a constituent structure using nonlinear models that include segmental tiers, syllable tiers, and feature geometry. He argued that mental representation is highly abstract, with hierarchical representations at different levels, yet still somehow accessible to the learner in speech production. Using these frameworks, he then insightfully argued that the acquisition of two liquids (e.g., /l/ and /r/ in English) is correlated with the acquisition of consonant clusters in syllable onsets. In this case, acquisition of liquids means not just the ability to produce them but rather being able to contrast them with each other. Furthermore, the typological facts are in accordance with this. Archibald surveyed a number of languages and found no language with just one liquid that allows onset consonant clusters. He claimed that this follows from feature geometry and sonority considerations because at an abstract geometrical level and derived sonority level, the same relationship exists between liquids in the

segmental inventory and in initial clusters. Thus, the acquisition of initial consonant clusters and liquids are interdependent.

Optimality Theory (OT, Prince & Smolensky, 1993, 1997) is a constraint-based approach. According to OT, different outputs can result from different constraint rankings, but each output is supposedly optimal, based on these various rankings. Markedness, then, can be defined in terms of constraint rankings. It has been used widely in L1 acquisition studies (e.g., Parkinson, 1997) but up until now very little in L2 acquisition. Yip (1996) employed it in a loan phonology study and Bunta (1999) in a segmental analysis of Hungarian learners of English. Similarity/dissimilarity has been thoroughly investigated but Bunta is perhaps the first to analyze it within an OT framework. Using the constraints of vowel length, height, and backness, he accounted for the acquisition of /ɛ/, the similar segment, and /æ/, the dissimilar segment, by showing different stages involving different rankings.

Hancin-Bhatt and Bhatt (1997) analyzed L2 syllable structures. In data of onsets and codas in the English of NS of Japanese and Spanish, they found that the sonority model of Broselow and Finer (1991) accounted for the degree of difficulty but failed to account for the type of errors. Using OT they found that some errors could be attributed to language specific rankings (cf. L1 transfer error, however it is defined) but other errors to language independent rankings that are universally dominant (cf. developmental error, however it is defined). Broselow, Chen, and Wang (1998) also employed an OT framework in analyzing Mandarin speakers' simplification of English words with coda obstruents. The speakers modified the codas by vowel epenthesis, deletion, and devoicing. However, there was a decided preference for epenthesis in monosyllabic words but devoicing in bisyllabic words. The authors argued that these are the result of constraint rankings that are instances of the emergence of the unmarked. They concluded that markedness constraint rankings may appear in interlanguages, even though such rankings are not visible in either the L1 or L2.

2.4 PERCEPTION

Production is related to perception. Adult language learners do not invent their L2 pronunciation in a vacuum with no input; rather, their pronunciation is in part the result of how they perceive the L2, which is often in terms of the L1 perceptual system. Infants also develop their pronunciation out of their developing perceptual system (for an extensive summary on neonatal speech

recognition of the last three decades, see Jusczyk, 1997). In the earliest stages, infants do a great deal of cooing and babbling, which do not seem to be linked to language input they receive, that is, it is the same regardless of the language they hear; however, after about 6 months of age evidence indicates that babbling differs, depending on the language input they hear (de Boysson-Bardies, Halle, Sagart, & Durand, 1989; de Boysson-Bardies & Vihman, 1991; Oller & Eilers, 1988; Roug, Landberg, & Lundberg, 1989; Vihman, Macken, Miller, R., Simmons, & Miller, J., 1985; Vihman, Ferguson, & Elbert, 1986; but Wode, 1995, pointed out problems with the evidence). This evidence suggests the development of speech from babbling is gradual, in contrast to Jakobson's early view (1941/1968) that the transition from babbling to speech was discontinuous. Regarding infant perception, it has been shown repeatedly that infants and even fetuses have acute perceptual abilities, that is, they can discriminate fine phonetic details of human speech. Thus, the classic sucking rate research (Eimas, 1974) showed infants could discriminate place and voicing contrasts. Other research also shows infants can discriminate fine detail in speech sounds (Bertoncini, Bijeljac-Babic, Blumstein, & Mehler, 1987; Eimas; 1975, 1986). According to Wode (1997a), as infants receive input they acquire the ability to map the variable speech waves onto a finite set of sound categories, which are probably innate and not language-specific. That is, infants are able to create phonetic categories on the basis of exposure to language input without any understanding of the structure of the language. As acquisition proceeds, out of the finite set of all the categories of the languages of the world, the child limits the categories to the language(s) being acquired.

As children grow older they soon lose their abilities to distinguish a large number of sounds in favor of sounds occurring in the language(s) they are acquiring (Lee, S. K., 1997; Werker & Tees, 1983, 1984a, 1984b; Werker & Pegg, 1992, Wode, 1994, 1996). By the time most people reach adulthood, their perceptual abilities have diminished considerably. That adults are often deaf to certain perceptual differences is evident when they move from one dialect region to another. Whereas certain dialect differences are readily noticeable (e.g., most Americans from the Midwest or West notice New Yorkers will often drop their *r*s), others go unnoticed. I am often struck that many natives of the Midwest and East, who have the /ɔ/ – /a/ distinction and who now live in the West, have failed to notice even after decades of living in the West that for most westerners *ball* and *doll* actually rhyme. They find it difficult to believe these two words rhyme, even when confronted with evidence to the contrary. Typical responses are, "I don't believe it," "That's not the right way to say it," or "I never noticed they did that."

When the L1 learner starts to produce words, most evidence indicates that the Underlying Representation (UR, also called mental representation)[12] is virtually the same as that of the adult, that is, the child knows what the words are supposed to sound like. However, the child's mispronunciations are due to production difficulties, rather than perceptual difficulties. Thus, a child who says [gak] for *back*, *bug*, *dog*, *duck*, and *sock* is trying to say [bæk], [bʌg], [dɔg], [dʌk], and [sak], but due to consonant harmony, lack of the ability to produce fricatives, word final obstruent devoicing, prevocalic voicing, and a merger of /a æ ɔ ʌ/, all five words are pronounced [gak]. Comparing morphology and syntax (and other linguistic levels) with phonology reveals there are important differences in terms of the target. In phonology the target is usually the same as the adult's, but in other areas of acquisition it may be completely different. A child who says [fɪs] for *fish* usually knows it is supposed to be [fiš] (the *fis* phenomenon), whereas a child who says, *Mommy going work?* (meaning 'Is Mommy going to work?') is intending to say *Mommy going work?* not *Is Mommy going to work?* Semantics can differ considerably too, for example, a child who says *doggie all gone* meaning "the cow is no longer here." Thus, in these examples the intention is the same as the output (barring of course performance problems, a factor in all acquisition), whereas in phonology the intention is for the most part the same as the adult's.

L1 and L2 acquisition of morphology and syntax are similar because there is a close correspondence between the target and what is produced, which may or not be the same as the adult NS. The target reflects the grammar of L1 and L2 at a particular stage of development. Thus, for both the child and adult L2 learner the nonnative forms are due to a nonnative target. For example, a child or L2 learner who says, "Why I can't go?" is trying to say just that, not "Why can't I go?" However, L1 and L2 phonological acquisition are very different. In L1 phonological acquisition the child knows what the adult NS target is; however, in L2 phonological acquisition the learner may or may not have the same target as the adult NS, just as this is true in L2 morphological and syntactic acquisition. However, in morphology and syntax if the L2 speaker knows the NS target, then it will be achieved; if he or she does not know the NS target, the target will not be achieved because the output is the result of the grammar at that particular stage.

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[12] UR is a traditional notion of generative phonology that posits rules or processes are applied to URs to arrive at surface representations, that is, the actual phonetic output. In contrast, Optimality Theory (OT) posits inputs and outputs. Through different rankings of universal constraints acting on the input, various outputs result. OT is discussed further in 1.3.6.

In L2 phonology the possibilities are more complicated. Although there is some connection between perception and production (because the target has to be based on something and in production one has to have a target to aim at), the relationship is not predictable or clear-cut, as both target and processes producing the output can be identical to the learner's NL or TL or even something intermediate. First of all, the L2 speaker may or may not know the NS target (due to perceptual differences between NSs and NNSs) but both of these possibilities can result in native and nonnativelike production because the output is not so directly linked to the intention as it is in syntax and morphology. Thus, in L2 phonology there are four possibilities for the L2 learner: (a) target = NS target, production = NS production, (b) target = NS target, production ≠ NS production, (c) target ≠ NS target, production ≠ NS production, and (d) target ≠ NS target, production = NS production (finer distinctions are discussed in Major, 1995).

These possibilities are illustrated in the following examples: (a) an L2 Portuguese learner with L1 English is aware of and produces contrasts between /ey/ and /ɛy/, (b) an L2 English learner with L1 Japanese knows and can perceive /l/ and /r/ contrasts but cannot produce the differences, and (c) an L2 English learner with L1 Portuguese represents both English /a/ and /ʌ/ as /a/ and fails to make the distinction in production. Possibility (d) is a fortuitous case of where not knowing helps. Even if the adult target is nonnative the surface may fortuitously result in native pronunciation. An English learner of Spanish pronouncing *para* "for" may use English /r/ and say [para] because the speaker knows there is an /r/, but if the speaker thinks of the word as having intervocalic /t/ or /d/ (thus misrepresenting the target) the word would be produced correctly as [paɾa] (similar to English *pot o'* as in *pot o' gold*). In Ganda, which phonemically has one liquid, [l] occurs before back vowels and [r] before front vowels (Halle & Clements, 1983, p. 53). Thus, Ganda speakers who have only one liquid as their target for English may correctly produce [re] for *Ray* and [lo] for *low* but also [re] for *lay* and [lo] for *row*.

Child/adult differences in speech perception have been researched with fairly similar results: Children are able to distinguish contrasts that adults are unable to distinguish, although children's abilities diminish very early in life. Children's perceptual capabilities extend to phonetic distinctions that do not occur in their language environment. For example, Spanish-and-Kikuyu learning infants can discriminate certain English voiced versus voiceless distinctions that are not phonemic in their ambient languages (Lasky, Syrdal-Lasky, & Klein, 1975; Streeter, 1976). English-learning infants can discriminate place of articulation differences not used in English, for example, Hindi /d/ *versus* /ɖ/ (Werker & Lalonde, 1988), the Nthlakampx velar and uvular ejective contrast /k'/ and /q'/ (Best & McRoberts, 1989; Werker & Tees, 1984a), Zulu

implosive and explosive contrast /ɓ/ and /b/, the Zulu voiceless stop /k/ and ejective /k'/ (Best et al., 1990), and the Zulu apicodental, palatoalveolar, and lateralalveolar clicks (Best, McRoberts, & Sithole, 1988). However, some discrimination abilities diminish before the first year of life, somewhere between 6 and 12 months of age (Best, 1994, 1995; Best & McRoberts, 1989), although Best, McRoberts, and Sithole (1988) reported that English-learning infants and adult English NSs could distinguish Zulu clicks, which they attribute to the fact that these clicks cannot be assimilated to any English categories. (Even though these sounds are not phonemes in English they do occur in most all English NSs, for example, when making sounds for *giddy up*, *tick tock*, and *tsk tsk* for expressing disapproval.)

Cross-linguistic speech perception research consistently indicates that experience with a particular language is correlated with decreased perception for some nonnative contrasts but increased perception for native contrasts (Lisker & Abramson, 1970; Miyawaki, Strange, Verbrugge, Liberman, Jenkins, & Fujimura, 1975; Singh & Black, 1966). Although adults can discriminate some nonnative contrasts with virtually no training (Polka, 1992; Werker, Gilbert, Humphrey, & Tees, 1981; Polka, 1991, 1992), hundreds of training trials are needed for only small improvements in other contrasts (Logan, Lively, & Pisoni, 1991; MacKain, Best, & Strange, 1981; Tees & Werker, 1984), and even with this training these productions still fall short of native listeners (Logan et al., 1991; Polka, 1991). Other research has shown that discrimination of nonnative contrasts improves with training (Jamieson & Morosan, 1987; Logan et al., 1991; Pisoni, Aslin, Perey, & Hennesy, 1982; Strange & Dittmann, 1984; Tees & Werker, 1984; Werker et al., 1981), and even with no training adults can discriminate many nonnative sounds if tested with sensitive-enough procedures (Werker & Logan, 1985; Werker & Tees, 1984b).

A well-known and well-respected model of L2 speech is Flege's (1995) Speech Learning Model (SLM), which links production to perception and incorporates the factors of similarity and dissimilarity that were extensively discussed earlier in §2.4. The SLM includes three postulates and seven hypotheses. Hypotheses 1 to 4 pertain to perception. A summarized version of the main tenets are: H1: Sounds of L1 and L2 are related perceptually at the allophonic rather than phonemic level; H2: A new phonetic category can be established if the learners can discern at least some of the phonetic differences between the L1 and L2 sound; H3: The greater the phonetic dissimilarity between the L1 and L2 sound the greater likelihood the differences will be discerned; and H4: The ability to discern differences decreases as AOL increases. Flege supported his model with an impressive body of his own research, as well as research of many others. For example, he noted that in Japanese learners of English perceive and produce English /ɹ/ and /l/ more

accurately in final than in initial position (Strange, 1992), perhaps because the acoustic differences are more pronounced (Sheldon & Strange, 1982) or the sounds are categorized differently in initial and final position (Flege, 1995).

Best's (1995) Perceptual Assimilation Model (PAM) shares similarities with Flege's SLM.[13] Best claims that "non-native segments, nonetheless, tend to be perceived according to their similarities to, and discrepancies from, the native segmental constellations that are in closest proximity to them in phonological space" (p. 193). It is called an assimilation model because sounds are either (a) assimilated to a native category, (b) assimilated as an uncategorizable speech sound that give rise to a new category (similar to Flege's similar or dissimilar sounds), or (c) not assimilated to speech, that is, heard as a nonspeech sound. This third possibility can result in fine discriminations, as in the case of English learning infants and adult NSs of English being able to perceive differences in Zulu clicks (Best, McRoberts, & Sithole, 1988). That humans have a speech mode of perception and a nonspeech mode has been known for a long time and this also follows from what we know from a large body of research on JNDs (just noticeable differences) that has demonstrated that JNDs are much less for nonspeech sounds than for speech sounds. JNDs for speech are often 20% but 10% for nonspeech sounds (e.g., two vowels with a length difference of 10% may not be perceived as different but two non-vowel sounds with a length difference of 10% may be perceived as different).

Both the SLM and the PAM use the notion of similarity between L1 and L2. Similarity criteria are often based on phonetic transcription, acoustic measurements, articulatory gestures, and listener judgments. This last criterion was investigated by A. M. Schmidt (1982) who examined Korean learners of English and how they judged 22 English consonants. The subjects orthographically labeled each consonant as the closest Korean consonant and also ranked each consonant on a scale of 1 to 5 on the basis of how similar it was to a Korean consonant. Her results revealed that some consonants were consistently labeled as one Korean consonant and judged to be very similar, others were consistently labeled but judged less similar, and still others were inconsistently labeled.

Wode (1997b) called for an integration of perception and production and noted that most past and current approaches to L2 phonology are based on production. However, he argued that in many respects perception is primary because it controls the nature and production of phonological units. His approach is termed perception-based phonology (PBP) and claims that phonological systems have anatomical prerequisites but also have their origins

[13] For a summary and critique of these two models, see Markham, 1997.

in properties of the auditory system that are both non-language specific and non-species specific. In his model, Wode thus traced the characteristics of sound systems to perceptual properties of auditory systems that may be even older than human beings, such as those in birds, chinchillas, and macaques.

Probably the largest body of research in perception for both NSs and NNSs is categorical perception of VOT, which is a primary factor used by many languages in distinguishing between stops. A typical experiment involves hearing stimuli of varying the VOTs. Listeners then choose which sound they hear, for example, /t/ or /d/. The change from one category to another is not gradual but abrupt, with a rapid change occurring where their L1 locates a phoneme boundary (Abramson & Lisker 1970). Figure 2.2 illustrates this. Thus, at 0 msec 100% of the stimuli were perceived as /d/, and at 22 msec 100% were perceived as /t/. The crossover point or phoneme boundary is at approximately 16 msec, meaning 50% of stimuli were judged as /t/ and 50% as /d/.

In bilinguals, the phoneme boundary is often an intermediate value between monolingual speakers of both languages (Caramazza, Yeni-Komshian, Zurif, & Carbone, 1973; Williams, 1977). The phoneme boundaries for the two languages in bilinguals may be the same or different (Elman, Diehl, & Buchwald, 1977), and child L2 learners show progression in their L2 boundaries toward those of NSs (Williams, 1979). Caramazza et al. (1973) found in

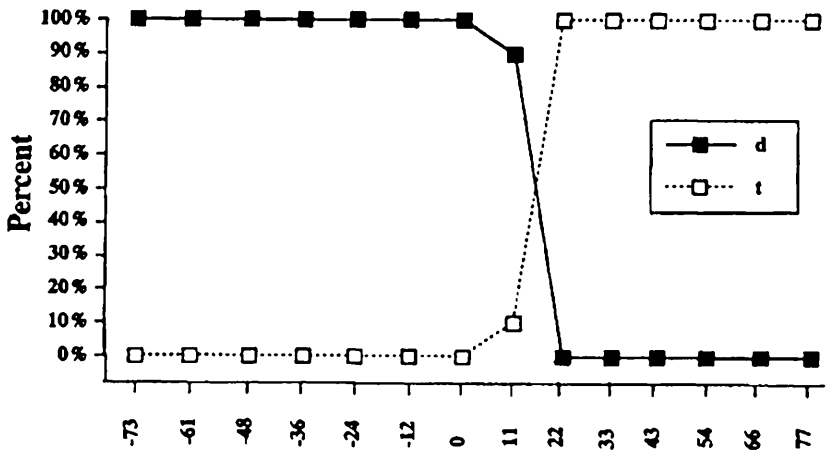

FIG. 2.2. Identification functions of a single listener for VOT continuum from /d/ to /t/ in approximately 11ms steps (Ganong, 1980, p. 52).

bilingual Canadians (French and English) that their VOTs for French and English were different but they were also different from monolinguals. (Voiceless stops in native English have long-lag VOTs and French short-lag. For a comparative study of several languages, see Lisker & Abramson, 1964.) Interestingly, even in monolingual French Canadians the VOTs were much higher than in monolingual French speakers in France. This demonstrates the influence of language contact. In two separate studies, Zampini (1998, in press) examined VOTs of /b/ and /p/ in Spanish and English (native VOT values for /p/ in Spanish are short-lag). She found (1998) students enrolled in an advanced undergraduate course in Spanish phonetics showed significant changes toward Spanish-like categories in both production and perception, but there was very little relationship between production and perception. In another study of early Spanish-English bilinguals and L1 English monolinguals (Zampini, in press), the VOTs in bilinguals were equal to English monolinguals but differed in closure interval. In perception, for words in isolation both groups were equal but in sentences there were significant differences.

In addition to perception research in VOTs, there is a body of research investigating /r/ and /l/. In general, both for native and nonnative language, perception is better than production for all sounds; however, Sheldon and Strange (1982) found that Japanese learners of English /r/ and /l/ performed better in production over perception. Yamada (1995) examined the influence of age and length of stay in the United States on Japanese learners of English. She found that the younger the speakers and the longer the stay in the United States, the better their perceptual abilities for /r/ and /l/. Also lexical familiarity may be a factor in /r/ and /l/ perception (Flege, Takagi, & Mann, 1996). De Jonge (1996) looked at production and perception of /r/ – /l/ for Japanese speakers, /b/ – /p/ for Arabic speakers, and /ǰ/ – /dz/ for Spanish speakers. She found that the Arabic learners mastered the contrasts at early stages of proficiency but the Japanese and Spanish speakers did not, even at high levels of proficiency. She further used her data to evaluate the adequacy of four models of L2 acquisition (CA, Eckman's MDH, 1977; Flege's SLM, 1995; Best's PAM, 1995) and found none of them fully accounted for the data. She claimed these models need to incorporate reference to universal patterns of frequency and preference. Riney and Flege (1998) did a longitudinal study of Japanese college students learning English /r/ and /l/ and found some improvement over time in perception; however, little support for markedness based on frequencies (/r/ is more marked than /l/). Finally, Kang (1999) examined Koreans' production and perception of English /r/ – /l/, /b/ – /v/, and /ǰ/ – /z/. Surprisingly, the Koreans had the least difficulty with /r/ – /l/ and the most difficulty with /b/ – /v/. For three sets of phonemic perception contrasts error rates for the subjects were 8% for /r/ – /l/, 11% for /ǰ/ – /z/, and 16% for /b/ – /v/.

A good deal of research has been done with perception of vowels, especially by Flege and his associates (Bohn & Flege, 1990a, 1990b; Flege, Bohn, & Jang, 1997; Flege, Munro, & Fox, 1994; Fox, Flege, & Munro, 1995). Most studies show that NSs perceive vowels in terms of their native categories but that exposure to an L2 can change these categories. Flege, Bohn, and Jang (1997) looked at the effect of language experience on NN English speakers' ability to produce and perceive the English vowels /i ɪ ɛ ə/. NSs of Spanish, Mandarin, Korean, and German with varied English experience were tested against native English speakers. Speakers with more English experience produced and perceived the English vowels more accurately than less-experienced subjects. In the first part of a two part experiment Rochet (1995) examined the relationship between perception and production of French /ü/ by NSs of Canadian French and Brazilian Portuguese (neither language has /ü/) and found support for the hypothesis that foreign accents are perceptually determined. In the second part he gave training to Mandarin speakers of standard French in perceiving stop consonants. Training led to significant modification of perception of the target and this even carried over to other syllables. Bohn (1995) studied the English vowels /i ɪ ɛ æ/ in NSs of German, Mandarin, and Spanish. He demonstrated that L1 transfer does not offer a full explanation and in fact may not be a factor in NN vowel perception if the vowel contrast covers an acoustic area that is underexploited in the NL.

In perception of prosody, L1 patterns can transfer to the L2, but universal factors also come into play just as they do with other phenomena. Lane and Schneider (1963) found perceptual training did not help production of Thai tones. In investigations of Chinese tones, Vance (1977) synthesized [yu] syllables with varying tones and presented them to Cantonese speakers. In the lexical labeling tasks they identified the syllables using their Cantonese tone system. Leather (1983, 1987, 1990, 1991) investigated NN perception and production of Chinese tones. The relationship between perception and production was not a 1:1 relationship, but rather it depended on the tones being acquired. Likewise, Broselow, Hurtig, and Ringen (1987) found English learners were better able to identify the falling tone in Mandarin when it occurred in final position as opposed to other positions. This they attributed to the fact that falling tone in final position resembles English declarative intonation. Leather (1990), who studied Dutch and English speakers acquiring Chinese tones, found that if learners had learned accurately to perceive the four tones by only being exposed to one speaker, when they were exposed to different speakers these same learners reorganized their categories; however, the result was sometimes a worse approximation of the tones than they had previously acquired.

In investigation of intonation, Cruz-Ferreira (1987) looked at L1 British English and L2 European Portuguese and L1 European Portuguese and L2 British English. She found that in addition to L1 transfer, subjects utilized universal strategies. Komar (1997) investigated Slovenians' perception and production of English intonation and found that the influence of L1 depended on the patterns under consideration: The rising intonation of Slovenian more often replaces falling-rising intonation of English because in their sample all falling-rising tokens occurred in non-final word groups and this expresses non-finality in Slovenian.

Husby (1997) looked at perception and production of rhythmical features in Norwegian spoken by Vietnamese. In the Norwegian dialect under consideration, NS stress correlates include a complex lengthening system, vowel quality differences, and low tone, but intensity is not a correlate. The Vietnamese-speaking learners of Norwegian varied in their success depending on their length of stay in Norway. The long-term residents had partial access to the hierarchical lengthening system and used low tone, but the shorterm residents had not acquired length and they used high tone. Setter (1997) investigated the rhythm in Hong Kong English and found that the speakers shortened the vowels in VC rhymes and made no significant distinctions for stress.

Length differences are contrastive in many languages, and they may or may not be learned by L2 learners not having these distinctions in their L1s. For example, Enomoto (1992) looked at perceptual development of length in English-speaking learners of Japanese but found the learners were only partially successful. However, non-phonemic length differences can also be factors in acquisition. Goldstein (1983) looked at the effect of word length and initial consonants for L1 English and L2 French. The words varied between one and four syllables and began with a stop or fricative. Four syllable words were more accurately identified than one-syllable words but contrary to predictions, stop initial words were not identified more accurately than fricative initial words.

Overall listening comprehension can depend on a number of factors. Unsurprisingly, good hearing is one (Karamarkovic, 1974). Gass and Varonis (1984) found that comprehension increased with familiarity of the topic, with NN speech, with specific accents, and with specific speakers. Degree of foreign accent also correlates with listening comprehension but not perfectly as some NN forms have more serious effects on comprehension (Anderson-Hsieh et al., 1992; Borrell, 1996; Munro & Derwing, 1995a; Wingstedt & Schulman, 1987). Speaking rate can also affect comprehension (Munro, 1998a) and processing time can vary with different accents. Munro & Derwing (1995b) found Mandarin-accented English took longer to evaluate than NS English. Early studies have found noise too can affect comprehension (French & Steinberg,

1946; Miller & Nicely, 1955). Mayo, Florentine, and Buus (1997) investigated the effect of noise in production and perception of Mexican Spanish/American English bilinguals and American English speakers. They found that speech was intelligible with more noise for early bilinguals (those who learned English before age 6) and monolinguals than for late bilinguals (those who learned English after age 14). Munro (1998b) looked at the effect of cafeteria noise on the perception of NSs of English and Mandarin-accented English and found noise more severely affected perception of Mandarin speakers of English.

In bilinguals, speech perception can be different from monolinguals depending on AOL and proficiency (Bohn & Flege, 1993; Hardison, 1996). In very proficient bilinguals there may be two modes of perception; however, less-proficient learners perceive both languages only in terms of their L1. In a study of an aphasic bilingual Russian-Hebrew (L1 Russian and L2 Hebrew who immigrated to Israel at age 20), Eviatar, Leikin, and Ibrahim (1999) found that the subject showed a difference in her ability to perceive phonemes in Hebrew words depending on whether the words were produced with a Russian accent or natively: She performed considerably better when hearing the words with the Russian accent. The researchers conclude that a mediating mechanism assimilating L2 phonemes to L1 categories is differentially damaged.

2.5 FIRST LANGUAGE LOSS

Losing one's first language or L1 attrition is a common phenomenon. Because L1 loss includes a number of scenarios, I define L1 language loss as a change in the NL as the result of the influence of another language or languages. There is considerable anecdotal evidence of language loss occurring with isolation from all human contact (e.g., hermits or Arctic or Antarctic explorers) and among immigrants who after a few years in their newly adopted country visit their home countries and are thought to sound a little different or even nonnative. Language loss also means the loss of a native dialect, such as when one moves and picks up characteristics of a new dialect of the same language. Here, too, anecdotal evidence is abundant: A U.S. southerner moves north and after several years of residence is still thought by northerners to be a southerner, but when visiting the original home town in the South is thought to be from the North or at least not from that town. [14]

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[14] A former student of mine, a native of France who came to the United States in her early 20s, reported that in her 30s when she visited her home town in France, people remarked, "You speak French very well. Where did you learn it?"

Language loss can be very minute; for example, a person who used only *pop* for carbonated soft drink but now uses *pop* and *soda*;[15] moderate, such as losing various degrees of proficiency (Kaufman & Aronoff, 1989a, 1989b; Seliger & Vago, 1989; Sharwood Smith, 1983a, 1983b), which has implications for speech pathology assessment (Westernoff, 1994); or large, such as language death (Dorian, 1973, 1981; Dressler, 1972; Dressler & Wodak-Leodolter, 1977). Bilinguals, too, can experience the forces of L1 loss, as most research shows that late bilinguals do not achieve the proficiency in the L2 of other monolinguals, but their L1 also differs from other monolinguals. Even child bilinguals show the effect of language loss. Although they can grow up being nativelike in two languages, the nature of "nativelike" changes, due to the mutual influence of the two languages. For example, Caramazza et al. (1973) demonstrated that the VOTs of Canadian French-English bilinguals were significantly different from monolinguals. These bilinguals were NSs of these two languages, but because their standard had changed from the monolingual norm these bilingual speakers can be considered products of language loss. Thus, the linguistic characteristics of synchronic societal bilingualism and languages in contact are products of diachronic language loss. (For more on languages in contact see Caramazza et al., 1973; Clyne, 1972, 1980; Haugen, 1956; Thomason & Kaufman, 1988; Trudgill, 1986; Van Coetsem, 1988; Weinreich, 1953).

Because L1 and L2 acquisition show stylistic variation, it would be reasonable to expect stylistic variation in L1 loss; however, there seem to be very few studies dealing with stylistic variation in L1 loss. In L1 and L2 acquisition learners generally approximate the standard or target with greater accuracy with increasing formality. With this in mind, what predictions are there for L1 loss? On the one hand, one might expect the L1 vernacular or casual speech to be the least influenced by the L2, because this style is considered to be the most natural. On the other hand, one might expect the opposite, considering the general conditions under which the target is most heavily influenced by transfer. In L2 acquisition L1 transfer is greatest in a casual style. Thus, in L1 loss the influence of transfer might also be the greatest in a casual style, but in this case it would be L2, not L1, transfer.

One study dealing with stylistic variation in L1 phonological loss is my own study of American immigrants to Brazil (Major, 1992). The study examined the

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[15] I do not mean to imply that every time a new word is learned that this is language loss. Consider a region where *pop* is the norm, where no one from that region uses *soda*. If a person begins to use both *soda* and *pop*, then it could be said that this person has lost his or her competence because someone from this dialect area only uses *pop*.

VOTs of five adult native speakers of American English and found inverse relationships between L2 mastery and L1 loss. Those with a greater L2 proficiency (Portuguese) suffered the greatest loss in L1 (English). Across subjects, the greatest loss occurred in casual English, whereas loss in the formal style was not consistent among subjects. In addition, L2 proficiency was correlated with a greater relative degree of loss of L1 in a casual style compared to a formal style. Figure 2.3 shows these relationships. Going from speakers 1 to 5 the formal English (word list) shows a jagged pattern; however, the Portuguese VOTs steadily decrease, becoming closer to NSs, and the English casual speech VOTs (from a conversation) also steadily decrease, becoming further away from NSs. Speaker B5 was quite remarkable: Her formal English and Portuguese were nativelike; however, her casual English was very close to native Portuguese.[16] The implications of this study are that the influence of

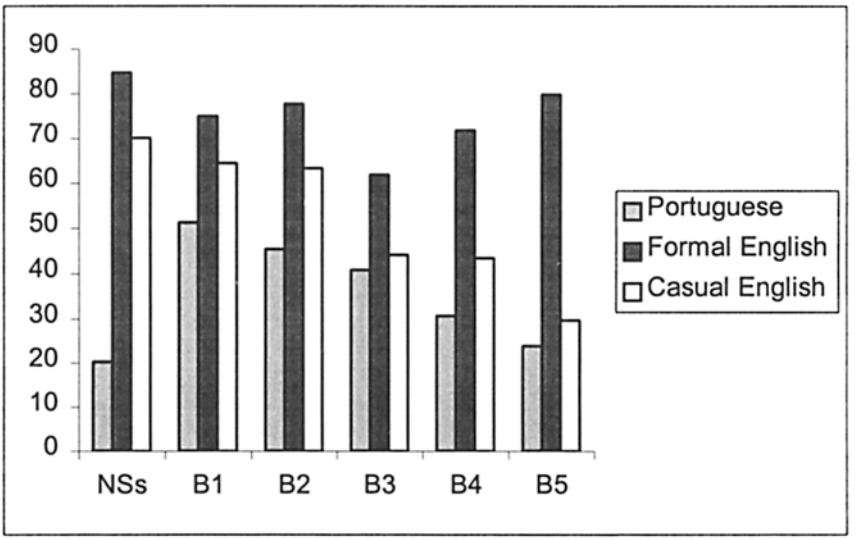

FIG 2.3. VOTs in NSs and Bilinguals (Major, 1992).

[16] When I first met her I did not know if she was Brazilian or American. After talking to her for several minutes I thought she was a Brazilian who had probably spent a good deal of time in the United States. She remarked that when she visited the United States, people would not believe she was a NS of English. However, several years later after she had moved back to the United States I talked to her and she did not seem to have a Brazilian accent. I recorded her using the same speech materials but I have not analyzed them.

transfer of L2 to L1 becomes greater as L2 is mastered and that L2 acquisition mirrors L1 loss: In L2 acquisition the formal style is learned before the informal but in L1 loss the informal is lost before the formal.

I further argued (perhaps too vehemently, as VOTs are but one aspect of a phonological system) that this study may be thought of as a microcosm of language contact and change in progress. If casual is lost before formal then in language contact situations one would expect the L2 to have an immediate influence on L1 learners of that language in all styles. In immigrants, if language *A* is the NL and *B* the dominant societal language, then first generation immigrants learning *A* will be subject to the influence of *B* from their parents' *A*. This is because most of the input in L1 acquisition is from a relatively colloquial style, as opposed to formal (e.g., reading a word list), and it is especially in the colloquial style that their parents have suffered the greatest L1 loss. However, first generation immigrant children acquiring *A* will be affected in their casual speech as well as in other styles because they will not be hearing a true nativelike *A*, but rather mostly their parents' casual *A*, which has been already influenced by *B* (not their parents' formal *A*, which still could be nativelike). Furthermore, by the very fact that the children are also acquiring *B*, *B* will directly influence their *A*. Thus, these learners are doubly jeopardized when learning *A*. It is therefore not at all surprising that in first generation immigrants there are large differences between their *A* and the *A* of NSs from their parents' home country.

2.6 CONCLUSION

The early days of Contrastive Analysis have long given way to more sophisticated analyses involving hierarchical levels of representation, often at levels larger than the segment. Although research on segments has continued, there has been a growing interest in larger units, such as the syllable, word, and phrase, and other prosodic phenomena.

Almost all research today acknowledges the role of both L1 transfer and universals in the formation of an IL. As mainstream linguists continue to gain insights into the nature of universals, so too do L2 theorists. The nature of the influence of L1, L2, and universals, their relative importance, and their interaction in the formation of an IL continue to be of prime interest in second language acquisition research. In addition, only within the last two or three decades has the study of variation become prominent. This is the issue of the next chapter.

Chapter 3

Variation

3.0 INTRODUCTION

Variation exists at all levels of language: in the lexicon, phonology, morphology, syntax, semantics, pragmatics, and discourse. Some variation correlates with unique differences between individuals; other variation correlates with sociocultural variables.

3.1 INDIVIDUAL VARIATION

There are numerous individual factors affecting L2 phonology, often subsumed under personality of the individual. These include empathy, motivation, sense of identity, ego permeability, self-esteem, risktaking, anxiety, and introversion versus extroversion, musicality, and field independence versus field dependence. Some of these factors have been rigorously analyzed, and others are nebulous, yet intuitively appealing. A person's NL accent is part of one's sense of identity and personality. Identity and personality can affect L2 accent, and in turn L2 accent can affect identity and personality. These traits are inextricably intertwined with social factors. One's identity and personality are in part defined as they relate to society and the degree to which the person wishes to participate in society.

Motivation is a much-touted factor for all aspects of success in L2 acquisition, not just phonology. However, motivation and success are mutually reinforcing: Motivation can lead to success, but success also can lead to motivation. The classic dichotomy for type of motivation is Gardner and Lamberts' *integrative* and *instrumental motivation* (1972). An integratively motivated learner desires to become completely integrated into the L2 society

and essentially wants to pass for native, which implies acquiring nativelike language proficiency; an instrumentally motivated learner wants to use the L2 in order to achieve very specific goals, for example, getting a job or passing the TOEFL. Most language educators probably believe that integrative motivation will cause better acquisition, although there is some evidence that instrumental motivation can be just as strong (Gardner & MacIntyre, 1991, Gardner, Day, & MacIntyre, 1992). Gardner & MacIntyre (1991) found very little difference between the integratively and instrumentally motivated learners in acquiring vocabulary (the instrumentally motivated subjects were paid for their success). Coates (1986) found no correlation between integrative motivation and pronunciation (although the subjects of his study were German learners of English living in Germany). However, the distinction between integrative and instrumental motivation is not clear-cut. Integrative motivation can be thought of as the sum of all the various instrumental motivations (obtain a job, be competent at small talk, courtship, business contracts, etc.); thus, the difference between instrumental and integrative motivation is a matter of degree, not kind. Other types of motivation can be even more nebulous. Suter (1976) and Purcell and Suter (1980) found that the learners' amount of concern for good pronunciation influenced their success. Tahta, Wood, and Loewenthal (1981a) also found attitude affected pronunciation. However, Leather and James (1991) pointed out that attitudes can be prevailing societal values, which place varying amounts of importance on good pronunciation.

Although motivation can be a powerful factor, even if the learner is strongly motivated to learn a language there are other personality factors that can prevent success, such as inhibition, anxiety, lack of empathy, and low ego permeability. The oft-cited study by Guiora, Beit-Hallami, Brannon, Dull, and Scovel (1972) demonstrated that very small amounts of alcohol (1 ounce) improved pronunciation in half of the subjects, whereas the other half showed no improvement; unhappily, more alcohol than this amount made pronunciation worse. They attributed the improvement with small doses of alcohol to a decrease in inhibition or more ego permeability (of course, larger doses caused motor skills impairment). Guiora and others have done research on the effect of other affective factors on pronunciation, such as empathy (Conrad, 1992; Guiora, Brannon, & Dull, 1972), language ego (Guiora, 1992; Guiora et al., 1975; Guiora & Schronberger, 1990), affective filter (Hammond, 1990), hypnosis (Schumann, Holroyd, & Campbell, 1978), and the effect of other drugs such as valium (Guiora, Acton, Erard, & Strickland, 1980). Anxiety is often found to negatively affect pronunciation, but Stølen (1987) found it had no effect on pronunciation.

A study that included a number of personality and affective factors is Coates' (1986) study of 143 German students learning English. He included the

factors of musicality, motivation, extroversion, need for achievement, and grade point average. Although admitting some methodological problems in his study, he found no correlation between pronunciation proficiency and integrative motivation, extroversion, and musical ability (but see Thogmartin, 1982, on musical aptitude); however, he found a strong positive correlation between pronunciation proficiency and grade point average and the need for achievement.

The personality traits of field independence and field dependence have been linked to pronunciation proficiency. Field independent learners are able to concentrate on the individual tasks at hand without being distracted by other information. They can see the trees but not be distracted by the forest, which they may not even see at all. Field dependent learners can see the forest but maybe not the trees. Studies on the influence of these two traits have been found to be inconclusive (Dowd, 1985; Elliott, 1995). Perhaps this is because very successful learners may have high profiles for both field independence and dependence: They can learn segmental details (field independence) but are also able to master larger units such as the prosodic characteristics of sentences and discourse (field dependence). On the other hand, very poor learners may have low profiles for both field independence and dependence.

3.2 SOCIOLINGUISTIC VARIATION

Sociolinguistics encompasses many areas, including conversational analysis, language and the law, language planning, language maintenance and shift, as well as the social and demographic factors that contribute to variation. The demographic and social factors that have been found to influence variation include geography, style, profession, ethnicity, age, social class, and gender. In addition to these factors, there are purely linguistic factors that contribute to variation, such as phonological environment, for example, whether the *–ed* morpheme is deleted more frequently in *he passed by* versus *he passed on the right*. Furthermore, social factors may be intricately linked to purely linguistic ones: In the case of the *–ed* morpheme, it is more likely that the past morpheme is deleted (1) before another consonant, (2) in more informal speech, and (3) in non-standard dialects. For example, in almost all speech styles a NS of standard American English is extremely unlikely to delete the [t] before a vowel; in extremely casual speech a NS of African American English is very likely to delete the [t] before a consonant. However, there may be significant differences in the probability of deletion individually across speech styles and between speakers in the same speech style in different phonological environments. Consider the following utterances spoken in a moderately formal style: (1) *He*

passed on, (2) *He passed Willy,* (3) *He passed Betty,* and (4) *He passed Tom.* In general, the likelihood of deletion increases as one goes from (1) to (4); it is possible that no speaker deletes [t] in (1), the African American English speaker may delete it in (2), (3), and (4), and the standard American English speaker only in (4). Furthermore, across dialects male speakers have a greater tendency to delete it, as compared to females. Thus, there can be interplay between ethnicity, style, and gender.

3.2.1 Style

Variation at all levels also exists in SLA. However, the status of variation studies, particularly stylistic variation, as a worthy field of endeavor varies both in mainstream linguistics and in SLA where for some time there has been an ongoing debate about the importance of variation in theory. Chomsky and his followers relegated variation to performance, a second-class citizen when first class is competence. In SLA, Gregg (1990, note title of his article) and others also disputed the role of variation in a competence model (like Chomsky, he called variation performance, having nothing to do with competence), whereas Tarone (1988, and elsewhere) and others argued that the study of variation is an important area for SLA and is needed for a competence model, which is often termed variable competence. In this view, a speaker has different competences with different speech styles, and this variation is not just a result of performance factors of one competence but of many. This disagreement has often been referred to as the Tarone/Gregg debate. (See Eckman, 1994 for more discussion.) Although I just make a passing remark on whether performance itself is a worthy endeavor of language study—I think it is—the attack on variation studies as not relevant to competence is one I do not take lightly. I argue simply: Variation exists and furthermore all language data show variation both in NSs and NNSs, including introspective intuitive judgments about grammaticality (highly valued by some, especially armchair linguists who are not too concerned with gathering data from actual speakers). Therefore, any model, theory, or purported explanation that fails to account for variation is not accounting for the data, period.

If variation is just random, that is, *free variation*, then it may not be of particular interest because nothing can explain it. When I teach phonology and introduce free variation I say that's what you call it when you're not smart enough to figure out the solution. Free variation implies there is nothing at all that has caused it, but from what we know about the universe this seems extremely unlikely, Brownian movement and Heisenberg's uncertainty principle notwithstanding. In Preston's poignant words, "I am suspicious that language variation which is influenced by nothing at all is a chimera" (1996, p. 25).

Although slight variation is not usually noticed in everyday speech, gradually changing probabilities in variable forms over generations can result in dramatic language change, such as suppletion, for example, was/were (the *r* resulted from rhotacism). Thus, the study of variation is important to any theory of language.

There is a bias in sociolinguistic study that places more value on research dealing with the vernacular speech style than other styles, such as reading a text or word list because the latter are considered "unnatural," supposedly meaning they do not occur in natural speech. However, even analyzing a word list is a legitimate field of endeavor because "word lists" do occur in natural speech, even in conversation. A one-word answer to the common question in a restaurant *Do you want soup or salad?* is a frequent occurrence, as is a word list-type answer for *What shall I pick up at the store?* If the listener does not understand the speaker and asks *What,?* the speaker usually repeats using a careful style, similar to reading a word list in a carefully controlled phonetics lab. Even Labov's *fourth floor* study (1966) discussed later based its conclusions on two word utterances. The bias toward conversation may also be the result of one of Labov's (1969, 1972) axioms from his Observer's Paradox: The most systematic patterns occur in the vernacular (colloquial style), whereas more variability and less systematicity occur in other styles. That non-vernacular styles show more variability and less systematicity is not always true (see previous discussion on free variation). For NNSs the statement is equally untrue. Sato (1985) reported that some of her data support this claim but other data do not. Furthermore, I have argued elsewhere (Major, 1987c, 1988, 1994) that word lists can be more or less systematic and variable than conversation because of different proficiencies of L2 learners. Consider the following hypothetical L1 English L2 Spanish speakers and their success with the Spanish trilled /r/:

Speaker A has zero success and uses English /r/ 100% of the time in all styles.

Speaker B has 20% accuracy in word lists but in all other styles English substitutes English /r/.

Speaker C has limited success in all styles. Word list: 70% accuracy, Text: 50% accuracy, Conversation: 10% accuracy.

Speaker D: Word list 100% accuracy, Text: 75% accuracy, Conversation: 50% accuracy.

Speaker E: 100% accuracy in all styles.

If we define variability simply as an alternation between native versus nonnative production, then Speaker A and Speaker B show no variability; however, variation within native and nonnative production may occur, that is, the /r/ that Speaker A uses might show the same type of variation when speaking Spanish or when speaking English (e.g., if the speaker speaks an r-less dialect /r/

may show variable deletion—but it is still an English /r/); Speaker B might show the variability of /r/ of a NS of Spanish. Likewise, Speakers B, C, and D may show variation both in their native and nonnative productions of Spanish, in addition to variability in the percent of targetlike Spanish /r/. Thus, all speakers show variation and their interlanguages are systematic for all styles (see Major, 1987c,[1] 1988).

Even in NSs, Labov's axiom that the greatest variability occurs in the nonvernacular does not hold because it too can depend on the speaker's proficiency with the formal standard. A speaker of a nonstandard vernacular who has not fully mastered the formal standard may show considerable variation and inconsistency when using the formal standard, simply because of lack of competence in the standard, while the same speaker will show much consistency with his or her native vernacular. On the other hand, one who has mastered the formal standard (or is a NS of it) may be just as consistent with it as the vernacular. However, even the vernacular can be less consistent than a formal style. Attrition can occur with extensive isolation from one's native dialect, causing the vernacular to be more variable and less consistent than the formal (Major, 1992). There are further similarities between NS and NNS variation. A similar process is involved when both a NS speaker of a nonstandard dialect of English and a NNS of English are attempting to speak standard English: both using a nonnative variety (be it a nonnative dialect or nonnative language). However, the similarities diminish when the native English speaker switches to an informal style because this is the speaker's native dialect; in contrast, all varieties of English for the NNS are by definition nonnative.

NS variation has been extensively studied in phonology. In his famous *fourth floor* study of /r/ deletion in New York City, Labov (1966) determined which items were located on the fourth floor in three different department stores (Sak's, Macy's, and Klein's) and then asked a clerk where a particular item was located. Then he leaned forward and said "Excuse me?" to elicit a more careful response. Thus, he was able to investigate /r/ deletion on the basis of phonological environment (/r/ before a consonant vs. final position), formality (the first vs. the second more emphatic or formal), and social status (Sak's is the most prestigious and Klein's the least). His results showed that the more emphatic the pronunciation and the more prestigious the store the less frequently the /r/ was deleted; with regard to linguistic environment the /r/ was deleted more frequently in *fourth* than in *floor* (this is predicted from markedness because a coda of two consonants is more marked than a coda of one consonant). These results typify most other studies: The more formal the

[1] After hearing this talk, Labov commented to me that he was then convinced that all these L2 speech styles show systematicity.

situation and the higher the social status of the speakers, the more likely standard forms are used.

In NNS variation it has also been demonstrated that generally there is an increase in the frequency of standard forms in more formal situations; however, there has been very little research on the social status of NNSs (but see Beebe, 1980). Thus, a speaker may be nativelike when reading a word list but nonnativelike in conversation. In addition, just as with NS variation linguistic environment is important for NNSs.

One of the earliest studies dealing with style was Nemser (1971a), who found in a study of Hungarian learners of English that L1 transfer was less with more formal tasks and thus more nativelike. The Dickersons' early work on Japanese learners of English demonstrated both the influence of linguistic environment and style on accuracy and L1 transfer. L. Dickerson (1974, 1975) introduced the concept of variable system in L2 phonology (widely used in sociolinguistics) and W. Dickerson (1976) claimed a wave model of the acquisition /l/ by Japanese learners of English, similar to the one proposed by Labov on phonological change (1972). In a similar fashion Gatbonton (1975, 1978) proposed a gradual diffusion model for French Canadian learners of English. Her results showed influence of linguistic environment, for example, there was an implicational hierarchy for the acquisition of /ð/, with the most likely environment for targetlike production before a vowel and the least likely before a voiceless stop. W. Dickerson's longitudinal analysis (1977) of Japanese learners of English showed that variation depended on linguistic environment and style, and Dickerson and Dickerson (1977) found Japanese learners of English produced /r/ 100% accurately in word lists but only 50% accurately in free speech. Wilson and Møllergard (1981) found more accuracy in the reading style than in speaking style for Norwegians producing British RP /ʌ/. Similar results demonstrating that transfer decreases and target-like accuracy increases as style becomes more formal have been found in a number of other studies (Gatbonton, 1975, 1978; Petrenko, 1989; Sato, 1985; R. W. Schmidt, 1977; Tarone, 1979, 1982, 1983, 1988; Wenk, 1979, 1983).

One reason for the differences due to formality is that the amount of L1 transfer decreases as style becomes more formal. This is because in more formal styles one is more conscious of the form, that is, a person more closely monitors speech and in doing so is able to prevent the natural tendency for L1 transfer to occur. Although Krashen (1977, 1978, 1980) has repeatedly maintained that the monitor is either off or on, almost everyone else views it as Labov had originally defined it (1972) as the amount of attention given to speech; thus, there are various degrees of monitoring (e.g., Beebe, 1980; Tarone, 1982; see also R. W. Schmidt, 1990, 1992, for the role of consciousness in SLA).

Although targetlike accuracy generally increases with increasing formality, this is not always the case. Just as NS variation is stylistically conditioned, so too is NS variation when it occurs in transfer in L2 acquisition. When there is no variation in an L1 sound due to formality, then the result of L1 transfer is that the same sound is transferred to the L2 regardless of style, remembering of course that the amount of transfer decreases with increasing formality. Thus, the difference is in the amount but not the kind of transfer. However, when there is stylistic variation in the phenomenon under question in the L1 then this variation also transfers to the L2. Both Beebe (1980, L1 Thai/L2 English) and James (1983, L1 Swabian German/L2 English) showed that stylistic variation in the L1 leads to differences in amount of L1 nonstandard versus L1 standard forms in the L2. In some instances, greater accuracy in the formal style might be due not just to monitoring but to positive transfer of the formal L1 variant that happens to correspond to the target in the L2. Thus, R. W. Schmidt (1977) pointed out that [ð] occurs more frequently in formal Arabic than in casual and that could explain his Arabic speakers' greater accuracy with English /ð/ in formal English. However, when the formal L1 variant is a nonnative L2 variant but the casual L1 variant is a native L2 variant, then the two factors of transfer and style operate at cross odds: The more formal the less transfer but the less formal the more targetlike. Beebe (1980) found greater accuracy in word initial /r/ production in Thai speakers of English in casual speech compared to formal speech, where more Thai trilled /r/s were substituted. She claimed this was because the influence of the L1 was stronger in formal speech because the speakers were consciously paying attention and in doing so were using the prestige variant of Thai, the trilled /r/. However, I have pointed out (Major, 1994) that in native Thai conversation a variant occurs that is very similar to American English /r/; therefore, the greater accuracy for English /r/ in conversation could simply have been the result of transfer of this Thai variant of /r/ into English.

There are numerous other examples where an L1 process favored in casual speech will coincidentally produce the correct L2 output, thereby offsetting the tendency of greater L2 accuracy in formal speech (adapted from Major, 1990):

1. L1 Spanish – L2 English. In Latin American dialects of Spanish the initial phoneme in *yo* "I" is usually given as /y/. Because phonetically in many dialects it is a palatal stop [ɟ] or the affricate [ʃ], speakers typically pronounce English /y/ inaccurately. However, these same speakers pronounce English /y/ more accurately in casual speech because of a lenition process in their native Spanish changing the obstruent into a glide, thus coinciding with correct English pronunciation.

2. L1 Portuguese – L2 English. Formal Portuguese pronunciation of /il/ and /iu/ is [iw] but in casual speech it is [yu] (Major, 1985). Therefore, in formal English these speakers will pronounce few as [fiw] but in casual English, especially in unstressed position, it will correctly be pronounced as [fyu]. Portuguese also has a paragoge rule that inserts /i/ in words with syllable final obstruents (except /s/), and between consonant clusters (including loan words and acronyms) but also a casual speech process that devoices the vowel and even deletes it: Formal [puki], [šerokis] [abisurdu] but casual speech [puki], [šeroks], [absurdu] *PUK* (a university), *Xerox*, *absurdo*, "absurd". Because of these stylistically conditioned processes, these speakers' pronunciation of English *lap*, *backs*, and *absurd* will be more targetlike in casual speech.
3. L1 Japanese – L2 English. Similar to Portuguese, Japanese has a rule of vowel insertion for loan words but the vowel inserted is usually /o/ or /u/, for example, [kurabu] "club." In addition, high vowels can become voiceless and delete between voiceless obstruents and in final position, especially after /s/, but this process occurs in normal running speech (unlike Portuguese where the process is limited to casual varieties): [sukiyaki] → [sụkiyaki] → [skiyaki] *sukiyaki*. In normal running speech Japanese learners of English may pronounce *city* as [sti] and *lasso* as [læs], due to this process. In slow deliberate speech *sky* can be [sukay] and pass [pæsu], but in normal running speech these words may be pronounced correctly, due to devoicing and deletion.
4. Loan words: L1 English – L2 Japanese – L2 Portuguese. In formal styles both speakers will tend to mispronounce the words due vowel insertion (/u/ and /o/ in Japanese and /i/ in Portuguese): Japanese [bigumaku] Portuguese [bigimaki] *Big Mac*. However, accuracy is greater in casual speech for both speakers, because in both languages the final vowel becomes voiceless and can delete: Japanese [bigumak], Portuguese [bigimak].
5. L1 English – L2 Spanish. In most dialects of American English, tense vowels are diphthongized, especially in careful speech, in stressed position, and in southern dialects, for example, [key] *Kay* but in casual speech the vowels can become monophthongal as in *it wasn't just a good v*[e]*cation; it was a great v*[e]*cation*. However, the vowels in Spanish tend to be monophthongal in all styles. Thus, English speakers have a tendency to mispronounce words like *que* "that" as [key] in isolation but at a faster tempo it may be pronounced correctly as [ke].
6. L1 English – L2 Portuguese. To an English speaker, the Portuguese nasalized diphthongs /ʌ̃w̃/, /ʌ̃ỹ/, and /õỹ/, (for example, *pão* "bread",

pães "loaves of bread", *pões* "puts") seem exotic, strange, and even funny and usually present the speaker with considerable difficulty. However, in extremely casual, intimate English these diphthongs actually occur through a process of nasal flapping and then deletion: *I don't know what's the matter honey. Don't you like Coney Island?* can be pronounced [ãw̃nowəsəmærhãỹdõčəlaykõỹaylən]. Thus, these English speakers may actually be able to produce the correct Portuguese diphthongs but probably only when they put the least amount of effort into it. In fact, these Portuguese-sounding diphthongs in English are only produced when these English speakers' target includes intervocalic /n/, which is deleted only in extremely casual speech.

Explaining pronunciation becomes even more complicated when considering universal factors coupled with stylistic L1 and L2 variation. In addition, prosodic factors can interact with segmentals, as evidenced in James' (1986) study describing variation in Dutch learners of English. Voiced obstruents are more marked in final position than in other positions and speakers generally do better in word lists than in running speech. However, in the case of final voiced obstruents, speakers of Chinese, Japanese, Korean, and Portuguese (none of these languages have final voiced obstruents) perform better in running speech than in word lists because of the universal tendency of terminal devoicing (this does not mean one's last words). On the other hand, there can appear to be markedness violations in IL, but in fact these are only surface form violations, which can be explained on the basis of stylistic variation in the L1. In some cases Brazilian learners of English produced the more marked consonant clusters more accurately than the less marked (for example, final /ps/# vs. /rt/#; Major, 1996). However, this can be explained due to the L1 processes occurring between voiceless obstruents: vowel insertion, vowel devoicing, and finally deletion, for example, English laps /læps/ → [læpis] → [læpi̥s] → [læps].

In addition to universal factors interacting with stylistic L1 and L2 factors these in turn can interact with the underlying representations in the L2 learner, including orthographic considerations. Zampini (1994) investigated English learners of Spanish in their acquisition of Spanish /b d g/ including the allophonic variations of [b β d ð g ɣ]. She found in two groups of speakers the three allophones [β ð ɣ] were produced more accurately in conversation than in reading, very likely because these variants do occasionally occur in English in casual speech. However, accuracy with [ð] was much less than for [β] and [ɣ], which Zampini attributes to the fact that in English [ð] and [d] are separate phonemes whereas [β] and [ɣ]are members of /b/ and /g/ respectively. This is a

case of what Weinreich termed overdifferentiation (1953, discussed previously in §2.2.3).

Another case of where underlying representation affects production in unexpected ways is discussed by Labov (1996). He noted that the common pronunciation in the English of native New Yorkers for *Puerto Rican* is [pɔrəəɚikən] (where [ɚ] stands for intervocalic /r/). However, in the English of Puerto Rican L1 and L2 speakers it is common to hear [pɔɚəɚikən],[2] which does not occur in NSs of English. Even though Spanish has [ɾ] these speakers do not use it here. Labov attributes this to speakers reanalyzing [pɔrəɚikən] as /pɔrərikən/, and this could be due to the fact that Puerto Ricans interpret the English flap as a realization of /r/ instead of /t/, following Spanish (Spanish has intervocalic [ɾ]). When they pronounce it they use their newly acquired English /r/, which is [ɚ] instead of the Spanish flap [ɾ]. Another explanation is that Puerto Ricans often delete /t/ and /d/ in consonant clusters, for example, in *card game, Fort Knox*. Thus, when the /t/ is deleted in *Puerto* an intervocalic /r/ is created. I have often observed a similar phenomenon when Brazilians, trying to sound casual in English say [aygərəgo] for *I gotta go*. Brazilians also will often confuse /r/ and /h/. Because in most dialects initial /r/ is [χ] (very similar to English [h], e.g., *Rio* is [χiu]), speakers will use their acquired English [r] as in *My* [r]*ouse is* [r]*ed* or even *My* [r]*ouse is* [χ]*ed*.

3.2.2 Gender

Variation in SLA also correlates with gender. In NSs there has been considerable research across a wide variety of languages demonstrating gender differences in phonology, for example, in American English (Eckert, 1996; Labov, 1966, 1972; Luthin, 1987), British English (Milroy, 1988; Trudgill, 1984), Arabic (Haeri, 1987), Chukchi (Wardhaugh, 1997), Gross Ventre (Wardhaugh, 1997), Japanese (Shibamoto, 1987), Koasati (Haas, 1944), and Spanish (Rissel, 1989). In general it has been found that in a given style, males use more casual phonological forms than females, who are more likely to use prestige forms. An early study by Fischer (1958) of children (ages 3-10) found that for the *–ing* morpheme the boys showed a higher frequency of final [n], as opposed to [ŋ], than the girls.

In SLA there are very few studies on gender differences in phonology, as opposed to a wealth of studies on non-phonological differences. Similar to NSs, in general, women NNSs use more prestige and formal forms. Weiss (1970)

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[2] In the original article there was an typo in the phonetic transcription on p. 247 of line 2 of 3.1. It should be [pɔɚəɚikən], as I have indicated here (Labov, personal communication, April 4, 1999).

noted better pronunciation by females than males but Tahta, Wood, & Loewenthal (1981b) found no gender differences in pronunciation. Gussenhoven (1979) and Broeders (1982) both reported that Dutch females students were more favorably disposed to use prestige forms in British RP than males. Hiang and Gupta (1992) examined postvocalic /r/ in Singapore English and found that females displayed a higher usage of the /r/, which is a prestige feature.

Another study involving prestige and nonprestige forms was Adamson and Regan (1991), who examined Cambodian immigrants' use of the English *–ing* morpheme in two speech styles. Some of their findings paralleled NS variation but some did not. The NNS females used more of the prestige variant *–ing* ([ɪŋ]) than *–in'* ([n]) than males (a similar pattern was observed for NSs). However, the most surprising finding was that the frequency of *–ing* for males actually decreased as style became more formal. What is suggested is that the males quite accurately perceived the *–in'* as a male marker, and thus to them it was the prestige variant. Accordingly, in their formal style, where greater accuracy is generally observed because more attention is paid to form, these male speakers accommodated to the male NS norm (i.e., males use more *–in'*), rather than to the stylistic norm, which exhibits a greater frequency of *–ing* in formal styles for both genders. Thus, for these male speakers it appears that gender was a more salient feature than formality; however, the authors raise the possibility that the high frequency for *–in'* was simply due to language exposure—these speakers were mainly exposed to working class English, where *–in'* is very frequent.

In a study of casual speech processes (Major, 2000), I examined four English casual phonological processes in NSs of English, Japanese, and Spanish. For NSs, the females used fewer casual forms than males, and across styles both genders used more casual forms in the sentences than in the short phrases. In the Spanish speakers, both style and gender differences were observed; however, the gender differences and stylistic differences were nearly equal, in contrast to the NSs, where stylistic differences were much greater (i.e., in NSs, there were larger differences between styles than between genders). These results imply that gender differences were acquired before stylistic differences. This claim is further suggested by the results of the Japanese speakers: The Japanese speakers only acquired gender differences but not stylistic differences.

3.2.3 Speech Accommodation Theory

Speech Accommodation Theory, elaborated by Giles and others (Giles, 1973; Giles & Johnson, 1987; Giles, Mulac, Bradac, & Johnson, 1987; Thakerar, Giles, & Cheshire, 1982), describes convergence and divergence in speech

patterns of interlocutors. This occurs on the individual level because of psychological factors, as well on a societal level, due to a myriad of social factors. People converge (accommodate toward the patterns of interlocutors) when they desire social approval, communicational efficiency, and wish to express social identity with the interlocutors. They will often diverge (or accommodate away from the patterns of interlocutors) when wishing to emphasize their differences.

One's desire to accommodate toward or away from NSs can depend on the prestige (or perceived prestige) of a particular accent or sound, one's attitude toward the target language and culture, and the perceived power gained or not by acquiring the language (Brown, 1980; Kachru & Nelson, 1996; McGroarty, 1996; Schumann, 1975, 1978b; Zuengler, 1988), including social distance (Acton, 1979; Schumann, 1976). Integration patterns of complete assimilation or various degrees of preservation can be societal imposed (e.g., attitudes toward certain accents affecting the individual's or group's ability to assimilate or not) or self-imposed, for example, willingness or not to assimilate). Many French learners of foreign languages are proud of their French accent and are reluctant to give it up, as a French accent is considered prestigious by many, particularly in the United States;[3] I have never met a British person who wanted to be mistaken for an American.

Short-term speech accommodation can be observed daily in everyday conversation, when one shifts back and forth from one style or dialect to another. In addition, speech accommodation can be longterm. This includes accommodation over time, including SLA and the acquisition of a second dialect (Beebe & Giles, 1984; Major, 1993).

3.2.4 Dialects in Contact

Although some do not consider dialects in contact and language contact phenomena to be SLA, they most certainly are, because the acquisition of a new linguistic system is a second language process. Thus, Trudgill (1986), who devoted a whole volume to dialects in contact, is really dealing with a type of SLA. Furthermore, I argued in §1.5 that to some degree everyone speaks an interlanguage.

Butters (1987) looked at linguistic convergence in a North Carolina community, including such factors as final consonant cluster simplification and found that the African Americans' speech is closer to the White vernacular than it is to the African American speech of the urban North. Because originally

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[3] When I was in my early 20s, a French friend of mine (living in the United States) and I found his accent quite useful when we frequented bars together.

most African Americans living in the North have origins in the South, this is evidence that those in the South are learning a new dialect. In an investigation of speakers of Montagnais, inhabitants of Labrador in the extreme northeast of Canada, Clarke (1987) looked at the effects of dialect mixing. All of the 16 phonological variables she examined showed age stratification in at least one style: The variants that earlier marked territorial affiliation no longer mark it among younger speakers, who are opting for competing variants of other dialects.

Escure (1987) investigated phonological acquisition of Wuhan speakers of Mandarin and found significant differences compared to the local standard, for example, their resistance to acquisition of the retroflex that occurs in standard Mandarin. She further argued that the Mandarin of these Wuhan speakers is not an imperfect attempt at producing the target but rather is a symbol of native identity. Group identity is also seen in a study of Hinton (1987) who found that in Highland Mixtec (Mexico) the creation of two *municipios* caused the speakers to create and exaggerate phonological differences between the two communities (in Giles' terms [1973, etc.], this a case of divergence in speech accommodation, discussed earlier in §3.2.3). In contrast, a case of convergence occurred in Australian Aboriginal English (Kaldor & Malcolm, 1991), where speakers show a large number of phonological features that are features of creole-influenced areas and Aboriginal languages.

3.3 CONCLUSION

Linguistic studies of variation have been widespread for centuries, and even modern sociolinguistic study, in the Labovian tradition, started over 40 years ago. In SLA, variation studies have only come to the fore within the last 20 years. Although there are some who still relegate variation to performance rather than part of competence (in both mainstream linguistics and SLA), many serious SLA researchers consider variation important in any encompassing theory of SLA.

Chapter 4

The Ontogeny Phylogeny Model of Language Acquisition and Change

4.0 INTRODUCTION

The Ontogeny Phylogeny Model (OPM) is a revision of the Ontogeny Model (OM; Major, 1987d). The OM simply states that transfer[1] processes decrease over time, while developmental processes increase and then decrease (see Fig. 2.1). Although these basic claims appear to be sound, there are several problematic areas of the OM. Among them: The OM refers to L1 transfer and developmental processes, yet says nothing about the L2 component. Rather, it merely states that at early stages transfer processes predominate and developmental processes are infrequent, and at later stages both transfer and developmental processes decrease. Because the OM does not address the L2 component in IL, this could mean at the beginning stages L2 could either remain at zero or increase. During the later stages, only by implication can we infer that L2 processes must increase because L1 and developmental processes (universals) decrease and we assume L1, L2, and developmental processes must add up to 100%. Thus, the OM refers to L1 transfer and developmental processes, yet it is not explicit about the L2. Therefore, the OM does not deal with the development of the IL as a whole; rather it describes two but not all three of its components. In addition, the OM does not claim an idealized starting or ending point in IL development. We might assume that the starting point is 100% transfer and 0% developmental and the end point 0% transfer and 0% developmental, but this is not explicit in the model. Furthermore, the OM is more a model of performance than competence, as it limits its claims to

[1] In this seminal article, the term *interference* was used in place of *transfer*.

substitutions and processes, rather than the nature of the IL system that allows processes to operate and to produce substitutions. Another problematic area is similarity. Although the OM claims similar phenomena are more difficult to learn than other phenomena, the model merely claims there are more transfer processes for similar phenomena but more developmental processes for phenomena that are "further apart" (p. 109); however, this statement does not imply anything about the chronological stages of development. Finally the OM makes no claims about markedness. The OPM accepts the basic claims of the OM but addresses these problematic issues.

In addition to dealing with problems with the OM, the OPM adds a new dimension: Phylogeny. In traditional biological terms, ontogeny is the life cycle of a single organism, whereas phylogeny is the evolutionary development of groups of organisms, such as the origin and development of species. Rephrasing this distinction in terms of language, ontogeny is the life cycle of an individual's language and phylogeny is the life cycle of whole languages and language types, including historical change, dialect variation, language loss, and language contact phenomena. The OPM includes both perspectives: Ontogenetically, the OPM deals with the development of an individual's IL; phylogenetically, the OPM deals with larger populations, including language contact and change. Thus, the OPM encompasses both the individual and the evolutionary development of languages. This chapter deals with the ontogeny component of the OPM; chapter 5 deals with the phylogeny component.

This chapter investigates chronological development and stylistic variation, including the influence of similarity and markedness. In addition, it deals with the acquisition of multiple second languages and monolingual and bilingual acquisition. The OPM is then framed within different linguistics theories, and finally this chapter looks at how the OPM can account for non-phonological phenomena.

4.1 THE ONTOGENY PHYLOGENY MODEL

A model of SLA should describe the various components of IL, justify the relative importance of each component, as well as their interactions. I assume IL has the components L1, L2, and universals (U), as outlined in chapter 1 and in Fig. 1.1. Thus, IL = parts of L1 + parts of L2 + parts of U that are not already part of L1 and L2. Such a model does not view IL as something necessarily intermediate between L1 and L2. A particular IL phenomenon may or may not be intermediate between L1 and L2: Although an IL VOT may be intermediate between L1 and L2, it would be difficult to argue how an IL [R] is intermediate between L1 [ɹ] and L2 [r]. IL is also not a deficient version of the L2, but rather

a complete system in its own right, composed of parts of three other systems: L1, L2, and U. Accordingly, a good model should account for the interaction and interrelationships of these three components and should provide the reasons for such interrelationships.

At the beginning stage of acquisition the idealized learner has a completely developed L1 and no other language system. Thus, there is no L2 and U is dormant; that is, there is no U apparent that is not already part of the L1. Therefore, IL = L1. As the learner receives L2 input, the L2 system gradually develops through various intermediate stages until it reaches the idealized state where the L2 is completely mastered, that is, IL = L2. This pattern characterizes the idealized learner. Even though very few if any learners reach this advanced stage, obviously every learner has L1 as the starting point if the person has not ever been exposed to an L2.

The Ontogeny Phylogeny Model (OPM) claims the basic pattern of development for IL is: L2 increases, L1 decreases, and U increases and then decreases.

The OPM can be represented mathematically as follows:

$$IL = L1_n + L2_0 + U_0$$
$$IL = L1_{(n-1)} + L2_x + U_y$$
$$IL = L1_{(n-2)} + L2_{(x+1)} + U_{(y+1)}$$
$$IL = L1_{(n-3)} + L2_{(x+2)} + U_{(y+2)}$$
$$IL = L1_{(n-4)} + L2_{(x+3)} + U_{(y+3)}$$
$$IL = L1_{(n-5)} + L2_{(x+4)} + U_{(y+4)}$$

. . . .
. . . .
. . . .
. . . $+ U_{(y+c)}$ $(c<n)$
. . . $+ U_{(y+c-1)}$
. . . $+ U_{(y+c-2)}$
. . . $+ U_{(y+c-3)}$
. . . .
. . . .
. . . .
. . . $+ U_{(y+c-c)} (= U_y)$
. . . $+ U_{(y-1)}$
. . . $+ U_{(y-2)}$
. . . $+ U_{(y-3)}$
. . . .
. . . .
. . . .

$$IL = L1_{(n-n)} + L2_{(x+n-x)} + U_{(y-y)}$$
$$IL = L1_0 + L2_n + U_0$$

The vertical sequences of equations indicate various acquisition stages. Following these sequences from top to bottom we observe that at the first stage IL is composed exclusively of L1, where n = the total system of the adult NS of L1 and $L2_0$ and U_0 mean that there are zero components of L2 and U. In the following stages, the L1 components gradually diminish successively from one stage to the next, until they reach zero at the last stage. Simultaneously, L2 starts to develop at some arbitrary stage x (where $x \geq 1$). Gradually L2 components are acquired until the last stage where they are equal to a NS of L2 (n = the total system of the adult NS of L2). Concurrently, U components start to develop at some arbitrary stage y (where $y \geq 1$). Gradually U components increase to some point $y + c$ (where $c < n$ and n is the total of U in all languages). Then after point $y + c$, the U components decrease to the point y again ($U_{(y+c-c)}$). Finally, U continues to decrease until it is zero again.

This model assumes access to U (including UG), as it is well-documented that the IL grammar shows characteristics of neither the L1 nor L2. However, the debate whether or not the learner has full or partial access to UG, what the filtering mechanisms are, and so on, are not relevant concerns for the OPM. What is relevant is that UG and U in general are accessible to the learner, the manner and to what degree not being of central importance (See White, 1996, for different views on UG accessibility, as pointed out by Gass, 1997, pp. 90–91). Furthermore, however one wishes to characterize U is not a relevant concern here; that is, the particular framework one prefers is not crucial to the model—be it generative phonology, parameter setting, desetting, resetting, or constraint based approaches (e.g., Optimality Theory), and so on. In my view, U simply includes the universal set of properties of the human language capacity and the resulting universal characteristics of languages. In addition to abstract linguistic constructs, U includes anatomical, functional, and processing properties of the human mind. These, by definition, have to be universal if they are to be part of the properties of our species. For the purpose of the OPM, U simply means the universals of language that are not already part of the L1 or L2 system. This is an important point in the OPM, as obviously all languages and ILs have U; thus the claim U increases and then decreases does not make sense if U is to include everything. What I mean here is that the components of U that are not already part of L1 and L2 increase and then decrease. The U I am concerned with here is the latent U that only becomes operative or visible during L2 acquisition.

The increase and then decrease in U in the OPM could be interpreted to mean various things, depending on one's theoretical perspective. Among them:

(a) from a general linguistic learning principle perspective, overgeneralization and hypercorrection appear and then disappear, (b) from a parameter model viewpoint, parameters are set, then deset, and finally reset, (c) from generative phonology or Natural Phonology or perspective, new rules or processes surface and then disappear or become ordered or reordered, (d) from a markedness standpoint, learners acquire onset consonant clusters before coda clusters and this is reflected in the decrease of U processes in onsets before codas, and (e) from an Optimality Theory framework, at first constraints have L1 rankings, later they become unranked or reranked but not in accordance with either L1 or L2, and then finally the constraints take on L2 rankings. Section 4.5 discusses the OPM within different theoretical frameworks.

Although all natural language systems are characterized by U, in the OPM framework it is important to emphasize that U here means the parts of U that are not already contained in the NL systems of L1 and L2 (see Fig. 1.1). For example, when terminal obstruent devoicing occurs in L2 acquisition of German, it is subsumed under L2, not U, because native German is characterized by devoicing; on the other hand, when terminal obstruent devoicing occurs in L2 acquisition of English, it is subsumed under U, because devoicing is not native English. Thus, in the OPM, U means the nascent U that is operating, that is, the remnants of the child's U that do not operate in adult NSs of the L1 and L2, but do become activated during L2 acquisition. In a sense, activating these dormant phenomena[2] is reverting to a nascent state where U is full-blown, thereby allowing phenomena to occur that are not part of the L1 or L2. Consider an L2 learner who has no final obstruents in the L1 (e.g., Japanese), but is acquiring final voiced obstruents in the L2 (e.g., English). If transfer operates and the learner epenthesizes a vowel, then the U process of final devoicing is not part of the IL, because there is no evidence whatsoever of its existence. However, at the point when and if epenthesis ceases and devoicing occurs, then devoicing obviously is part of the IL system. Another example of dormant phenomena that can become activated in L2 acquisition can occur in the acquisition of a voiced pharyngeal fricative [ʕ], where substitution of a glottal stop [ʔ] and deletion are common. If the learner's L1 has neither [ʔ] nor [ʕ] (e.g., Spanish), then these processes are necessarily dormant before the learner is exposed to an L2. However, the processes may become active when the learner starts acquiring an L2 containing [ʕ] (e.g., Arabic).

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[2]That U is dormant and has not atrophied is evident in speech errors. Adult speakers frequently produce utterances that are not the result of their L1 competence, for example, metatheses and sounds and sequences of sounds not in the L1.

The OPM makes a general claim addressing the interrelationship between L1, L2, and U. Specific corollaries of the OPM pertain to chronology, style, similarity, and markedness.

Chronological Corollary of the OPM. IL develops chronologically in the following manner: (a) L2 increases, (b) L1 decreases, and (c) U increases and then decreases.

Stylistic Corollary of the OPM. IL varies stylistically in the following manner: As style becomes more formal, (a) L2 increases, (b) L1 decreases, and (c) U increases and then decreases.

Similarity Corollary of the OPM. In similar phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases slowly, and (c) U increases slowly and then decreases slowly. Thus, the role of L1 is much greater than U, compared to less-similar phenomena.

Markedness Corollary of the OPM. In marked phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases and then decreases slowly, and (c) U increases rapidly and then decreases slowly. Thus, except for the earliest stages, the role of U is much greater than L1, compared to less-marked phenomena.

Let us examine each claim, one by one.

4.1.1 Chronological Development

The basic claims of the OPM pertain to the overall chronological development of IL in normal phenomena. The other corollaries follow from them.

Chronological Corollary of the OPM. IL develops chronologically in the following manner: L2 increases, L1 decreases, and U increases and then decreases.

The model is demonstrated graphically in Figs. 4.1 to 4.5. In these figures, the circles indicate the total IL system with each sector indicating proportions of the three subsystems, L1, L2, and U. The specific proportions or percentages in the figures are hypothetical and can vary from learner to learner and from phenomenon to phenomenon. Looking at these figures from one stage to the next, one observes that the IL system is composed successively of more L2, less L1, and concurrently more U and then less U.

The OPM claims that at the beginning stages the L1 influence is so strong that it prevents U from exerting its influence. Later the learner realizes (often unconsciously) that the L1 is not a sufficient substitute for the L2. As a result of this, as well as continued L2 exposure, L2 components start to develop. However, because much of the L2 may be beyond the learner's reach or is nebulous in the learner's mind, simultaneously U starts to exert its influence,

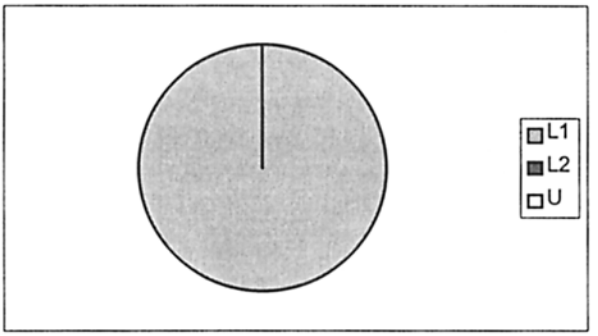

FIG. 4.1. Stage 1. The Ontogeny Phylogeny Model.

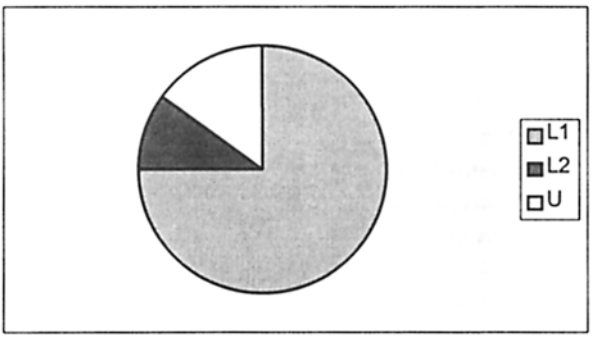

FIG. 4.2. Stage 2. The Ontogeny Phylogeny Model.

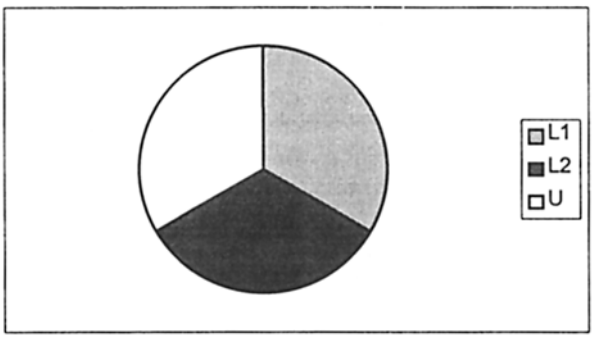

FIG. 4.3. Stage 3. The Ontogeny Phylogeny Model.

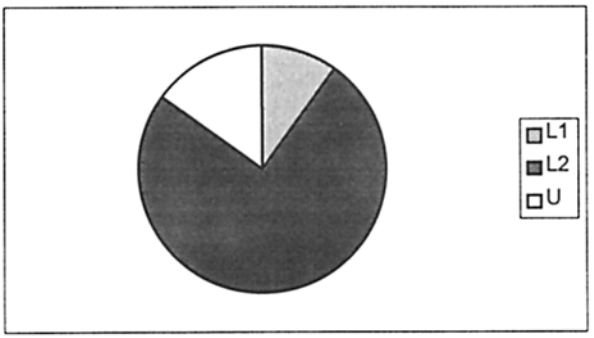

FIG. 4.4. Stage 4. The Ontogeny Phylogeny Model.

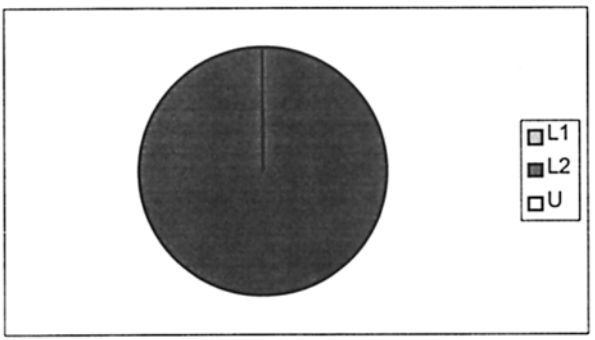

FIG. 4.5. Stage 5. The Ontogeny Phylogeny Model.

which results in phenomena that are neither part of the L1 nor L2. Thus, at an early stage L1 obliterates the effect of U so nothing in U is evident that is not already in the L1; that is, U remains dormant. However, at a later stage U awakens and has a life of its own, so to speak. Then in later stages, the influence of U decreases as the L2 becomes more developed. The decreasing influence of U means that after a U principle has operated and has been "correctly" instantiated in the IL (i.e., it is nativelike), U has "done its work" so to speak and therefore does not appear as a nonnative part of the IL—but rather as part of the L2 component of the IL.

The claims of the OPM apply to the total IL system, as well as to individual phenomena. Some hypothetical examples of individual phenomena demonstrate the principles of the model.

1. L1 English – L2 Spanish /r/. At an early stage the learner substitutes English [ɹ] exclusively for the Spanish trilled [r], thus L2 = 0 and U = 0. At a later stage the learner has moderate success with [r] but also starts to substitute a uvular trilled [R], in addition to continuing to use [ɹ]. Thus, the IL at this stage shows an increase in L2 and U and a decrease in L1. The substitutions continue but the proportions change, [r] continuing to increase until it reaches 100%, while [ɹ] and [R] decrease until they reach zero.
2. L1 Korean – L2 English /f/. Korean has /p/ but no /f/. The learner substitutes [p], then [p], [f], and [ɸ] (which occurs neither in English nor Korean), and then finally only [f].
3. L1 Hawaiian – L2 English obstruent voicing contrasts. Hawaiian has only the voiceless obstruents /p k ʔ h/ (some consider /h/ a glide). Consider the pronunciation of English *big* and *biggy*. At first, the learner epenthesizes a vowel on *big* (since Hawaiian has only open syllables) and substitutes voiceless obstruents everywhere. Thus, both words are pronounced [piki]. Later, when the transfer process of epenthesis is eliminated for *big* the words are pronounced [pik] and [piki]. Later still, the U principles of markedness in voicing contrasts surface: The least marked position for voicing contrasts is initial position, whereas the most marked is final position. This hierarchical relationship is reflected in the successive stages of [bik] and [biki], then [bik] and [bigi], and then finally [big] and [bigi].
4. L1 Japanese – L2 English onset and coda consonant clusters. Because Japanese has no consonant clusters (other than word medial geminates), the first stage epenthesizes a vowel to break up the clusters, for example, [pulizudo] for *pleased*. Later stages are [plizudo], [plizdo], [plist], and then [plizd]. What is observed in these successive stages is a decrease in transfer (epenthesis), but transfer decreases more rapidly in initial over final position, following U principles of markedness, where final clusters are more-marked than initial clusters. In addition, when epenthesis is overcome the U process of terminal devoicing operates. Finally, all L1 and U components disappear, allowing nativelike production.
5. L1 German – L2 Italian VOTs. Italian VOTs are much shorter than those in German. Therefore, the learner will first substitute the German long-lag VOT, and then during successive stages gradually diminish the length until they reach the Italian standard. In this case there is no clear point at which U starts to operate, as the changes are on a continuum and the IL is clearly intermediate between L1 and L2. However, because the VOTs change because of exposure to L2 we

conclude that some principles must allow this to take place, namely the principles of U. Furthermore, in L2 VOT acquisition, there typically is much more variability than in the native utterances of L1 and L2. This is also typical of L1 VOT acquisition, suggesting that the principles are indeed U because they apply to both L1 and L2 acquisition.

The OPM claims represent the general pattern of L2 acquisition for the whole IL system, as well as for individual phenomena. The proportions of the three components will vary, depending on the learner and phenomena involved. It is possible, for example, for L1 to decrease, U to increase, but L2 to remain at zero. This would be likely for phenomena that are extremely marked and rarely mastered, for example, in the acquisition of the dozen or so clicks occurring in Xhosa (see §2.3.2). In contrast, it is possible for a learner to bypass the U component altogether. A NS of English learning to pronounce German *stein* "stone" as [štayn] may alternate only between [stayn] and [štayn], thereby showing no evidence that U is operating; the learner simply acquires the rule that changes [s] to [š] before obstruents without going through any intermediate stages of other substitutions. A further possibility is for L1 to persist while the components of L2 and U remain at zero. This often happens because of similarity (see §2.2). An L1 English – L2 Brazilian Portuguese learner may continually use English /s̈/ for Portuguese /š/. Although the differences are subtle, they are nevertheless noticeable, English /s̈/ having more lip rounding than the Portuguese counterpart. In another example, L1 transfer might also persist, not necessarily because of similarity but because of the phonemic versus allophonic status of the L2 phenomenon. Furthermore, it is often more difficult to overcome allophonic substitution than phoneme substitution. Thus, an L1 English – L2 French learner may be able to learn French /ü/ because it is phonemically different from any English sound, but the same learner may have difficulty with syllable final French [l], instead substituting English [ɫ], as in English [ɫ] always occurs in this position.

Logically, the OPM should be true, in light of the widely observed IL patterns. The idealized learner starts out with 100% L1 and 0% L2. At the final stage the learner has 0% L1 and 100% L2. Chronologically, this means L2 increases and L1 decreases. It has long been known that U also influences IL; that is, there are phenomena in IL that are neither part of L1 or L2. Because at the beginning stage L1 is 100% and at the final stage L2 is 100%, therefore U must be 0% at both these stages. However, as U takes a part, this means that it must rise and fall at stages other than the very beginning or the very end. Furthermore, depending on the rate that L1 decreases and on the rate that L2 increases, at some point after U increases it must decrease because mathematically L1 + L2 + U = 100%. For example, consider hypothetically a

point where L1, L2, and U are of equal proportions (e.g., stage 3, Fig. 4.3). After this point, as L1 continues to decrease and L2 continues to increase, U must therefore decrease.

The reason why transfer is much more important than U during the early stages (rather than vice versa) follows from long-known principles of learning theory concerning transfer (Ausubel, 1963, 1967; Ausubel & Robinson, 1969; Ausubel, Novak, & Hanesian, 1978; Bruce, 1933; Bugelski, 1942; Cheng, 1929; Gagné, 1977; McGeogh, 1942; Schultz, 1960; Travers, 1977). Such research has demonstrated that one relies on previous cognitive structures when learning new structures, that is, transfer occurs. As new structures are created, these in turn affect subsequent learning. Ausubel, et al. (1978, p. 165) claimed that transfer in fact is involved in all learning:

> We have just hypothesized that past experience influences, or has positive or negative effects on, new meaningful learning and retention by virtue of its impact on relevant properties of cognitive structure. If this is true, all meaningful learning necessarily involves transfer. It is impossible to conceive of any instance of such learning that is not affected in some way by existing cognitive structure. This learning experience, in turn, results in new transfer by modifying cognitive structure. (Cited in Major, 1987d, p. 104)

Applying these principles to SLA (some of these arguments are given in Major, 1987d), at early stages L1 transfer will dominate because the learner has mastered very little of the TL. As acquisition proceeds, the "existing cognitive structure" (i.e., the IL) is modified by the L2 experience, creating new cognitive structures. However, because these structures are new they are not L1 but rather U (or L2 if they are nativelike). These new structures subsequently affect further modifications of the IL. That is, as the influence of the L2 increases, the IL will show increasing U, while the influence of pure L1 transfer will decrease. As the learner continues to whereas, these U substitutions will give way to nativelike or targetlike forms; thus, U will decrease. From the framework of the OPM this means L1 will decrease over time, whereas U will first increase and then decrease. This general pattern also seems to apply to L1 loss, where immigrants' L1s become increasingly nonnativelike. Thus, the principles of retroactive transfer can explain L2 transfer to L1, with U also affecting L1 (see §2.5 and §4.3).

The claims that L1 gives way to U is also supported by related research of Ausubel, et al. (1978, p. 165): "This learning experience, in turn, results in new transfer by modifying cognitive structure." However, in terms of L1, L2, and U this "new transfer" would not mean L1, but rather transfer of the new structures, which could either be U or L2. Assuming a learner does not always go directly

from L1 to nativelike L2 this implies U occurs. Thus, in the OPM framework this "new transfer" is really U. For example, an L1 Japanese – L2 English learner first epenthesizes [u] to dog ([dɔgu]), due L1 transfer; later the person devoices the [g] ([dɔk]), due to U; during subsequent stages the learner's starting point is final [k] rather than [gu]. Although the learner "transfers" [k] to the subsequent stages, in fact this transfer is a U substitution, not an L1 substitution. This explains the rise of U and the elimination of L1.

Although there are clear-cut cases where a substitution is either L1 or U, in some instances a substitution can be both. In the previous example, devoicing is clearly U, because it is not part of Japanese phonology. However, devoicing of final obstruents in a German speaker of English can be attributed both to L1 and to U. A number of researchers have claimed that substitutions are more likely to persist if both transfer and U would produce the same result (Andersen, 1983; Hecht & Mulford, 1982).[3] This pattern is precisely what is predicted by the OPM. The model predicts that psycholinguistically (whether consciously or unconsciously), as the learner succeeds in eliminating L1 transfer, U kicks in, so to speak; however, because U produces the same result, the substitution persists. In the case of the German speaker of English, if L1 decreases, (i.e., devoicing ceases due to L1) and U increases (causing devoicing to occur, but due to U not to L1), the net result is that devoicing will persist. Thus, a good test case would be final obstruent devoicing in German versus Japanese learners of English. The prediction is that devoicing would persist longer in German NSs because it also occurs in native German but not in native Japanese.

If L1 decreases, causing devoicing to cease (as caused by L1), and then U increases but U produces the same result, that is, devoicing, the net result is that devoicing will persist.

The OPM patterns may not be limited to phonology. Taylor (1975) found syntactic transfer more common in beginning learners but overgeneralization more common in intermediate ESL learners. His reasoning is that "As he learns more about the target language, his reliance on his native language will decrease, and errors attributable to target language syntactic overgeneralization will increase." (p. 75. See also §4.6.)

A great deal of SLA research supports the claims of the Chronological Corollary of the OPM. The claim that transfer is the most important factor in early acquisition is supported by numerous works (discussed in §2.1). Even without a large body of research supporting this, widespread observation of what it means to have a heavy foreign accent substantiates the claim that transfer is the most important factor in early acquisition. An L2 learner with a heavy

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[3] *Developmental process*, *developmental substitution*, and *developmental error* were the terms commonly used in the 1980s and 1990s, referring to what I call U.

foreign accent is synonymous with a learner at an early stage of acquisition (or one who has fossilized at an early stage). Such a person's accent can easily be identified by those familiar with this speaker's L1 (e.g., those who know French and Spanish well can often identify a French or Spanish accent). The ability to identify the L1 of the speaker is tantamount to saying that L1 transfer is an important factor. If U were the predominant factor then the speaker's L1 could not be so easily identified. In fact, if this were so all heavy foreign accents would tend to sound very similar, regardless of the L1s of the speakers, which is not the case.

The claim that U becomes greater and then diminishes is more difficult to directly support from the research because there are very few longitudinal studies and even fewer that document the frequency of both L1 and U. However, one early longitudinal study that provides direct support for the OPM is Wode's study (1981) on the acquisition of English by his four German-speaking children (beginning at ages 3;11 to 8;11) over a period of approximately 6 months. Wode proposes two types of developmental sequences that approach the L2: Those with gradual approximations to the target and those with discrete jumps. Gradual approximations in the vowels occur in the first substitutions for English /ʌ/ and /æ/, which were [a] and [ɛ] respectively, indicating transfer from German. Later the substitutions become closer and closer to the target via gradual approximations. However, discrete jumps occurred in the acquisition of /r/: [R] > [w] > [ɹ] > [r̝] (The order was the same for all four children. In Wode's symbols, [ɹ] "central frictionless continuant and [r̝] = "target-like retroflex."). These stages for the vowel and *r* substitutions are predicted from the OPM. The early substitutions are due to transfer, later substitutions are due to U, and finally L2 is mastered.

Some of my own work also provides support for the chronological claims of the OPM with longitudinal studies of the acquisition of Spanish /r/ and /r/ by English speakers (Major, 1986a) and English consonant cluster acquisition by Brazilian Portuguese speakers (Major, 1994, 1996). In these studies, the general patterns show an increase in L2, a decrease in L1, and an increase and then a decrease in U. A study of paragoge (Major, 1986b), though crosssectional, provides additional evidence for the model.

Other studies provide support for the OPM, but not directly because most studies are not longitudinal, nor do they include different proficiency levels so that stages can be determined. However, the numerous studies showing that U occurs in learners other than true beginners give indirect support to the OPM. Furthermore, if acquisition continues to completion (i.e., L2 is mastered), this necessarily means that U decreases during the later stages. A number of such studies showing U as a factor in non-beginners were cited in §2.3.2. Among them: Nemser (1971b) found Hungarian learners acquiring English [θ]

produced [sθ] (non-occurring in native English or Hungarian), and Johansson (1973) demonstrated that American English and German speakers used sounds that occurred in neither Swedish nor their NL (e.g., [ʉ] for [ɯ]). A number of works have found final obstruent devoicing occurs in L2 speakers (Altenberg & Vago, 1983; Edge, 1991; Flege & Davidian, 1984; Hodne, 1985; Riney, 1989; Yavaş, 1997). In learners whose L1s do not have final obstruents, this process must be attributed to U. Musau (1993) also found U occurring in the L2 acquisition of Swahili by NSs of Bukusu, Kamba, Kikuyu, Massai, Nandi, Somali, and Luo. Musau found that U phenomena occurred at various levels, including segmentals, syllable structure (e.g., metatheses in consonant clusters), stress, and tone.

Recent research by Hancin-Bhatt and Bhatt (1997) analyzing L2 syllable structures gives theoretical support to the chronological claims of the OPM. Using an OT framework and analyzing various constraints rankings, they found some errors were due to language specific rankings (L1 transfer), and others were due to language independent rankings (U). They claimed by studying the reranking of constraints, we can gain a better understanding of the conditions when transfer overrides U and when U overrides transfer. They conclude:

> In so doing, we can begin to give a linguistic-theoretic interpretation to Major's (1986, 1987, 1994) ontogeny model...that L2 learners have mostly transfer-related errors in early stages of learning, but that, over time, developmental errors become more prominent, whereas both taper off in advanced L2 speakers. If we assume that the L2 learner's initial state is transferred L1 constraint ranking, we can then begin to address why transfer effects are prominent in early stages of acquisition. (p. 386)

4.1.2 Stylistic Variation

The OPM claims that patterns of the three components of IL, L1, L2, and U also vary stylistically in the same way as they do chronologically:

Stylistic Corollary of the OPM. IL varies stylistically in the following manner: As style becomes more formal, L2 increases, L1 decreases, and U increases and then decreases.

Thus, the same patterns that obtain chronologically also obtain stylistically; that is, Stage 1 (Fig. 4.1) chronologically corresponds to an extremely casual style (Fig. 4.6), whereas Stage 5 (Fig. 4.5) corresponds to an extremely formal style, such as citation (Fig. 4.10). These patterns follow logically from a well-known fact about pronunciation: It has been known for some time that the

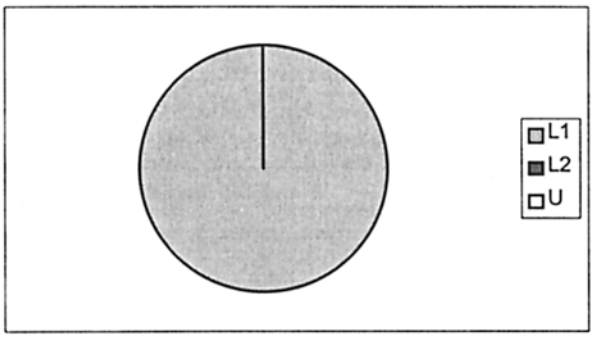

FIG 4.6. Extremely casual or intimate style.

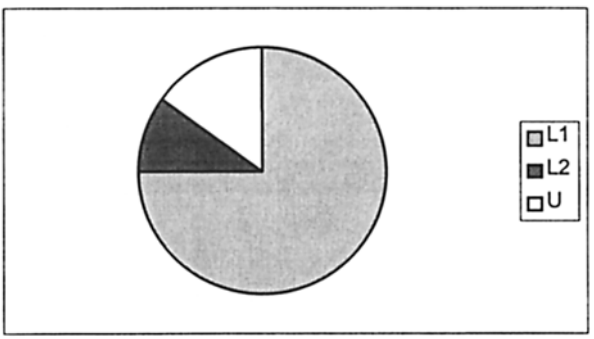

FIG. 4.7. Casual style.

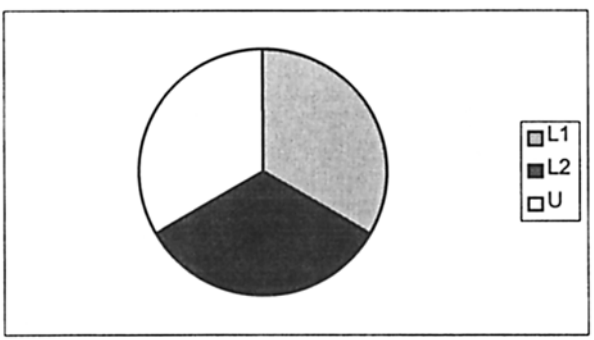

FIG. 4.8. Normal or consultive style.

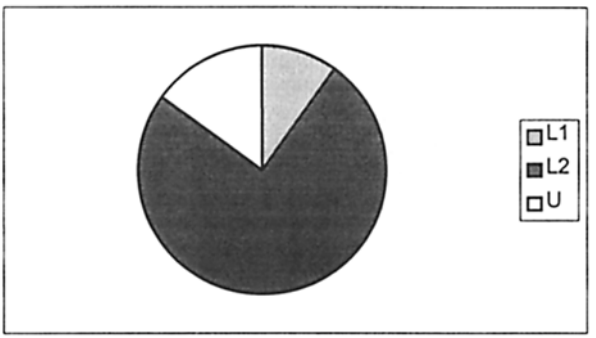

FIG. 4.9. Formal style.

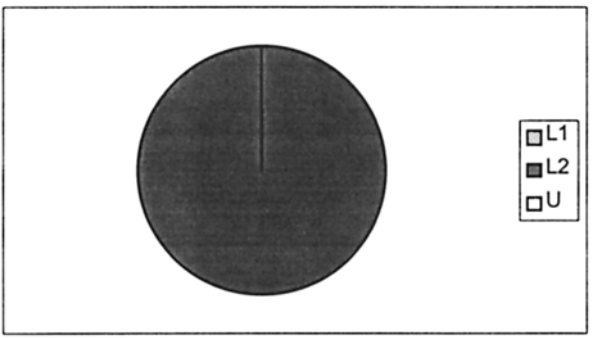

FIG. 4.10. Extremely formal or citation style.

influence of transfer is less with more formal tasks. One consequence of this is that the more formal the style, the more targetlike accuracy is achieved. Probably nearly every language teacher would agree that L2 learners usually have more accuracy in pronouncing isolated words than in conversation because in running speech learners often revert to their L1 patterns, making their foreign accent more prevalent. What this means is that transfer is the most prominent when the style is the most casual, and transfer is the least prominent when the style is the most formal. Naturally, this general pattern can be upset due to extralinguistic factors, such as nervousness in a formal setting (e.g., speaking before an audience), in which case a less formal style may show more transfer. In addition, familiarity and comfort level for a given style can also override the general patterns of the OPM. For example, if a learner has more familiarity with a casual style than a formal style, the OPM patterns may not obtain, simply because acquisition has progressed further for the casual style.

Numerous studies support the claim that the influence of transfer is less with more formal tasks (see§3.2.1), for example, Nemser's (1971a) study of Hungarian learners of English, Dickerson and Dickerson's (1977) research on Japanese learners of English /r/, and Wilson and Møllergard's (1981) work on Norwegians producing British RP /ʌ/. Other research demonstrating that transfer decreases while accuracy increases as style becomes more formal includes Gatbonton, 1975, 1978; Petrenko, 1989; Sato, 1985; R. W. Schmidt, 1977; Tarone, 1979, 1982, 1983, 1988; and Wenk, 1979, 1983. Although transfer decreases and L2 increases as style becomes more formal, this relationship does not overtly predict what the U pattern will be. However, the U pattern of the OPM is implicit, because any IL component that is neither L1 nor L2 is by definition U (see Fig. 1.1). Logically then, in the idealized or extreme case, if a very formal style is pure L2 and very casual style is pure L1, then as style changes from formal to casual the U component has to appear and then disappear; that is, it increases and then decreases.

Wode's (1981) study of his daughter Birgit's L1 German – L2 English acquisition of /r/ directly supports the stylistic claims of the OPM:

> Until she got out of school at the beginning of June, she much preferred [R] as a substitute for [r̝]/[ɹ]in her casual spontaneous speech. In the imitation-like check ups she would frequently produce or attempt [w] or something [w]-like to substitute for the L2 /r/. (p. 228)

These "check ups," where she produced U substitutions ([w] or something [w]-like)[4] can be considered more formal than "casual spontaneous speech," where she used L1 substitutions ([R]). These data thus support the OPM for style shifting: Because the incidence of targetlike /r/ was small, the two main factors were L1 and U, L1 being greater in casual speech, but U greater in more formal speech.

Depending on the stage of the learner, the proportion of the different components can vary from speaker to speaker for the same style. This is because the different proportions vary chronologically, indicating different stages of development. Therefore, these different proportions are also reflected in stylistic variation in different speakers. Thus, the pattern of a casual style for a very advanced learner might be similar to that of a formal style for a very beginning learner. The OPM simply claims that the patterns for chronology and style are similar: As the learner becomes more advanced and as style becomes more formal, the components vary as follows: L1 decreases, L2 increases, and U increases and then decreases.

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[4] I am assuming these substitutions were not the German [ʊ].

Another reason for the patterns of the OPM is that as style becomes more formal the speaker increasingly pays more attention to form. Paying attention to form is one means of monitoring, and in general, the more monitoring the greater the accuracy. Greater accuracy is synonymous with a more advanced stage; thus, the patterns for chronology and style are similar.

The OPM is a model of competence. Accordingly, the claims of the model make it explicit that variable competence should be part of a model of IL. Whether or not variation is needed for a model of competence was discussed in §3.2.1 and need not be repeated here. As previously mentioned, I take the view that stylistic variation is a result of competence, not merely part of performance or production. In different situations, an L2 learner has different competencies; the learner may show all indications of being nativelike in an extremely formal style but may show L1 patterns in a more casual style. If IL represents a system of competence and performance is a reflex of such competence, then the variable performance for different styles must be caused by variable competence, unless one believes this variation is only caused by performance factors, such as fatigue, nervousness, boredom, and so on.

The argument that there is one competence and that stylistic variation is a result of performance—not the result of variable competence—is a flawed argument. Suppose one takes the view that the formal style is the basis on which competence can be determined. If an L2 learner is nativelike in a formal style, the only conclusion one can draw from using this speech sample as the basis is that the speaker has nativelike competence; that is, IL = L2. However, suppose the same learner produces U and L1 variants in a casual style, then where do these components come from if they are not the result of competence? For this particular speaker (who is nativelike in a formal style), one would have to argue that L1 and U are merely performance factors, coming from out of the blue, because it had already been determined that IL = L2. Thus, in this view all L1 and U components that surface in other styles necessarily have to be excluded from competence. This flies in the face of the widely accepted view among SLA researchers that nonnativelike IL competence is composed of L1, L2, and U. Of course, this view would not be a problem when characterizing a different speaker who is nonnative for all styles (thus the components of L1, L2, and U would necessarily be part of that person's competence). However, eliminating the notion of variable competence altogether results in an a logical inconsistency: Even though these two speakers produce speech with components of L1, L2, and U (depending on style), the competence for only one of the speakers is composed of all three components; the other speaker's competence mysteriously only has an L2 component.

On the other hand, if one takes casual speech as the standard for determining competence (see discussion in §3.2.1 on the sociolinguistic bias of

highly valuing the vernacular), the argument has similar difficulties: Consider the learner who is nativelike in a formal style but nonnative in a casual style. Taking casual speech as the basis of competence for this learner, one would conclude that the learner's IL has the three components L1, L2, and U; however, in a formal style (which is nativelike), how can performance factors alone mysteriously eliminate the influence of L1 and U?

I also take the view that NSs have variable competence. Consider a NS of American English who speaks Standard English in formal situations but varies from the standard in informal situations, in accordance with peer speech. In these two situations, performance is a result of different competencies—competence with the standard and competence with the vernacular. To say that one style is the result of performance factors, using the other style as the basis, is inaccurate and simplistic. Another example also makes this point clear. Consider a different NS who has full competence with the vernacular but not full competence with the standard. This person is not unlike a NNS, yet we call the person a NS. Attempting the standard in a formal style, the NS may show influences of the vernacular, as well as other factors, such as overgeneralization. Thus, this speaker's Standard English is really an IL (see §1.5), with components of L1 (the vernacular), U (e.g., overgeneralization), and L2 (the standard). However, in a casual style the speaker only has the L1 component—the vernacular. The most reasonable conclusion is that this formal/vernacular variability is the result of variable competence.

A further example illustrates variable competence in NSs. Labov (1994) coined "the Bill Peters effect" (p. 363). Bill Peters, an 80-year-old man, showed a distinction between /ɔ/ and /ɑ/ in spontaneous speech but in minimal pairs showed a near merger, which is more typical of younger speakers. We could say Peters was learning a second dialect where /ɔ/ and /ɑ/ are merged. He had greater competence in formal speech (minimal pairs) than in his spontaneous speech where L1 transfer predominated (in this case his native dialect). Labov then documented a number of other similar cases. These patterns are in perfect accordance with the claims of the OPM.

The stylistic patterns of the OPM can vary considerably due to a number of factors. U stylistic factors can alter the influence of the three components depending on which of these U factors are part of the L1, which are part of the L2, and which are part of neither. Across languages, fortition or strengthening processes (such as insertions and lengthening) tend to be favored in formal and emphatic styles (e.g., an umpire shouting [stirayk] *Strike!*), while lenition or weakening processes (such as assimilations, reductions, and deletions) are favored in casual styles (e.g., [jiče?] *Did you eat yet?*). However, if the speaker's L1 is a language such as Japanese, where vowel epenthesis (fortition) is an L1 process but consonant cluster deletion (lenition) is not, then the speaker

may actually show more L1 influence (epenthesis) in a formal style than in a casual style, where consonants in clusters may be deleted (U). This is because of universal stylistic tendencies, which favor lenition in casual styles and fortition in formal styles. U is present in all styles; some phenomena universally favored in certain styles may also be present in the L1, but other phenomena universally favored in other styles may not be present in the L1.

In addition to universal stylistic tendencies, stylistically conditioned L1 phenomena can seemingly alter the general pattern of the OPM. If targetlike accuracy is achieved and it is not due to positive transfer, then it is due to L2 competence. Although transfer can be positive or negative, it too can also vary according to style. A process that is negative transfer in one style may give way to another process that is positive transfer in another style. If the L1 process that produces negative transfer occurs in a casual style, while the other process that produces positive transfer occurs in a formal style, then the L2 productions for a speaker with this L1 would be in accordance with the general observation that L2 accuracy is greater in a formal style. Although such a case would seem to fit the general observation that transfer is more easily overcome in a formal style, these data actually indicate nothing but the occurrence of transfer in both styles. However, if the opposite occurs (positive transfer for a casual style, but negative transfer for a formal style), this would at first appear to be counterevidence to the claims of the OPM because of the greater L2 accuracy in a more casual style. However, such a case is not counterevidence because here too transfer is the crucial component that produces L2 accuracy. For example, in Brazilian Portuguese stressed and pretonic /il/ and /iu/ are normally pronounced [iw], but [yu] in very casual speech (Major, 1981, 1985; cited in Major, 1987d). Thus, normally Brazilians tend to pronounce English *few* as [fiw] but in very casual speech they produce the targetlike [fyu]. In this example, the source of variation has nothing to do with stylistically conditioned tendencies relating to the relative components of L1, L2, and U proposed in the OPM; rather, L1 is the relevant factor in both these styles (see §3.2.1 for further examples).

A further example demonstrates that stylistically conditioned processes can in one style produce a nativelike utterance for one word but not in another word; however, in a different style the first word becomes nonnativelike but the second word becomes nativelike. Consider a Japanese speaker's pronunciation of the English words *sky and city*. In a formal style these words would be pronounced [sukay] (due to the transfer rule of epenthesis) and [siti] (for the sake of this example, we shall ignore the transfer process of palatalization of [s]). However, in running speech, Japanese has a rule that devoices and then deletes high vowels between voiceless obstruents. Thus, in a casual style these words would be pronounced [skay] and [sti].

Stylistic conditioning can be even more complex, depending with which style the learner has more competence. For example, if learners have more competence in a casual style, then if they closely monitor their speech in a formal style they will be less accurate than when speaking in a casual style, simply because they have less competence in this formal style. Other combinations can produce curious results. A former student of mine reported that his Japanese girlfriend living in the United States sounded more nativelike (although formal) when she was less guarded than when she consciously attempted to sound casual. She had learned formal English in Japan, had mastered it well, but had not learned casual English. Thus, when she did not monitor her speech it was more nativelike than when she monitored it because she was attempting a style with which she had less competence than the formal standard.

4.1.3 Similarity

For well over 30 years it has been known that phenomena that are very similar to the L1 cause more difficulty to the learner than phenomena that are less-similar or dissimilar (see §2.1 and §2.2); however, as with markedness, the relative roles of L1 and U have not been fully explored. Flege's Speech Learning Model (1995, see §2.2) is very explicit about the importance of L1: In similar phenomena L1 substitutions persist, but dissimilar phenomena are acquired more easily; however, Flege does not discuss the role of U. The absence of U in Flege's work is by no means a criticism, as his theoretical phonetic framework does not explicitly employ U. The OM makes a claim about similarity taking U into account (here termed developmental processes): "...there will be more interference processes for similar phenomena and more developmental processes for phenomena that are further apart" (Major, 1987d, p. 109). Although this statement claims transfer is more frequent for similar phenomena, it says nothing about whether it will decrease more rapidly or less rapidly in comparison to other phenomena. The statement also says that U is more frequent for dissimilar phenomena but here too it does not say how the U component behaves chronologically compared to other phenomena. The Similarity Corollary of the OPM is explicit about these relationships:

Similarity Corollary of the OPM. In similar phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases slowly, and (c) U increases slowly and then decreases slowly. Thus, the role of L1 is much greater than U, compared to less-similar phenomena. By implication, the less-similar the phenomena (i.e., the more dissimilar), the more important the role of U is compared to L1.

These patterns are represented in Figs. 4.11 to 4.17. Here the term *slowly* means more slowly when compared to normal overall development (i.e., the Chronological Corollary of the OPM, Figs. 4.1–4.5). Thus, compared to other phenomena, L2 increases more slowly, L1 persists, and U both increases and decreases more slowly. In addition, the relative proportion of L1 to U is greater than with other phenomena. Although in the earlier stages of development L1 is the strongest component for all phenomena, for similar phenomena in the later stages L1 persists relative to U, compared to less-similar phenomena. Comparing Figs. 4.1 to 4.5 to Figs. 4.11 to 4.17, these differences can be observed. For example, in stage 3, compared to Fig. 4.3, Fig. 4.13 indicates a smaller L2, a much larger L1, and a smaller U; the greater proportion of L1 to U continues for stages 4, 5, and 6 (Figs. 4.14, 4.15, 4.16) until acquisition is complete at stage 7 (Fig. 4.17). We therefore observe that an advanced learner, who has incompletely mastered similar phenomena, relies more heavily on L1 than on U.

In order to test these and other claims about comparisons, it is important to compare phenomena that are equal in all other aspects except the criterion under consideration. Thus, these claims regarding similarity could not be tested, for example, by comparing phenomenon *A*, a marked and similar phenomenon, to *B*, a less -marked and less-similar phenomenon. This is because similarity and markedness can be mutually reinforcing, slowing rate, but different in the relative role of U versus transfer. Although in reality controlling for everything is virtually impossible, these claims are formulated, *ceteris paribus*.

Logically, these patterns should be true, simply because of mathematical logic involving well-known facts about similarity: Because L2 increases slowly, and L1 influence is strong and persists, U must increase slowly and decrease slowly. Thus, U must have relatively less importance than L1 because the components L1, L2, and U have to add up to 100%. One reason for these relative proportions is that in similar phenomena learners assume the L1 and L2 phenomena are the same, therefore relying much more heavily on L1; thus, because L1 persists, U does not have a chance to exert much influence.

The psycholinguistic reason why L1 transfer is more important than U for similar phenomena is because of perceptual saliency—minimal differences are less likely to be noticed, resulting in non-learning, that is, transfer occurs. Thus, an English speaker uses English aveolar aspirated /t/ when speaking Spanish because the Spanish unaspirated dental /t̪/ is very similar; however, the same speaker may notice the Spanish trilled /r/ is very distinct from English /ɹ/, and so may use U substitutions. Psychologists have shown that in many types of learning, transfer operates only when there are relevant phenomena to transfer. Thus, Ausubel et al. (1978, discussed previously in §2.1 and §2.2) noted that

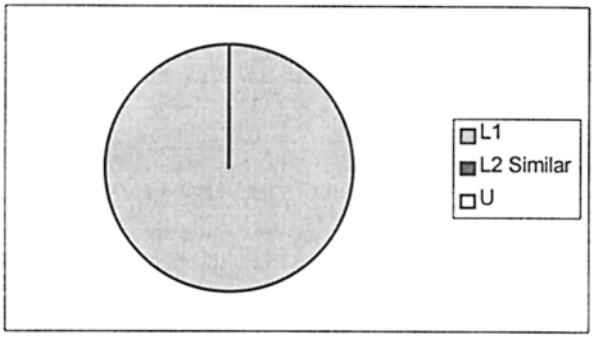

FIG. 4.11. Stage 1. Similar phenomena.

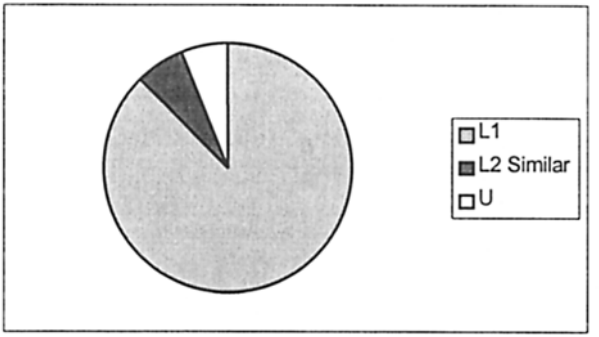

FIG. 4.12. Stage 2. Similar phenomena.

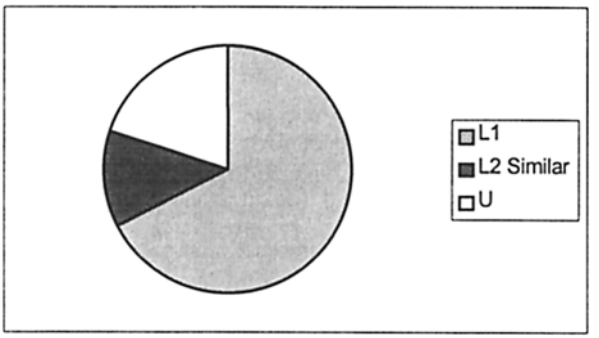

FIG. 4.13. Stage 3. Similar phenomena.

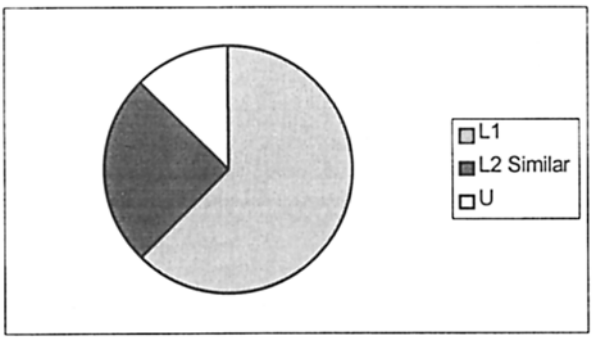

FIG. 4.14. Stage 4. Similar phenomena.

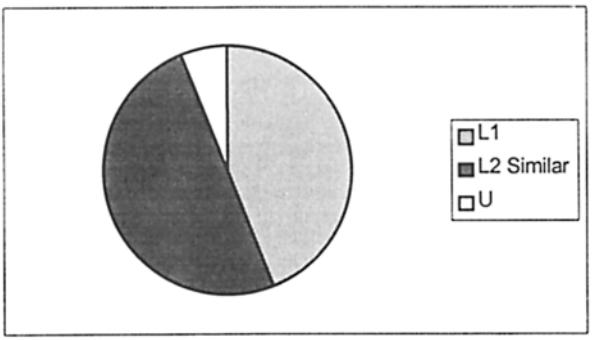

FIG. 4.15. Stage 5. Similar phenomena.

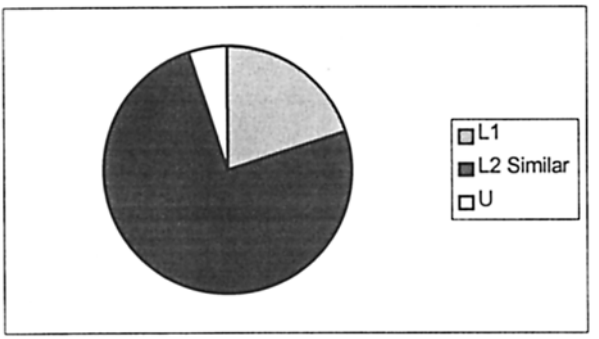

FIG. 4.16. Stage 6. Similar phenomena.

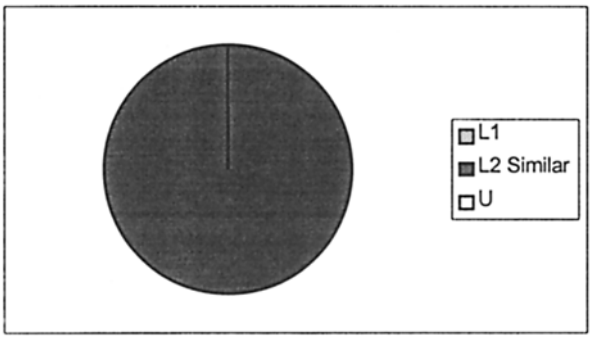

FIG. 4.17. Stage 7. Similar phenomena.

past experience has "impact on relevant properties of cognitive structure" (p. 165). However, if the properties are not "relevant properties," transfer cannot occur (cf. Andersen, 1983, discussed "transfer to somewhere"). Thus, transferring English /k/ to Arabic /q/ seems more likely than transferring English/k/ (or for that matter any other English sound) to Xhosa clicks, where learners are more likely to produce non-English sounds, indicating that U plays an important role.

However, seemingly there is a paradox. As L1 and L2 phenomena are maximally similar, transfer should be the greatest and consequently L2 should not be learned. However, at some point, as L1 and L2 approach identity, negative transfer will become positive transfer because the two phenomena have become virtually indistinguishable. In reality, because there are no two physical phenomena that are absolutely identical, for all practical purposes this means that phenomena that are different only infinitesimally will be judged as identical, both instrumentally and by NS judges. Thus, learning seemingly has taken place, but in fact it is the free ride of positive transfer. This "similarity paradox" was pointed out of over 50 years ago in a behaviorist framework by Charles Osgood (1949).[5]

Extensive research on similarity suggests the pattern of development for this corollary of the OPM. The key findings are that in similar sounds L2 acquisition is slow, L1 transfer predominates, thereby diminishing the possible effects of U. Wode (1977) claimed that transfer is highly systematic and tied to crucial structural prerequisites relating to the target L2, the learner's L2 state of development, and the state of development of the learner's L1 (Wode, 1977). From this Wode developed the idea of *crucial similarity measure* and the notion

[5] I thank Thomas Scovel for pointing out this article to me.

of *equivalent*, which was perhaps the starting point for Flege's equivalence classification (Wode, personal communication, July 13, 2000). Thus, Wode (1978, 1983a, 1983b) claimed transfer occurs only when certain conditions are met: "crucial similarity measures" (1983a, p. 180) and "specifiable similarity requirements" (1983a, p. 185). When these conditions are not met, developmental sequences that characterize L1 acquisition operate (i.e., U). Negative transfer thus occurs for similar phenomena (non-learning) whereas for less-similar phenomena transfer is less likely to operate, thereby resulting in U substitutions.

Zobl (1980a) argued further for the conditions of transfer, including the "selectivity of L1 influence on L2 acquisition" (p. 43), the predisposition for L1 transfer, based on structural characteristics (1980b), and the constructs of internal consistency and developmental complexity (1982). That there are selective conditions for transfer to operate is supported by a number of studies. For example, in studies of German, Young-Scholten (1985) found that transfer errors in morphology and phonology depended on similarity, and James (1983) found that similarity accounted for the differences in the amount of Swabian versus standard German in the speakers' English.

Numerous works of Flege and his associates (1987b, 1987c, 1990, 1993) support the notion that in similar phenomena, L2 acquisition is slow and L1 transfer predominates (and by implication U being minimal). For example, the advanced learners of L1 English – L2 French produced /ü/ authentically (the dissimilar or "new" sound), but produced /u/ unauthentically (the similar or "equivalent" sound).

More recent empirical research on similarity also supports the OPM. Continuing his long line of research involving similarity, Flege has demonstrated repeatedly, for example, in his SLM (1995) that L1 substitutions persist for similar phenomena, whereas dissimilar phenomena can often be acquired with nativelike accuracy. Major and Kim's SDRH (1996), referring to rate of acquisition rather than degree of difficulty or ultimate achievement, claims that because of the prevalence for L1 transfer, similar phenomena are acquired more slowly than dissimilar phenomena. The SDRH also makes reference to markedness: Markedness merely slows rate, for example, an unmarked similar phenomenon is acquired at a faster rate than a marked similar phenomenon. Thus, both the SLM and SDRH imply part of the Similarity Corollary of the OPM: L2 increases slowly and L1 is prominent and persists. However, as pointed out earlier, this and other research do not explore the relative importance of L1 compared to U, nor the reasons. The Similarity Corollary of the OPM claims a relatively minor role of U compared to L1, when compared to other phenomena (including dissimilar phenomena) at the same

stage of development (in contrast to the Markedness Corollary where U is greater during the later stages).

Well-known facts about L1 acquisition and dialect variation further suggest the reasons for the OPM patterns claimed for similarity. In L2 acquisition we can refer to L1 phenomena as similar or dissimilar to L2 phenomena, but in L1 acquisition there is obviously no L2 as a basis for comparison. However, a comparison is possible between the part of the L1 that has been acquired ($L1_x$) and the part that has not been acquired ($L1_{n-x}$.). If $L1_n$ = the complete NL system of the adult speaker and $L1_x$ represents the sum total of an L1 learner's system at a particular stage, then the portion of L1 that has not been acquired is $L1_{n-x}$. When the phenomenon being acquired at stage $L1_{n-x}$ is similar to a phenomenon that has already been acquired (i.e., it is in $L1_x$), a number of things happen that are different from the acquisition of less-similar phenomena. A common occurrence is merger. In English child language mergers are common, for example, [s] for [s] and [š], [ɑ] for [ɑ] and [ɔ]. From the standpoint of the L1 learner, this means that the phenomenon in $L1_x$ that has already been acquired is being substituted for the phenomenon in $L1_{n-x}$ that has not been acquired ([s] for [š] and [ɑ] for [ɔ]). Thus, $L1_x$ persists.[6] Because $L1_x$ persists, U cannot overtly demonstrate its influence. Historical data also support this claim. Groups of L1 learners who fossilize at any given stage can result in dialect variation and mergers can thus be the result of $L1_x$ remnants. For example, in many American dialects there are /ɑ/ – /ɔ/ mergers (e.g., *caught/cot*). In addition, mergers are common between tense and lax vowels before nasals and liquids. In the vast majority of American dialects there is a merger before /r/, for example, *horse/hoarse, mourning/morning*. In many other dialects mergers occur before nasals and /l/, for example, *pin/pen, wheel/will, sale/sell*. Phonetically, nasals and liquids color the vowels; therefore the acoustic differences between the words in these pairs are less than when these vowels occur in other environments. Thus, the vowels in these pairs (where the vowels occur before nasals and liquids) are more-similar to each other phonetically than they are in other environments. Hence, there is strong phonetic motivation for mergers. The comparison to L2 acquisition is obvious: For L2 learners, L1 is similar to $L1_x$ and L2 is similar to $L1_{n-x}$. Thus, the patterns of L1 and L2 acquisition are analogous.

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[6] It is commonly believed that error correction or negative evidence does not help L1 acquisition progress, whereas in L2 acquisition many believe that negative evidence aids acquisition. However, Saxton (1997) challenged this belief regarding L1 acquisition. He found that negative evidence helped, and attributed it to the juxtaposition of the child error and adult correct form, which, to the child, reveals the conflict or contrast.

4.1.4 Markedness

The OM makes no claims about markedness, although the role of markedness in L1 and L2 acquisition has been known for sometime (Jakobson, 1941/1968; see numerous works of Eckman, Carlisle in References). More-marked phenomena are acquired later than less-marked phenomena, meaning that the normal chronological sequences for marked phenomena are slower than for unmarked phenomena. The OM would add nothing to this fact: It would merely suggest that the stages in Figs. 4.1 to 4.5 would proceed more slowly for marked phenomena. More importantly, the OM is not explicit about any differences in the proportions of L1, L2, and U between marked and unmarked phenomena; consequently if there are different proportions, the OM could not give any reasons. In addition to being a shortcoming of the OM, it is also a shortcoming of other SLA research, as none of the research on markedness addresses the possibility of different proportions of L1, L2, and U between marked and unmarked phenomena, nor does it suggest different proportions due to different stages of IL development, other than the obvious fact that the proportion of L2 is smaller for marked phenomena through the various stages. Thus, in this respect, markedness research has the same shortcomings as research dealing with similarity, discussed in §4.1.3. In NSs, both synchronically and diachronically, marked phenomena have different linguistic characteristics compared to unmarked phenomena; therefore, it is reasonable to believe that in L2 acquisition as well there are important differences between marked and unmarked phenomena. The markedness corollary of the OPM addresses such differences. Taking unmarked phenomena as the basis, it compares marked phenomena to the unmarked case:

Markedness Corollary of the OPM. In marked phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases and then decreases slowly, and (c) U increases rapidly and then decreases slowly. Thus, except for the earliest stages, the role of U is much greater than L1, compared to less-marked phenomena.

These patterns are depicted in Figs. 4.18 to 4.24. Here the terms *slowly* and *rapidly* mean *more slowly* and *more rapidly* than the general overall pattern claimed by the OPM (Chronological Corollary of the OPM, Figs. 4.1–4.5). Thus, in relation to other phenomena, L2 increases more slowly throughout its development. However, the patterns for L1 and U differ. At the early stages, L1 decreases at a normal rate (i.e., compared to normal phenomena) but then decreases more slowly. In contrast, U increases rapidly and then decreases slowly. Although for all phenomena, L1 is the strongest component in the earlier stages of development, in marked phenomena the model claims once

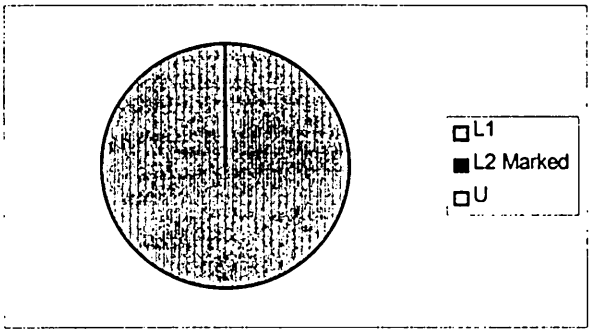


FIG. 4.18. Stage 1. Marked phenomena.

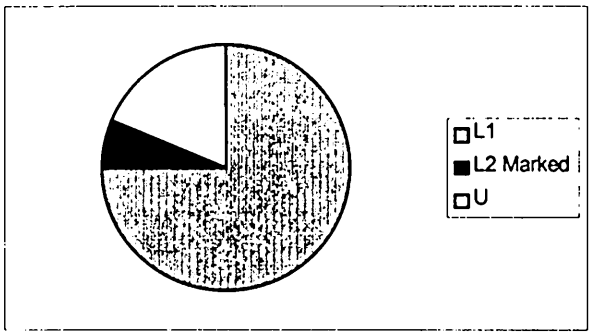


FIG. 4.19. Stage 2. Marked phenomena.

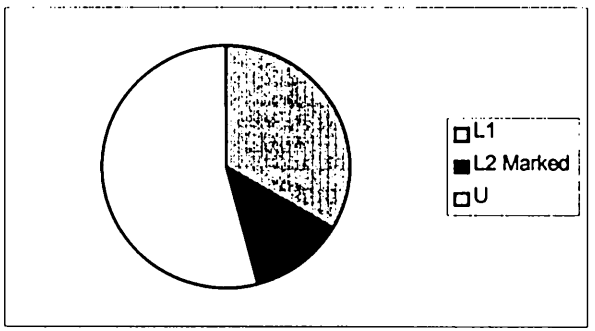


FIG. 4.20. Stage 3. Marked phenomena.

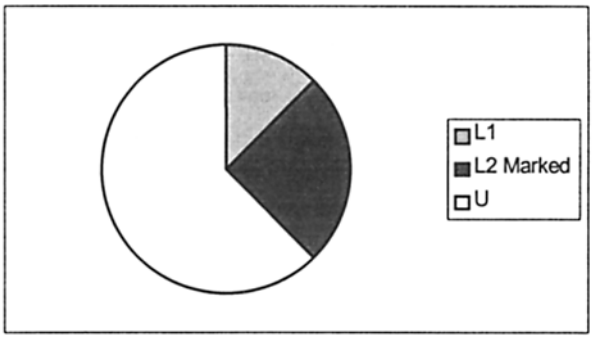


FIG. 4.21. Stage 4. Marked phenomena.

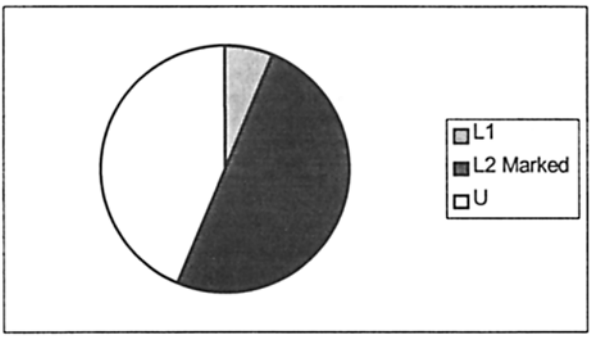


FIG. 4.22. Stage 5. Marked phenomena.

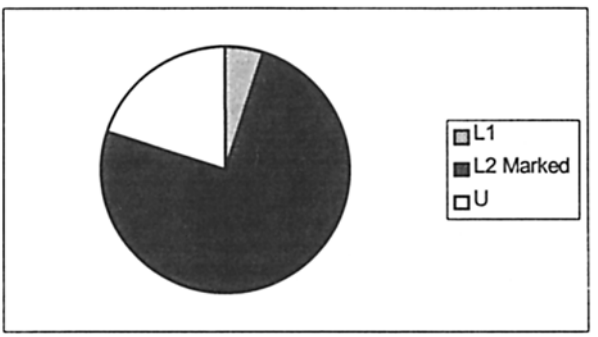


FIG. 4.23. Stage 6. Marked phenomena.

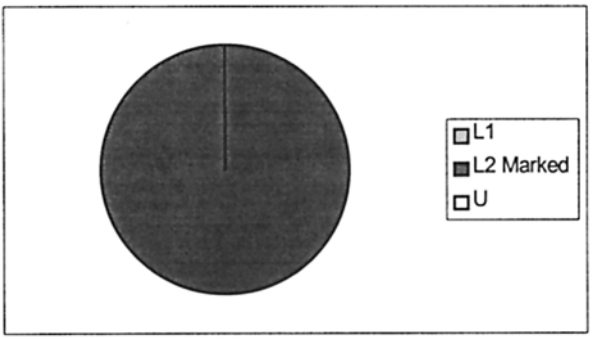


FIG. 4.24. Stage 7. Marked phenomena.

transfer has decreased substantially that the relative proportion of U to L1 will be greater than for less-marked phenomena. (Recall for similar phenomena the proportion of L1 to U is greater. See §4.1.3.) Comparing Figs. 4.1 to 4.5 to Figs. 4.18 to 4.24, these differences can be observed graphically. For example, at stage 2, Fig. 4.19 shows the same L1, a slightly larger U, but a smaller L2 and U compared to Fig. 4.2; at stage 3, Fig. 4.20 shows the same L1 but a much larger U compared to Fig 4.3. At stage 4, Fig. 4.21 shows an even larger U compared to Fig 4.4. In marked phenomena, the proportion of U to L1 continues to be large through stages 5 and 6 (Figs. 4.15, 4.16) until acquisition is complete at stage 7 (Fig. 4.17).

Let us examine some reasons for these patterns. First of all, it is widely known that marked phenomena are acquired more slowly than unmarked phenomena; thus, the smaller component of L2 throughout (Figs. 4.18–4.24). However, compared to unmarked phenomena, why does L1 first decrease normally and then decrease more slowly, and why does U increase rapidly and then persist? That is, why is U more important than L1 in the later stages? One reason for these patterns is mathematical logic (just as mathematical logic predicts the patterns for similarity in §4.1.3). If *x* is more-marked than *y* but both have the same degree of similarity (e.g., to L1 phenomenon *z*), then *x* and *y* should not differ in the importance of L1 transfer, because similarity highly influences L1 transfer. However, because *x* is more-marked than *y*, this means the L2 component for *x* (i.e., nativelike *x*) will necessarily increase more slowly than for *y*. If L1 is the same for both phenomena this necessarily means the U will rise more quickly in *x* than in *y*, because L1 + L2 + U = 100%. Subsequently U for *x* will decrease but more slowly than for *y* because L2 for *x* continues to rise slowly. This also necessitates that L1 continues to decrease, though more slowly than during the initial stages. If L1 continued to decrease at

a normal rate, this would mean it would reach zero before acquisition were complete. This is unlikely because it is well-known that L1 transfer continues throughout acquisition.

In addition to the mathematical logic supporting these claims, they make sense from what we know about acquisition in general. At early stages of acquisition, learners use whatever means they have available to them to substitute for the L2 phenomena. At the beginning stage, for both marked and unmarked phenomena, L1 is the most likely substitution. In a sense, not making an effort is using the L1 but making an effort and getting it wrong is using U. Giving a voice to the conscious or unconscious mind of the learner, the person may be thinking: "That's too difficult so I won't even try. I'll just use my L1." An often unconscious reluctance on the part of the learner, fully knowing that targetlike achievement is not attainable, is one reason why L1 is used. Then, as acquisition proceeds, the learner's courage increases, in addition to noticing that using the L1 exclusively is not adequate in order to function with other interlocutors; for example, he or she receives negative reactions, is misunderstood, or not understood at all. This therefore prompts the learner to try something other than the L1—which results in U substitutions, rather than nativelike L2. Because marked phenomena are difficult, the learner tries but fails repeatedly (more frequently than for normal phenomena), resulting in U substitutions, not L1 substitutions. However, the learner believes or at least hopes that these attempts are an improvement over merely using the L1. Knowing the L1 will not work, the learner is continually making an effort at speaking the L2 but without success: "I know it doesn't sound quite right but at least I'm trying. Maybe it sounds a little better than just using my L1." This continual overcoming L1 influence, although not achieving L2 accuracy, means that the U component rises rapidly, but because L2 is achieved slowly this in turn means U decreases slowly. For certain marked phenomena there are a number of U substitutions possible, meaning that the learner can go through progressive stages of nonnativelike U substitutions. For example, in the acquisition of the Spanish trilled /r/, learners use a variety of substitutions, for example, a retroflex [ɻ] (Major, 1986a). Thus, U persists.

Research is prevalent supporting the portion of the Markedness Corollary that claims L2 increases slowly in marked phenomena (see §2.3.1). The most prevalent research investigates voicing contrasts (Altenberg & Vago, 1983; Eckman, 1977; Edge, 1991; Major & Faudree, 1996; Yavaş, 1994) and consonant clusters (Anderson, 1987; Broselow, 1983; Carlisle, 1991a, 1991b, 1997, 1998; Major, 1994; Osburne, 1996).

The claim that the role of U is greater than L1 is more difficult to support directly from the research because, as stated elsewhere, there are very few longitudinal studies and even fewer that document the frequency of both L1 and

U components. Two empirical studies of my own, however, support this claim. To the best of my knowledge, other empirical support or refutation of these claims is absent. In a study of L2 acquisition of the Spanish trilled /r/ and flap /ɾ/ (Major, 1986a) I found a prevalence of U substitutions for the /r/, when compared to the /ɾ/. Therefore, because /r/ is more-marked than /ɾ/, the prevalence of U process for /r/ supports the U claims of the OPM. It is curious that even though Spanish /ɾ/ and English /ɾ/ are very similar, subjects often used [ɹ], as well as U substitutions. If positive transfer operated, 100% accuracy with /ɾ/ should have been achieved, yet for some reason subjects equated Spanish /ɾ/ with English /ɹ/. Thus, subjects used nonnative substitutions for both /r/ and /ɾ/. In another study (Major, 1996) that investigated initial and final consonants and consonant clusters in nine environments, I found that the more-marked the environment, the greater the probability of U. For example, in codas, the probability of U was 0.854 for double stops, 0.590 for fricative plus stop, but only 0.083 for a single stop.

The patterns of L1 acquisition for marked phenomena further suggest why these patterns I have claimed in L2 acquisition should be true. Consider a child—an L1 learner. If $L1_n$ = the complete NL system of the adult speaker and $L1_x$ represents the sum total of an L1 learner's system at a particular stage, then the portion of L1 that has not been acquired is $L1_{n-x}$. Thus, at a very late stage if x = n then the L1 has been completely acquired. When acquisition first starts, L1 = U, because nothing has been acquired; after it proceeds and something has been acquired, then L1 = $L1_x$. However, suppose the L1 learner is acquiring a marked phenomenon at stage $L1_{n-x}$. The L1 learner first relies on what has already been acquired, namely the nearest equivalent in $L1_x$. This is analogous to an L2 learner relying on L1, with the L2 being analogous to the L1's learner $L1_{n-x}$. However, at a later stage the L1 learner breaks away, so to speak, from what has already been acquired by using other substitutions; however, these substitutions are not nativelike either. This necessarily means they are U, because the learner has only $L1_x$ and U—no other systems are available. Similar to the L2 learner, the L1 learner's continual but inaccurate attempts result in a rapid rise of U and its subsequence persistence.

4.1.5 Comparison of Normal, Similar, and Marked Phenomena

There is a long tradition in SLA research dealing with transfer and the conditions for transfer. In addition, the roles of similarity, markedness, and U have been investigated for over 30 years (although not called U 30 years ago, the influence of non-language specific universals has been known for at least this long. Cf. Corder, 1967; 1971; Selinker, 1972). Although there has been a good deal of research dealing with these issues, none of it addresses the

interrelationship of all four factors—transfer, U, markedness, and similarity. The OPM with its corollaries adds very explicit claims to these interrelationships, because it addresses transfer, U, markedness, and similarity. Table 4.1 and Figs. 4.25 to 4.27 compare the chronological development of normal, similar, and marked phenomena.

Similarity and markedness share some common characteristics, as well as some important differences, as they affect L2 acquisition. The unifying feature they share is that both factors cause acquisition to proceed more slowly than for phenomena that are neither marked nor similar, which can be termed normal phenomena (compare the L2 component in Figs. 4.1–4.5 to Figs. 4.11–4.17 and to Figs. 4.18–4.24). Where similarity and markedness differ from normal phenomena is in the relative importance of L1 versus U after the initial stages. For all phenomena at the beginning stages the component of L1 is large and U small (stages 1 and 2, Figs. 4.1–4.2, 4.11–4.12, 4.18–4.19). However, later the

TABLE 4.1
Comparison of Normal, Similar, and Marked Phenomena

Normal Phenomena	**Similar Phenomena**	**Marked Phenomena**
L2 acquired	L2 acquired slowly	L2 acquired slowly
Earlier stages: L1 dominates	Earlier stages: L1 dominates	Earlier stages: L1 dominates
Earlier stages: L1 decreases	Earlier stages: L1 decreases slowly	Earlier stages: L1 decreases
Later stages: L1 decreases	Later stages: L1 decreases slowly	Later stages: L1 decreases slowly
Earlier stages: U minimal	Earlier stages: U minimal	Earlier stages: U minimal
Earlier stages: U increases	Earlier stages: U increases slowly	Earlier stages: U increases rapidly
Later stages: U decreases	Later stages: U decreases slowly	Later stages: U decreases slowly

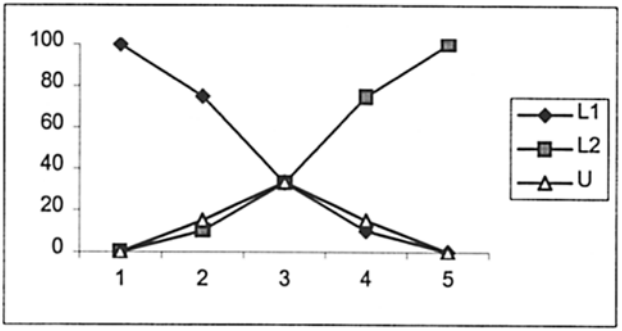


FIG 4.25. The Ontogeny Phylogeny Model. Normal Phenomena.

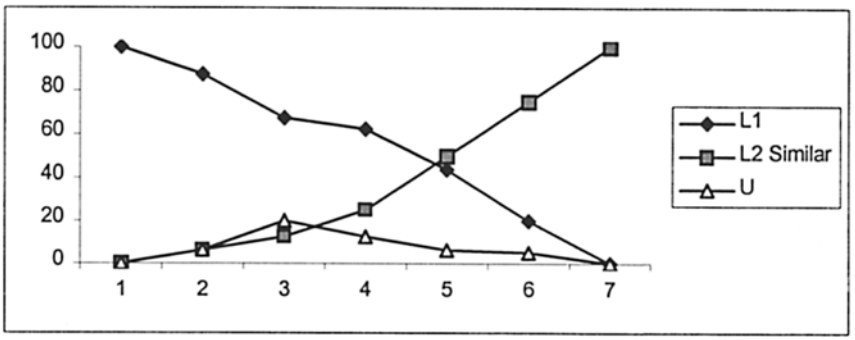


FIG 4.26. The Ontogeny Phylogeny Model. Similar Phenomena.

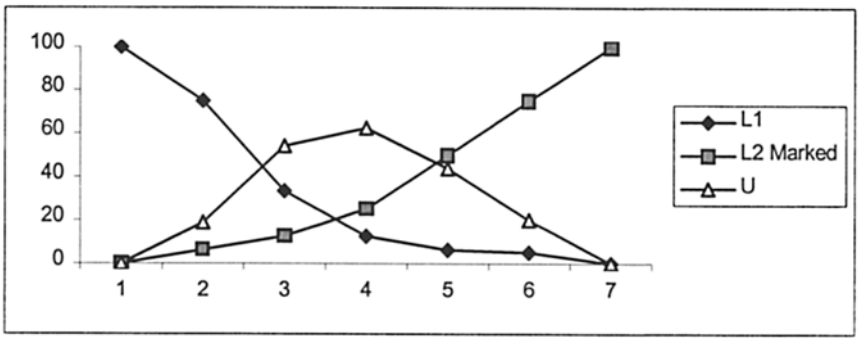


FIG 4.27. The Ontogeny Phylogeny Model. Marked Phenomena.

patterns diverge: In similar phenomena L1 persists and the proportion of U to L1 becomes relatively small throughout the various stages (compared to normal phenomena and to marked phenomena). However, in marked phenomena U becomes large and persists, the result being that the proportion of U to L1 becomes relatively large (Fig. 4.20-4.24). Hence, in the later stages the relative importance of L1 and U become reversed for marked and similar phenomena. Therefore, stages 4, 5, and 6 for similar and marked phenomena can be mirror images of each other (Fig. 4.14, 4.15, 4,16 vs. Figs. 4.21, 4.22, 4.23). In summary, although both similarity and markedness slow acquisition, at the later stages they differ significantly in the relative importance of L1 and U components.

As stated previously, the exact percentages can vary considerably from learner to learner and from phenomenon to phenomenon. However, the essence of these claims is that the relative proportions of the different components vary, depending on whether the phenomenon is normal, marked, or similar. Thus, stage 3, Fig. 4.3 shows roughly equal proportions of L1, L2, and U. Taking a normal phenomenon as the basis of comparison (whatever the exact proportions may be at this given stage), the OPM simply claims that a more-similar phenomenon at the same corresponding stage will show a lesser proportion of U to L1 (Fig. 4.13 vs. Fig. 4.3), and a more-marked phenomenon will show a greater proportion of U to L1 (Fig. 4.20 vs. Fig. 4.3).

In order to further investigate these claims about similarity and markedness, it would be interesting to investigate how these two factors would interact if the phenomenon being acquired is both marked and similar to a phenomenon in the L1. Because these factors should be mutually reinforcing, the most obvious prediction would be that acquisition would be even slower than for purely marked or purely similar phenomena. However, it would also be predicted that L1 transfer would win out as the most important factor, because the effects of similarity and markedness on U would tend to cancel one another. This is because in marked phenomena U increases rapidly but in similar phenomena U increases slowly. Thus, the U pattern would tend to be neither fast nor slow. A good example of this scenario is L1 English [h] and L2 Arabic [ħ]. The sounds are very similar but [ħ] also is very marked. In his longitudinal study of Arabic, Alshalawi (1998) found that NSs of American English used [h] for [ħ] more frequently than U substitutions at all stages, meaning that L1 transfer was the more important factor.

An empirical test controlling for similarity and markedness could compare the patterns of marked L2 phenomena with less-marked phenomena, and similar L2 phenomena with less-similar phenomena. Thus, if the patterns were different from the OPM claims, they would constitute counterevidence. Crucially, though, as was stated elsewhere, it is important to control for degree of

similarity and markedness. Thus, when comparing marked with less-marked phenomena, the degree of similarity would have to be the same; when comparing similar and less-similar phenomena, the degree of markedness would have to be the same. One possible hypothetical test case to consider (though it is not clear similarity is controlled for) is L2 English /ɔ/, /æ/, and /ʌ/ and L1 Spanish /a/. As both /æ/ and /ʌ/ are more-marked than /ɔ/ and all three are similar to /a/, a study investigating the acquisition of these three phenomena might provide relevant data. Another possible test case would be L2 English /θ/ and /t/ and L1 Spanish /t̪/. English /θ/ is more-marked than English /t/, but both English /θ/ and /t/ are similar to Spanish /t̪/ (though it is not clear they share the same degree of similarity, perhaps English /t/ being the more-similar sound). However, test cases could be found.

In addition to the differences in the relative importance of L1 and U for similar and marked phenomena, it is precisely this difference that can potentially produce different effects on near-nativelike competence. Authentic nativelike accuracy is certainly more difficult for both marked and similar phenomena but what about near-nativelike accuracy? Markedness is basically a single-edged sword: The more-marked the less likely a phenomenon will be acquired, and the more-marked the more likely the substitutions will be very nonnative. For example, very few NSs of English can master the very marked sound [tɬ'], a laterally released affricate ejective occurring in Highland Chontal. Although learners' substitutions may not be English, the U substitutions they use most likely will continue to sound very nonnative. In contrast, similarity is a double-edge sword: The more-similar the less likely to be acquired, but the more-similar the more near-nativelike the L1 substitutions are. Thus, an L1 Portuguese – L2 English learner may sound near-native when using a Portuguese [f] (which is a more fortis sound, produced with more friction than the English counterpart). In a sense, what happens with extremely similar phenomena can be likened to positive transfer, as the L1 substitutions are near-nativelike. If positive transfer can be thought of as a free ride, then transfer occurring with extremely similar phenomena can be termed a virtual free ride (see discussion in §4.1.3 on the similarity paradox).

Previous research investigating marked and similar phenomena has merely demonstrated that these phenomena are difficult to acquire, without specifying the relative components of L1, L2, and U. The OPM thus improves upon this research. Although the SDRH includes rate, it does not specify the interrelationships between L1, L2, and U in comparison to marked and normal phenomena. Thus, the similarity and markedness corollaries of the OPM not only make explicit claims about the L1, L2, and U components, which the OM and SDRH do not, the corollaries also include the notion of rate, by comparing these components to each other in normal, marked, and similar phenomena.

4.1.6 Monitoring and Individual Variation

The OPM is intended to characterize the idealized normal L2 learner. Individual learners vary considerably from the pattern depicted in Figs. 4.1 to 4.5, due to a number of factors. A good learner will progress more rapidly through the various stages than the normal learner, and a poor learner will progress more slowly and often fossilize at an early stage of development. Besides individual differences in talent, perhaps due to genetics, psychological and social factors can influence the learner. These factors are too numerous to be discussed within the scope of this book, although some of them were mentioned briefly in chapter 3. However, I deal with individual differences in one factor that may have sociopsychological origins—the monitor or the amount of attention given to speech. This factor can directly affect the proportions of the three components in IL.

In §4.1.2 on stylistic variation, I claimed that the more monitoring, or the more formal the style, the greater the accuracy. Because greater accuracy is equivalent to a more advanced stage, the patterns for chronology and style are similar. In normal learners, the amount of monitoring varies according to speech style, which is specified in the claims of the OPM corollary for style. However, there are considerable individual differences in the amount of monitoring. I discuss two extreme cases of how monitoring can alter the normal IL patterns of L1, L2, and U. I shall call a person who hardly monitors at all the *hypomonitor* and one who monitors to the extreme the *hypermonitor*. I avoid the terms under-monitor and over-monitor because they imply that the learner is monitoring too much or too little in order to produce the desired result, whatever that is, according to someone else's standard. The hypomonitor monitors so little that L2 progresses very slowly; in fact, this learner pays so little attention to form that L1 predominates, making it difficult for U to exert its influence. ("An *r* is an *r* is an *r*.") In this respect, the hypomonitor resembles the normal learner acquiring a similar phenomenon. On the other hand, the hypermonitor monitors so much that he or she quickly overcomes the influence of L1, but in its place U predominates ("I know what my L1 sounds like and I have to make the L2 different so anything but my L1 is better"). However, another result of hypermonitoring can be a rapid progression of nativelike L2 development. Thus, the hypermonitor is similar to the normal learner acquiring a marked phenomenon (where U predominates); however, for the hypermonitor L1 decreases more rapidly and L2 increases more rapidly, when compared to the normal learner acquiring marked phenomena. Figures 4.28 to 4.30 compare the normal learner to the hypomonitor and hypermonitor.

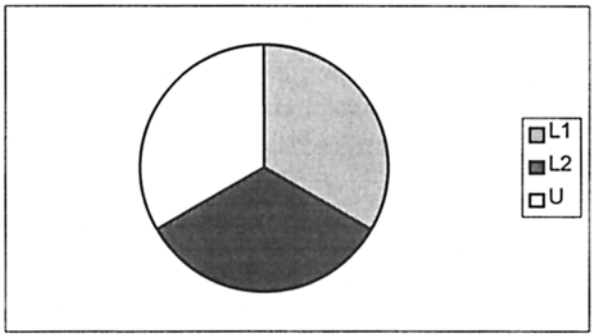


FIG. 4.28. Stage 3. Normal Learner.

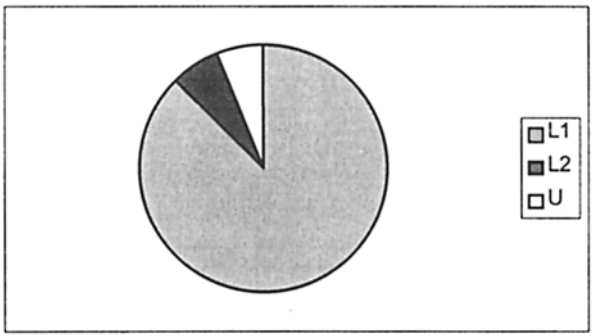


FIG. 4.29. Stage 3. Hypomonitor.

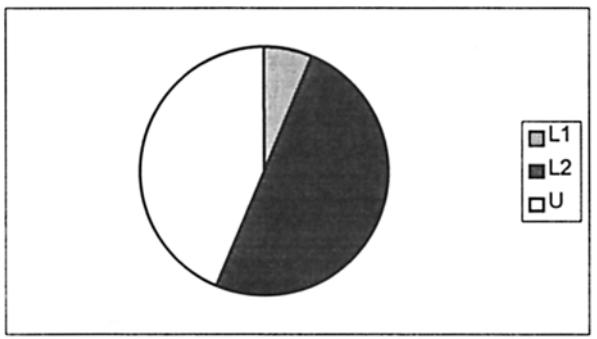


FIG. 4.30. Stage 3. Hypermonitor.

The idealized hypomonitor has a very heavy foreign accent, and the hypermonitor has a very slight foreign accent. I do not wish to suggest that hypomonitoring and hypermonitoring are the only causes of a heavy or slight accent, but merely that monitoring can play an important role. The hypomonitor's heavy accent is mostly attributable to L1 transfer. This is the type of person whose NL can readily be identified—the person is essentially speaking the L1 with loan words from the L2. On the other hand, the hypermonitor has a very slight accent. Although easily recognizable as nonnative, the person's NL usually cannot be readily identified. This is because the person has overcome much of L1 transfer but there are U remnants that in fact do occur in the IL of learners with any NL. As a consequence, these remnants, though distinctly nonnative, do not give away the person's NL. One result of U is hypercorrection, meaning the learner makes every effort to make the IL not sound like the L1, and consequently exaggerates or overcompensates the pronunciation, for example, a learner of American English who [ɹɹɹɹɹɹɹ]s and [æææææææ]s you to death. Thus, in characterizing these speakers, one often hears a backhanded compliment, which is logically contradictory, "he or she sounds more American than an American." In other words the person has gone too far.

4.2 MULTIPLE SECOND AND FOREIGN LANGUAGES

The OPM claims that in IL development there exists a specifiable interrelationship between L1, L2, and U. When multiple additional second and foreign languages are acquired (e.g., L3, L4, L5, etc.) I claim the same principles obtain. U will show the same patterning, that is, it will increase and then decrease. However, the patterns of transfer will pertain not only to the L1 but to the additional languages that have already been acquired, whatever their stages of completion. As multiple languages are acquired so too will there be multiple transfer, for example, L2 to L3, L2 to L4, L3 to L4, and so on. These possibilities are enumerable, thus for the sake of simplicity I limit this discussion to two languages, L2 and L3, with the stipulation that L3 is being acquired after L2 has already been acquired. It is important to note that "acquired" does not imply nativelike competence; merely that L2 has been acquired to some degree. Thus, when L2 is transferred to L3 the IL system of the L2 is transferred, however native or nonnative it may be. The OPM pattern will be analogous to a single L2: L3 increases, L1 and L2 decreases, and U increases and decreases. An intermediate stage of acquisition of L3 is shown in Fig. 4.31. This is analogous to L2 acquisition for stage 3, Fig. 4.3.

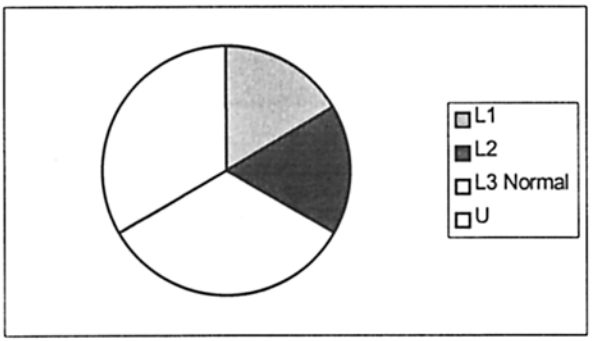


FIG. 4.31. L3 Acquisition. Normal phenomena.

These patterns may be complicated by the fact that L2 transfer to L3 may mean transfer of any or all of the components of the L2 system, that is, L1, L2, and U. A case of L1 transfer to L3 would be clear; however, when U is involved the situation can be misleading. Just as it is important to know the L1 system if one is to decide if L1 transfer occurs in the L2 IL, so too is it important to know the IL L2 system in order to decide if L2 transfer is involved in the IL L3. Consider an L1 English – L2 Spanish – L3 Italian and the acquisition of the trilled /r/s in Spanish and Italian. If the L2 Spanish substitution is uvular [R] this may be transferred to Italian because the learner thinks the /r/s in the two languages are equivalent. However, the [R] substitution in L2 is due to U not L1 transfer, because [R] is substituted rather than [ɹ]. (Cf. discussion in 4.1.1 on "new transfer." See Ausubel et al., 1978) Thus, in this example it would be very difficult if not impossible to determine if the [R] in L3 were caused by L2 transfer to L3 or by U operating independently on L3. Thus, U substitutions may be due to "transfer" of L2 to L3, or simply due to U in its own right.[7] This situation is analogous to a German speaker acquiring word final voiced obstruents. Because terminal devoicing is an L1 German process as well as a U process, it would be a moot point to argue whether the substitution were due to transfer, U, or both.

The discussion of the case mentioned, L1 English – L2 Spanish – L3 Italian, has implications for similarity. The OPM claims that transfer will be more important for similar phenomena than for less-similar phenomena. This implies that if L2 is more-similar to L3 than L1 is to L3, then transfer will be more likely from L2 to L3 than L1 to L3. If this L3 Italian learner has already acquired Spanish [r], it is highly probably that he or she will transfer [r] to

[7] In such a case, the OPM would predict that the substitution would persist. See §4.1.1.

Italian, rather than transfer English [ɹ] to Italian. Though undoubtedly there are differences between Spanish and Italian [r]s, they are certainly much less than the differences between English [ɹ] and Italian [r]. With these considerations in mind, consider Fig. 4.32, which represents an intermediate stage of development for L3, where the L3 phenomenon is similar to an L2 phenomenon. The pattern is analogous to L2 acquisition for stage 4, Fig. 4.14 for similar phenomena. Thus, the proportion of L1 to U in Fig. 4.14 is the same as the proportion of L1 + L2 to U in Fig. 4.32. The similarity claims of the OPM are thus consistent for a single L2 and an L2 and L3.

In cases of acquisition where it is not obvious which pairs of phenomena are more-similar to each other (i.e., L1 – L3, L2 – L3), this question is often resolved from the data themselves. Consider L1 English – L2 Spanish – L3 French and the acquisition of the Spanish [r] and French [R]. If the learner has already acquired nativelike Spanish [r], it may or may not be transferred to French [R], just as English [ɹ] may or may not be. Perhaps, one or the other or both may be transferred, and depending on which case occurs, the degree of similarity (in the mind of the learner) would therefore be implied. Thus, if L1 were more-similar to L3 than L2 is to L3, the proportions of L2 and L1 in Fig. 4.32 would be reversed because similarity predicts a high degree of transfer.

Regarding markedness, the OPM also has very specific predictions for L3 acquisition that are perfectly consistent with the claims about markedness when a single L2 is acquired. The OPM claims in marked phenomena that the relative importance of U is greater than L1, compared to normal phenomena. Accordingly, if L3 is marked, so will the relative importance of U be greater, compared to normal phenomena. Furthermore, when degree of similarity is controlled for, the corresponding influence of L1 and L2 will be small. Figure 4.33 represents an intermediate stage for marked L3 phenomena. The pattern is analogous to L2 acquisition for stage 4, Fig. 4.21 for marked phenomena. Thus,

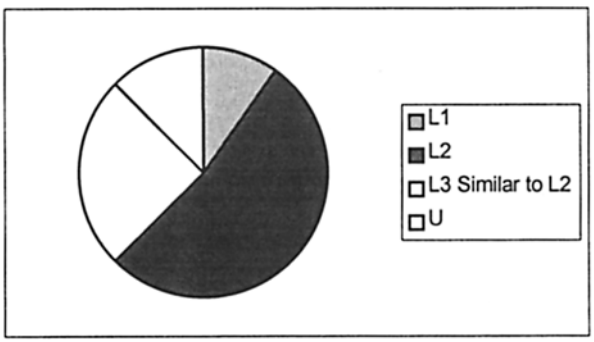


FIG. 4.32. L3 Acquisition. L2 and L3 with similar phenomena.

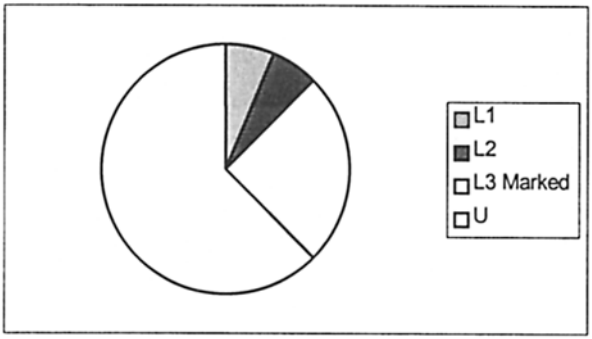


FIG. 4.33. L3 Acquisition. Marked phenomena.

the proportion of L1 to U in Fig. 4.21 is the same as the proportion of L1 + L2 to U in Fig. 4.33. The markedness claims of the OPM are thus consistent for a single L2 and an L2 and L3.

Furthermore, in keeping with internal consistency of the OPM, the patterns in Figs. 4.32 and 4.33 are mirror images (L1 + L2 in Fig. 4.32 vs. U in Fig. 4.33), just as Figs. 4.14 and 4.21 are mirror images (L1 in Fig. 4.14 vs. U in Fig. 4.21).

4.3 FIRST LANGUAGE LOSS

First language loss, or attrition, commonly occurs with continued L2 exposure and acquisition, coupled with less frequent use of the L1 (see §2.5). In societal bilingualism, the mutual influence of L1 and L2 is widely documented. For example, in an early study by Caramazza et al. (1973), the VOTs of Canadian French – English bilinguals were intermediate between monolingual speakers of each language. The VOT values of these bilinguals are nativelike in the sense that these are what characterize bilingual individuals in this community; however, in another sense one could say that from a societal standpoint these bilinguals had lost some of their native competence in both languages because they are different from monolingual speakers.

The OPM claims the conditions and constraints on transfer and U apply to all second language phenomena, including the effects they have on L1. Thus, the stages of L1 loss should mirror L2 acquisition. Over half a century ago Jakobson (1941/1968) claimed an interrelationship between child language, aphasia, and phonological universals. He demonstrated that the patterns of L1 loss in aphasic adults mirror L1 acquisition. That is, phenomena that are

acquired last are lost first. Although many of Jakobson's specific claims have since been disproven many of his general claims still seem to hold true. Such patterns are seen even in adults who are not aphasic but suffer some L1 loss. For example, many elderly English-speaking adults lose [s] – [š] distinctions; in L1 acquisition of English [s] – [š] distinctions are acquired late. Although many experts do not adhere to many of the specifics of Jakobson's claims, his general claim that L1 loss in aphasic adults mirror L1 acquisition is widely attested.

These patterns of loss should be the same when L1 loss occurs because of L2 acquisition, that is, L1 loss should mirror L2 acquisition. The principle—last acquired first lost—should apply to L1 and U phenomena in accordance with the claims of the OPM, including the corollaries of similarity and markedness. Accordingly, L2 will transfer to L1, just as L2 transfers to L3. Likewise U phenomena as well will come into play in L1 loss. For example, in L1 attrition an L1 English – L2 Spanish speaker may merge the English vowels /ɛ/ and /æ /. As Spanish has neither vowel this phenomenon must be due to U, because there is no equivalent process in Spanish from which transfer can occur. Thus, the OPM claims that L1 loss mirrors L2 acquisition would mean that the patterns in Figs. 4.1 to 4.5 also represent patterns of L1 loss. However, complete loss of L1 is even less likely than complete L2 acquisition.

4.4 CHILD LANGUAGE

4.4.1 Monolingual Acquisition

L1 acquisition involves only L1 and U, in contrast to L2 acquisition, which involves L1, L2, and U. In L1 acquisition the learner begins with U, as no language has been acquired, whereas the L2 learner begins with L1. Accordingly in the OPM framework, L1 acquisition simply consists of a gradual increase of L1 and decrease of U, as indicated in Figs. 4.34 to 4.38.

4.4.2 Bilingual Acquisition

In simultaneous bilingual acquisition in childhood,[8] the child also starts with U (as in L1 acquisition) but concurrently is exposed to two languages. In the early

[8] In successive bilingual acquisition in childhood, there is no agreement as to how old the child has to be for the second language to be considered successive acquisition, rather than simultaneous acquisition; age 3 is the figure commonly cited. Furthermore, there is no agreement as to what age L1 versus L2 acquisition can be distinguished.

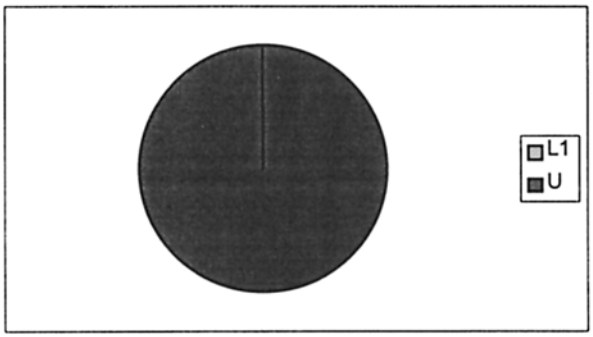


FIG. 4.34. Stage 1. Monolingual acquisition.

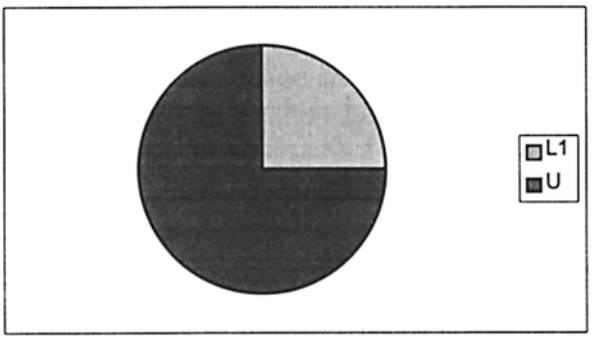


FIG. 4.35. Stage 2. Monolingual acquisition.

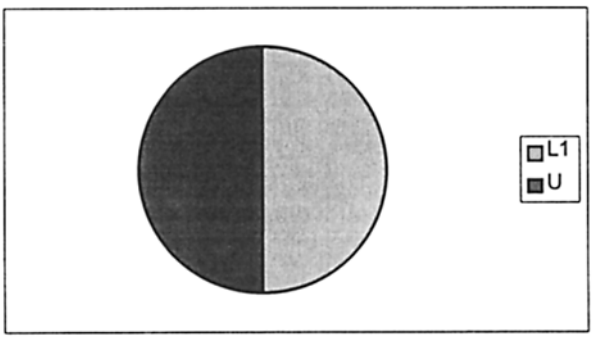


FIG. 4.36. Stage 3. Monolingual acquisition.

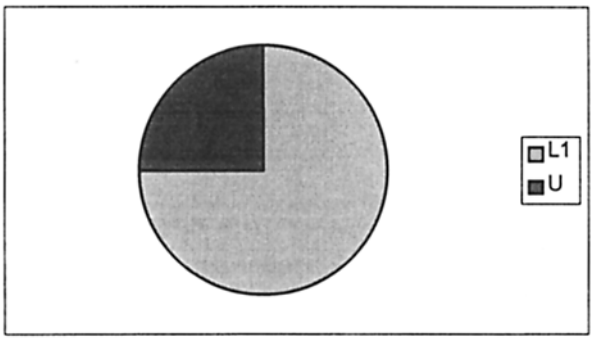


FIG. 4.37. Stage 4. Monolingual acquisition.

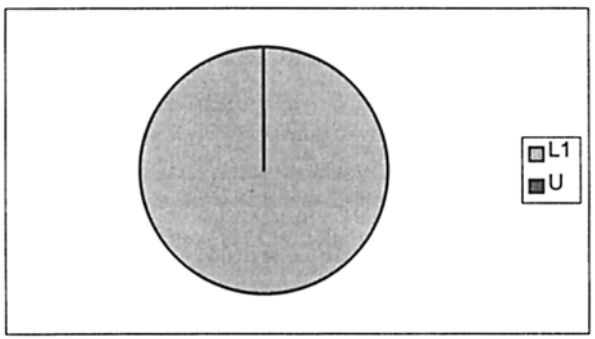


FIG. 4.38. Stage 5. Monolingual acquisition.

stages it has been widely documented that there is one undifferentiated system, that is, one system characterizes both languages. However, at a later stage, the two systems become separate, although neither system may necessarily be like that of adult NSs of the respective languages (Leopold, 1939, 1944, 1949a, 1949b; Major, 1977; Schnitzer & Krasinski, 1994; see also §1.1). Using the line of reasoning I have used elsewhere, Figs. 4.39 to 4.43 follow directly from the claims of the OPM. At stage 1, Fig. 4.39 shows 100% U, just as in monolingual acquisition. At stage 2, Fig. 4.40 shows an undifferentiated Language A and Language B system, meaning that the same sets of rules, processes, and constraints apply to Language A and Language B. For example, the child may have the same three vowel system in Language A and Language B, even though native Language A has five vowels and native Language B has 11 vowels (e.g., Spanish and English). At stage 3, Fig. 4.41 reveals the systems start to become

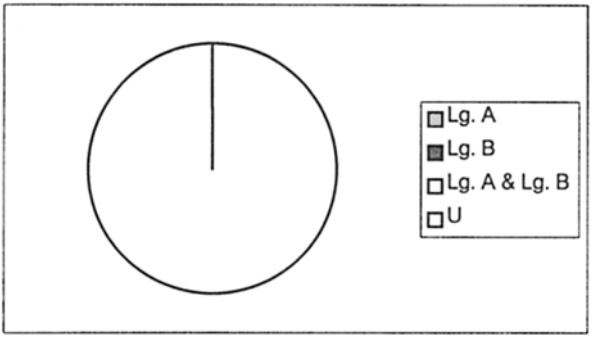


FIG. 4.39. Stage 1. Bilingual acquisition.

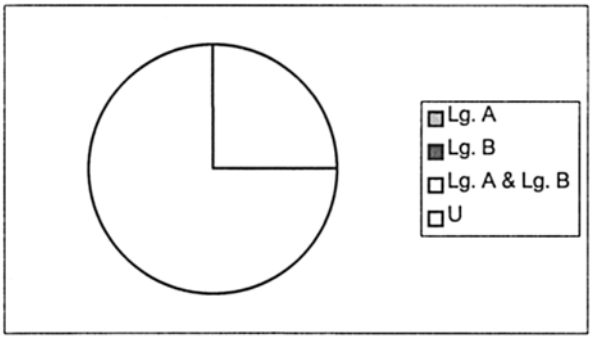
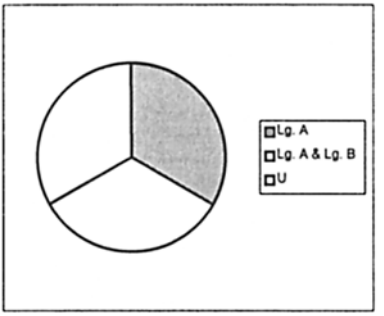


FIG. 4.40. Stage 2. Bilingual acquisition.



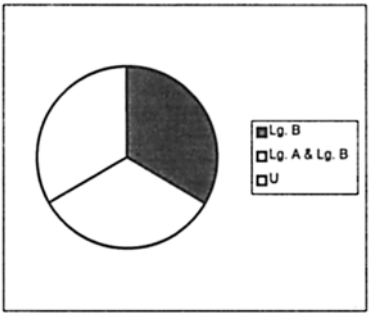


FIG. 4.41. Stage 3. Bilingual acquisition.

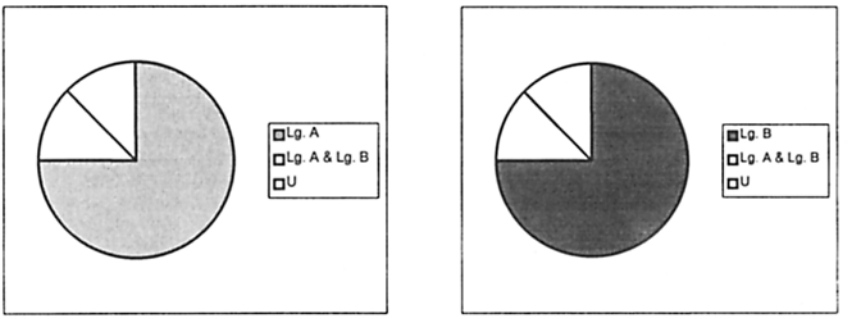


FIG. 4.42. Stage 4. Bilingual acquisition.

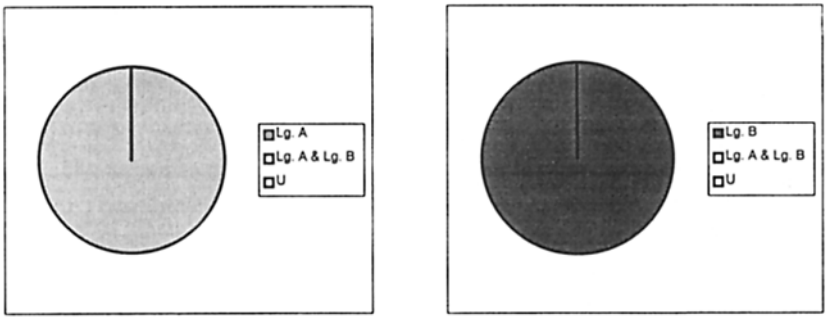


FIG. 4.43. Stage 5. Bilingual acquisition.

differentiated so that there is a separate Language A and Language B, although the learner still retains a core, or blended system characterizing both languages. At stage 4, Fig. 4.42 indicates a gradual increase of separate Language A and Language B systems and a decrease in the shared, or core Language A and Language B system. Finally, at stage 5, Fig. 4.43 shows that bilingual acquisition is complete; the two systems are completely separate. These figures represent the idealized learner, where both systems eventually become completely separate and equal. In reality, there probably is no such person because perhaps all bilinguals have systems where Language A and Language B influence each other. In addition, bilingual speakers are never completely competent in both languages in all aspects. In order for this to happen, absolute simultaneous bilingual acquisition would have to occur, a physically impossible situation. This could only occur if an individual were cloned and the original and the clone simultaneously acquired the same things in both languages throughout acquisition and maintained this situation throughout their lives. In

lieu of this, realistically a child learns something in one language at a time; it is physically impossible to learn simultaneously the same thing in the other language. The typical situation that results then is for bilinguals to use and to be more competent in one language in some situations, for example, home, family, and with one set of friends, and to use and to be more competent in the other language in other situations, for example, in the workplace and with another set of friends.

4.5 THE ONTOGENY PHYLOGENY MODEL IN DIFFERENT LINGUISTIC FRAMEWORKS

The reader has undoubtedly noted that the OPM and its corollaries are not stated within any explicit linguistic framework, such as generative phonology, feature geometry, or Optimality Theory. This was purposeful. At times any linguistic theory can be potentially confining, that is, it can be a procrustean bed. At the heart of linguistic theory is accounting for phenomena. A particular linguistic theory improves upon another when the new theory explains phenomena previously unaccounted for. In one sense theory constructs phenomena and provides the rationale for their theoretical existence. For example, in Classical Phonemics, linguists were able to find phonemes in languages because it was an established concept. However, a theory can be confining if it forces phenomena to fit its constructs, even though a different construct—perhaps not yet invented—would better account for the data. A simple example will suffice to make this point. In early SLA research, all errors were supposedly attributable to transfer. What today we would call a U substitution was forced to be called transfer, simply because the theory claimed all nonnative substitutions were due to and classified as transfer.

If the OPM were stated and confined to a particular linguistic framework, then as the framework changed, became outdated, or disproven so then too would the OPM be discredited. On the other hand, if my general claims are true but not machinery specific, they can be translated into future frameworks as the time arises. For example, if some 40 years ago I had stated the OPM within a CA framework, the U component would necessarily be missing because all errors were attributed to transfer. The model would thus be discredited today.

Accounting for phenomena should be the basis of theory. If there are perennial generalizations that do not seem to change, regardless of continued research, then these generalizations should be at least one basis on which to build theory. I have attempted to describe explicitly the interrelationship of three well-documented factors in SLA that have been known for decades: L1 transfer, L2 (nativelike achievement), and U (or whatever terminology one

wishes to call these non-specific-language specific factors). In addition, it also has been known for decades that similarity and markedness affect these factors. Regardless of changes in theoretical frameworks, all of these factors continue to be important in SLA research, for example, in recent parameter setting frameworks, in more recent OT frameworks, and in the continuing debate whether or to what degree U is accessible to the learner. The OPM does not frame these three factors, L1, L2, and U, within a particular theory but rather makes explicit claims—regardless of the framework—about the interaction of these three factors chronologically and stylistically, as well as how they are affected by similarity and markedness. If the patterns claimed for the OPM are accurate, it should be possible to frame them within any reputable linguistic theory. If I had confined the OPM to a particular linguistic theory, as this theory fell out of fashion so too might its claims. Naturally the claims of the OPM may prove to be false, but it is my hope that they be falsified not because a particular fashionable linguistic theory becomes falsified, but rather because my claims themselves become falsified.

In light of this, consider how the OPM can be framed in various linguistic theories, from past to present (see §1.3 for a review of theories). In order to illustrate these different approaches, I use a hypothetical example of a NS of Spanish acquiring the English voiced /b/ in initial, medial, and final position. According to the OPM, (a) L1 would first predominate (following native Spanish phonology /b/ → [β]in medial and final positions, but /b/ → [b] in initial position), (b) later devoicing might occur in final position (U) (/b/ → [p]), and (c) still later L2 targetlike [b] would occur everywhere. Orders of acquisition different from this would constitute counterevidence to the OPM.

Structuralism and Classical Phonemics based phonological descriptions on allophonic distributions of sounds. The OPM would simply be viewed and evaluated as, for example, (a) /b/: [β] occurs word medially and finally, [b] occurs elsewhere, (b) /b/: [β] occurs word medially, [p] occurs word finally, and [b] occurs elsewhere). (c) /b/: [b] occurs everywhere. If these successive stages were found then they would be evidence for the OPM. In a generative framework, these "occurs" would simply be replaced by arrows and features, for example, (a) /b/ → [β]/V—V, (b) /b/ → [-voi]/ —#.

Natural Phonology views L1 acquisition as a successive suppression, limitation, and ordering of processes, which in turn can cause other processes to surface. In contrast to L1 acquisition where the processes are only U, in L2 acquisition the processes are both L1 and U (see Major, 1987e). Thus, in this example, at stage (1) there is no suppression of L1 processes, (2) the L1 process of spirantization is suppressed in final position only, allowing the U process of terminal devoicing to surface, and at stage (3) terminal devoicing is suppressed in final position, as well as spirantization in medial position.

Optimality Theory (OT) has gained wide use and acceptance in the 1990s and into the 2000s. OT views U as set of violable constraints, and the grammars of specific languages as specific ranking of these constraints (see §1.3.6). Acquisition then is a successive reordering of these universal constraints.

In this Spanish example the relevant constraints would be faithfulness in voicing (FAITHVOI), faithfulness in continuency (FAITHCONT), and spirantization (SPIR, which favors voiced obstruents after vowels).[9] In medial position, the rankings are: (1) and (2) SPIR, FAITHVOI >> FAITHCONT and (3) FAITHCONT, FAITHVOI >> SPIR. In final position: (1) SPIR, FAITHVOI >> FAITHCONT, (2) FAITHCONT >> FAITHVOI, SPIR, and (3) FAITHCONT, FAITHVOI >> SPIR. Thus, in these successive stages L2 increases, L1 decreases, and U increases and decreases (except in medial position where U does not occur at all). OT has been used in a number of SLA studies, including Broselow, Chen, and Wang (1998), Bunta (1999), Hancin-Bhatt and Bhatt (1997), and Yip (1996).

Another more detailed example illustrates the OPM in an OT framework. Consider an L1 Brazilian Portuguese – L2 English speaker and the acquisition of English *Bob* [bab]. Typical stages are: (1) [babi] (L1 transfer), (2) [bap] (U, terminal devoicing), and (3) [bab] (L2). Relevant constraints in this example would be faithfulness in the consonant (FAITHC, meaning the same point and manner of articulation, but not necessarily the same voicing), faithfulness in the vowel (FAITHV), faithfulness in voicing (FAITHVOI), no coda (NOCODA), and no voiced obstruent coda (NOVOIOBSCODA). Tables 4.2 to 4.4 illustrate various rankings producing different possible outputs. The symbol * indicates a violation of a constraint, and *! indicates a fatal violation, meaning these outputs or candidates will not be produced. The pointing finger shows which output is actually produced according to the rankings. That is, this output is produced when it is the one for which it has violations in the lowest ranked constraint(s); that is, other outputs have violations in constraints that are ranked higher. Thus, for all three tables *[ba] is not produced because FAITHC is violated and ranked higher than the constraint violations for the other outputs.

Table 4.2 shows the output [babi], where [i] is inserted in accordance with Portuguese phonology because all four constraints outrank FAITHV. In this table the other possible outputs are not produced because violation of the constraints occur at a higher level than for [babi]. Thus, *[bab] is not produced because it violates NoCoda. Although [babi] violates FAITHV, this constraint is the lowest in rank; therefore it is produced. In Table 4.3, with the output [bap], the

[9] For the purpose of illustrating the points in this example, I have limited the constraints to these three.

TABLE 4.2
L1 transfer: [bab] becomes [babi]

Input: bab	FAITHC	FAITHVOI	NOCODA	NOVOIOBSCODA	FAITHV
bab			*!	*	
☞babi					*
Bap		*!	*		
ba	*!				

TABLE 4.3
U: [bab] becomes [bap]

Input: bab	FAITHC	FAITHV	NOVOIOBSCODA	FAITHVOI	NOCODA
bab			*!		*
babi		*!			
☞bap				*	*
ba	*!				

TABLE 4.4
L2: [bab] becomes [bab]

Input: bab	FAITHC	FAITHV	FAITHVOI	NOCODA	NOVOIOBSCODA
☞bab				*	*
babi		*!			
bap			*!	*	
ba	*!				

constraints FAITHC, FAITHV, and NOVOIOBSCODA outrank FAITHVOI and NOCODA, but because there are no other possible outputs for which constraints are ranked lower, this means a coda is allowed and it can violate the voicing faithfulness constraint. Table 4.4, [bab], indicates FAITHC, FAITHV, and FAITHVOI outrank NOCODA and NOVOIOBSCODA. Thus, faithfulness in voicing and the no coda constraint are the lowest ranked, producing the nativelike [bab]. Thus, these three stages show (1) L1 transfer (the ranking of the L1), (2) U (a ranking that is neither L1 nor L2) and (3) L2 (the ranking of the L2). These are in accordance of the claims of the OPM.

In general terms, if a, b, and c represent the rankings of L1, U, and L2, then there are six permutations possible: abc, acb, bac, bca, cab, cba. In OT conventions the possibilities are: (1) L1 >> U >> L2, (2) L1 >> U >> L2, (3) U >> L1>> L2, and (4) U >> L2 >> L1, (5) L2 >> L1 >>U , (6) L2 >> U >> L1 , (where >> means outranks). However, when some factors are not ranked relative to one another there are other possibilities, that is, (7) L1 >> L2, U (meaning L2 and U are not ranked relative to each other), (8) U, L1 >> L2, (9) L2, U >> L1, and so on. Possibilities (7), (8), and (9) are instances of variable rankings or unranked constraints. In non-OT frameworks these are called variable rules or optional rules. The rankings (1) and (2) would produce 100% L1 transfer, (3) and (4), 100% U, and (5) and (6) 100% L2. Because 100% L1, U, and L2 respectively at different stages are rarely found, it is more likely that variable rankings or unranked constraints do occur, as different outputs at the same stages mean different rankings, according to the claims of OT. The claims of the OPM can be stated in an OT framework simply by stating that L2 acquisition proceeds by a process of reranking of constraints. The various stages occur with various rankings, with different weights or probabilities assigned to the different rankings, meaning the rankings can be optional or variable. Thus, at the early stages L1 rankings are weighted more heavily than U and L2 (Table 4.2), later U rankings emerge (Table 4.3), and finally L2 rankings predominate (Table 4.3). Likewise, in comparison to normal phenomena, when similar and marked phenomena are involved, a greater weight respectively to L1 rankings and U rankings occur. Furthermore, in extremely marked phenomena where there are numerous U substitutions, this means that a number of variable rankings occur but these rankings characterize neither the L1 nor the L2.

4.6 THE ONTOGENY PHYLOGENY MODEL AND NON-PHONOLOGICAL PHENOMENA

Although the OPM is a model of phonological acquisition, potentially it could characterize other phenomena as well. Those who pursue research in these areas might consider their phenomena within the OPM framework. As this book concerns L2 phonology I only give brief hypothetical examples and anecdotal evidence how the OPM patterns might characterize other phenomena.

The claims that transfer dominates at early stages of acquisition is well-documented for all levels of acquisition. That U becomes important in later stages is heard in such utterances "Does she likes movies" and "I used to drink tea, now I use to drink coffee," and L1 transfer and U also apply to culture and sociolinguistic competence. Normally, ethnocentricity first takes the form of straight L1 transfer by assuming everyone acts and thinks as we do. Then as L2 learners progress they notice things are different in the L2 culture. Consequently, they try other ways but do not always succeed. These general human learning principles and strategies are thus analogous to U, including overgeneralization and hypercorrection. For example, a number of NNSs think Americans are casual and frank. Although this may be true in comparison to some cultures, many NNSs overdo it so Americans think they are rude and lacking respect.

The OPM's claims about similarity seem to apply to other areas as well. False cognates are examples of how the semantics of L1 is transferred to L2 because of the similar phonological representations in L1 and L2. Portuguese *família* is an example, where the similarity to English *family* is misleading. *Família* usually means extended family (or relatives) but Americans speaking Portuguese often use *família* to mean nuclear family. However, if the phonological representations in L1 and L2 are so different, semantic transfer is much less likely. Thus, if there is no L1 equivalent then learning has to involve U processes. For example, Portuguese *avacalhação* has no easy English equivalent. It roughly translates as "a royal, intentional, somewhat lackadaisical, immoral, devious, screw up." Consequently Americans often use the word in situations when it does not quite apply.

The OPM claims about markedness are more difficult to evaluate because there is less agreement as to markedness relationships in non-phonological phenomena, although some attempts have been made in syntax using OT.

In SLA research there has been an ongoing debate on the accessibility of U to the L2 learner. There are differing opinions from full, no access, and partial (see White, 1996). Those involved in this debate might wish to consider the relevance of the claims of the OPM: The relative degree of U access depends on whether phenomena are normal, similar, or marked. Perhaps this debate would

be informed by considering the OPM. Thus, the question of U accessibility perhaps may not be best phrased as a blanket simplistic statement, but rather may depend on the conditions of similarity and markedness.

4.7 CONCLUSION

The Ontogeny Phylogeny Model (OPM) makes explicit claims concerning the interrelationship of three well-documented factors in SLA: L1 transfer, L2 (nativelike achievement), and U. In addition, the OPM demonstrates how these patterns are mediated by similarity and markedness.

The OPM claims that over time, and as style becomes increasingly formal, IL patterns in the following manner: L2 increases, L1 decreases, and U increases and then decreases. In addition, the relative proportions of U and L1 vary, depending on whether phenomena are normal, similar, or marked. In both similar and marked phenomena, L2 increases more slowly than in normal phenomena. However, similar and marked phenomena differ in important ways from each other, in comparison to normal phenomena. In similar phenomena, L1 persists and U is relatively less important, whereas in marked phenomena U persists and is relatively more important than L1. The OPM claims these same principles apply to multiple second and foreign language acquisition, L1 loss, and monolingual and bilingual acquisition.

The OPM is supported by SLA research, in addition to research on learning theory, including such early works as Ausubel et al. (1978) and Osgood (1949). The high occurrence of L1 during early stages and the emergence of U at later stages is an instance of general principles of the conditions of transfer, that is going from the known (L1) to the unknown (L2). In general behavior, going from the known (learned) to the unknown (unlearned) first involves transfer of the known to the unknown (L1 substitutes for L2). As more exposure to the unknown occurs, non-transfer principles apply. Thus, the learner is learning, although not necessary achieving complete accuracy. The OPM's claims regarding similarity and markedness also follow from these same principles of transfer: The more-similar the phenomenon the more likely the transfer; the more-marked the phenomenon the more likely universal principles will operate. For example, a baseball player who takes up cricket will likely use a baseball swing at first and continue to do so because the two swings are so similar. In SLA terms, L1 persists. However, if the same baseball player takes up golf, the person may at first use a baseball swing but then later develop a series of persistent unorthodox golf swings that are definitely not baseball swings. Thus, in SLA terms U predominates and persists.

The claims of the OPM were purposely stated without preference for any particular linguistic framework. The claims of the model can be put into different frameworks, such as generative phonology and OT. Because the OPM can be translated into various frameworks, it should be possible to design research that can support or refute the OPM, using a variety of linguistic theories.

Chapter 5

The Ontogeny Phylogeny Model in Language Contact and Change

5.0 INTRODUCTION

Ontogeny, when referring to language, deals with language development and change in an individual person over a period of time that can span a few moments up to a lifetime, whereas phylogeny deals with language development and change in populations over part of a generation or over many generations, as well as changes in whole languages and language families. The last chapter dealt with ontogeny; this chapter deals with phylogeny. Although the OPM does not claim to account for all types of language change, the OPM does deal with change involving languages and dialects in contact, including loan phonology, isolation and assimilation of immigrant populations, bilingualism and multilingualism, pidgins and creoles, and dialects in contact. This chapter attempts to demonstrate how the types of phenomena that characterize the individual learner also characterize whole societies. An individual learning one or more second or foreign language is similar to groups of people with various language backgrounds coming into contact.

5.1 LOAN PHONOLOGY

Loan phonology usually involves a very rudimentary form of L2 acquisition, where L1 transfer completely dominates. Usually loan words are completely nativized, meaning there is nothing from the L2 system that is incorporated. This situation is synonymous with a person whose foreign accent is so heavy that he or she is only using their L1 phonology; that is, the speaker is really

speaking the L1 with L2 loan words. Examples of L1 transfer in loan words are numerous. For example, in English the *Koran* is pronounced with initial [k], not [q]; *ghi* is [gi], not [g^{h}i]; *fondue* is pronounced with final [u], not [ü] (in contrast to Brazilian Portuguese it is [i]); the first vowel in *Schroeder* is [o] or [e], not the German [œ]; Schleichter is Schlei[k]ter or Schlei[š]ter, not Schlei[ç]ter, as it is in standard high German. Although some speakers believe they are pronouncing loan words in a nativelike manner, they are nonnativelike and still the result of L1 transfer, for example, *Wagner* [vagnər] and *Volkswagen* [foksvagən]. An English [v] in these words is not the same as the German [ʋ],[1] a labiodental approximant.

Although most loan words do not cause a change in the native L1 phonological system, there are some cases when it does. Occasionally there is complete L2 acquisition; that is, the loans cause phonological change in the L1 system that makes it identical to the L2 system in some particular aspect. Maori of the Cook Islands, has no /s/, yet the loan word *Jesus* is [iesu]. Thus, in addition to borrowed words, parts of the L2 phonological system are borrowed as well. Examples in English are numerous. English does not have any Anglo-Saxon words with initial /ž/, yet English today has a number of words fitting this description, for example, the names *Zsasza* and *Gigi*. If initial /ž/ were changed to an allowable onset it would probably be /j/, /z/, or /š/; however, this does not seem to occur. The result of these loans is that the phonotactics of English have changed, now allowing #/ž/. A number of German and Yiddish words and names have resulted in the now permissible #/šm/, #/šn/, and #/šl/ in English, for example, *Schmidt*, *schmooze*, *schnauzer*, and *schlep*. Although perhaps the majority of NSs of American English have initial #/š/ in these sequences, there are a number of more conservative speakers who use #/s/ rather than #/š/, for example, [smɪt] *Schmidt*. Three other examples further indicate that L2 nativelike acquisition can occur in loans: [bax] *Bach*, [etüd] *étude*, and [žɑ̃rə] *genre* are frequent pronunciations in speakers with a classical musical and literary training. The occurrence of the German [x] in *Bach*, French [ü], and the deletion of [n] in *genre* (cf. native French [žɑ̃ʀə]) indicate the acquisition of a particular aspect of nonnative phonology.

In addition to L1 transfer and complete L2 acquisition discussed earlier, U can be present in loan phonology as well. Although these last examples were stated as cases of nativelike pronunciation, phonetic details often reveal nonnative substitutions, though still not L1 transfer, in which case these

[1] Although transcribed as [v] by some, the German [v] is clearly different from the English [v], the former often sounding intermediate between English [v] and [w]. Thus, for some German speakers of English, their [w] sounds like a [v] and their [v] sounds like a [w], as *very well*.

substitutions are U. For example, the vowel in *étude* may be [ʉ], rather than [ü], and the [x] in *Bach* may be a voiceless velar fricative but perhaps somewhat different from the one in native German. Other examples of U substitutions occur in *Bach* and *Van Gogh* for speakers who use final [ɻ] instead of the native [x] in German and Dutch respectively. Although [h] is a native English sound, [h] in final position is not. Thus, in attempting final [x], speakers produce final [h], thus resulting in a reorganization of the phonotactics in English. Furthermore, in native southern Dutch dialect where Van Gogh was born, *Gogh* is pronounced [xɔx], not *[gɔx]. Other examples of U are seen in the pronunciations of the names of two well-known professional athletes, *Brett Favre* (an American football quarterback) and *Patrick Roy* (a Canadian hockey goalie). In the United States, *Favre* is pronounced [fɑrv] and *Roy* [wɑ]. Metathesis, which occurs in *Favre*, is an historical process in English but not a synchronic process. Rather it is considered a speech error, thus a U process (cf. in child language it is common, e.g., a[m]I[n]al). The deletion of [r], in *Roy* (in native French it is [Rwa]), probably occurs because *#[rw] is not permissible in English (historically English had labialised /rʷ/ vs. non-labialised /r/, e.g., *write* vs. *ride*). However, epenthesis, not deletion, is what one would expect on the basis of L1 transfer; for example, *Rwanda* is [rəwandə] not *[wandə]. Therefore deletion of [r] in *Roy* can be considered a U process.

In addition to the three possibilities of complete L1 transfer, complete L2 acquisition, and complete U occurrences, there are speakers who have variations with all three components, for example, speakers who pronounce Bach variously with final [k], [h], and [x], corresponding to intermediate stages of L2 acquisition discussed in chapter 4. Figures 5.1 to 5.4 indicate these four possibilities, using the OPM conventions employed in chapter 4.

The claims of the OPM regarding similarity and markedness apply to loan phonology as well: Compared to normal phenomena, in similar phenomena L1

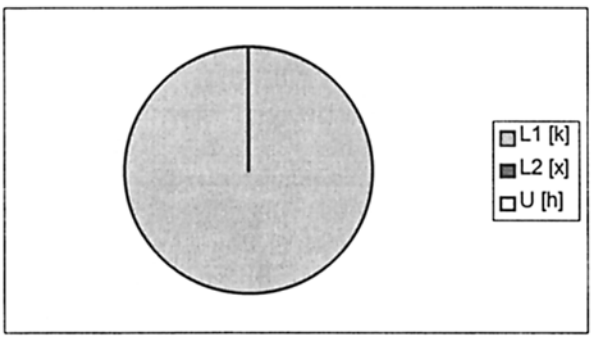


FIG. 5.1. Loan phonology: L1 transfer, [k] in *Bach*.

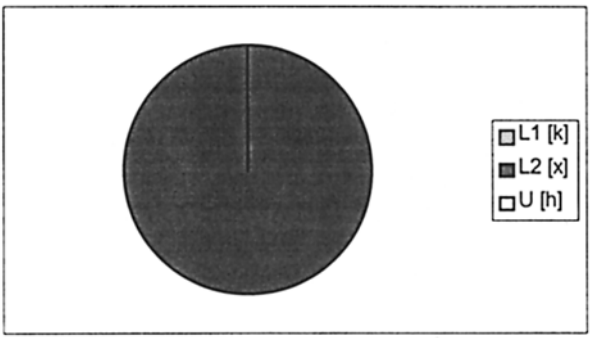


FIG. 5.2. Loan phonology: L2 acquired, [x] in *Bach*.

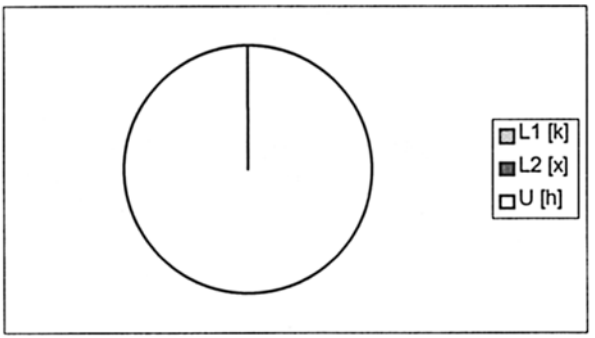


FIG. 5.3. Loan phonology: L1, L2, and UG: [h] in *Bach*.

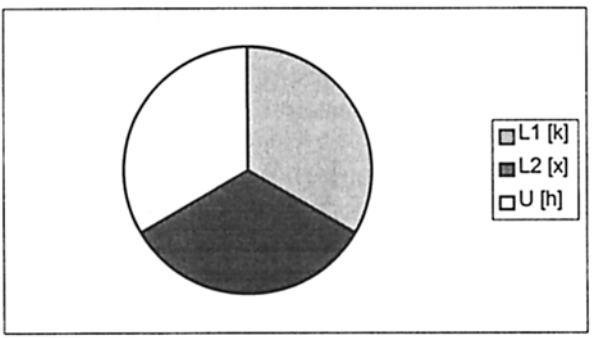


FIG. 5.4. Loan phonology: [k], [x], and [h] in *Bach*.

transfer is relatively more important and in marked phenomena U is more important. Thus, in the French loan *coup d'état* English speakers typically use alveolar [t^h], instead of the similar French [t̪], but the same speakers knowing the initial sound in the name of the language *Xhosa* is a non-English sound may attempt a click when pronouncing the name *Xhosa*, producing a non-English, non-Xhosa click (the Xhosa click is a very marked sound).

Many of these examples given are phonologies of individual lexical items. If there is only one lexical item with the new sound or phenomenon it is arguable whether a change in the whole system has occurred. This could be tested only if new words with the same phonological characteristics were borrowed. What is curious about loan phonology is that where non-L1 transfer occurs (i.e., substitutions that are L2 nativelike, or based on U, or a combination of L1, L2, and U), these phonologies are often limited to particular words: Probably [x] occurs only in this one word *Bach*;[2] thus, *Reich* is pronounced with final [k], not [ç] or [x]. Furthermore, the deletion of postvocalic [n] before [r] in *genre* ([žãʀ] in native French), does not occur in other words, for example, *Conrad* is not *[kãræd] but rather [kãnræd]. Although the pronunciation of *genre* as [žãrə] sounds like educated, cultured speech, *Conrad* pronounced [kãræd] sounds quite the opposite: Accordingly, the pronunciations of the phrase *the genre of Joseph Conrad* pronounced [ðəžãrəəvǰosəfkãnræd] and [ðəžãnrəəvǰosəfkãnræd] are common, [ðəžãrəəvǰosəfkãræd] and [ðəžãnrəəvǰosəfkãræd] sound bizarre. The example of the metathesis in *Favre* [farv] further illustrates that phonological phenomena can be limited to particular lexical items: *Le Havre* is [ləhɑvrə] or [ləhɑvər] but rarely *[ləhɑrv], and *every* is rarely *[ɛrvi]. Finally [wa] for *Roy* but not *[rəwa] and [rəwandə] for *Rwanda* but not *[wandə] illustrates the special status loan words.

These examples are relevant to the issue of the regularity of sound change. Though sound change is usually regular according to Neogrammarians (e.g., IE p > Germanic f: *pater* > *father*), numerous data indicate that change can occur in some but not all words with the phonological description for the rule. Subsequently sound change can diffuse gradually, starting from certain words and then spreading to others with the relevant phonological environment. This has been called lexical diffusion. (For more on the controversy about the regularity of sound change, see Labov, 1981, 1994.) It seems that many loan words fit this description of an initial stage of lexical diffusion, though typically this initial stage is fossilized and never proceeds further. That is, the sound

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[2] More accurately, in three words: Johann Sebastian Bach and his two sons Carl Phillip Emanuel Bach and Johann Christian Bach.

change is limited only to these words, that is, the rule is lexicalized (cf. lexical phonology, Kiparsky,1982; See also Flege et al., 1998; Flege et al., 1996).

5.2 ISOLATION AND ASSIMILATION

When immigration occurs, often groups of speakers with different NLs come into contact with one another. Among the various outcomes, isolation and assimilation can occur. Isolation is an extreme form of language maintenance that occurs when a population is cut off linguistically from the dominant societal language. These immigrants are often monolingual, although some become bilingual. However, because these bilinguals are subject to the interaction of two languages and they interact with monolinguals, the dominant language therefore has an indirect influence on the monolinguals too, in addition to U, which is involved in any language-learning situation. In turn, the minority language (although usually to a lesser extent) exerts some influence on the dominant language. Thus, even in these supposed cases of isolation, there is mutual influence. Figure 5.5 represents an advanced stage of isolation, language A being the dominant language of the society and language B, the language of the immigrants.

The opposite of isolation is assimilation, which is an extreme form of language shift. Assimilation occurs when after a generation or more speakers lose their L1 in favor of the dominant language. During the process of assimilation, generations typically go through stages of monolingualism (minority language(s)), bilingualism, and then monolingualism (dominant language). For example, immigrants may be monolingual in language A, their children bilingual in A and B, and their grandchildren monolingual in B. These stages are analogous to the L2 acquisition stages of one individual discussed in chapter 4, where initial stages are L1 dominated (language A), intermediate stages with components of L1, L2, and U, and finally completed L2 acquisition (language B). These stages contrast to the case of isolation, where language B is dominant throughout the period of contact.

However, just as complete nativelike L2 acquisition rarely if ever occurs in an individual, so too rarely does complete assimilation occur without leaving traces of the other languages, as well as U remnants. Figure 5.6 represents an advanced stage of assimilation, with language A the dominant language of the society and language B the language of the immigrants. Isolation and assimilation are opposite and mirror images, as seen by comparing Fig. 5.5 and Fig. 5.6. Both show small remnants of U and the other language involved in the contact.

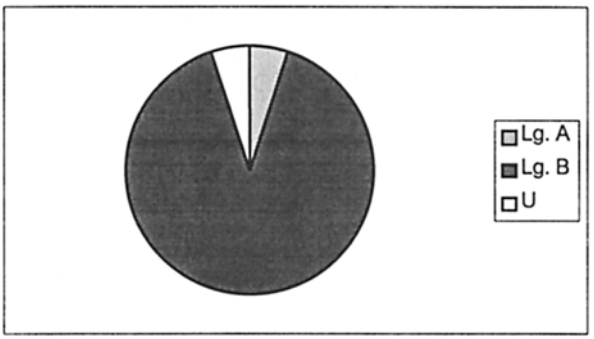

FIG. 5.5. Isolation.

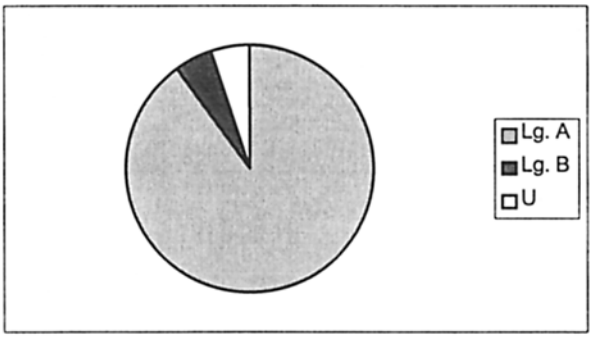

FIG. 5.6. Assimilation.

The vast majority of U.S. citizens who are NSs of English have immigrant ancestors who did not speak English natively. Consequently American English has been subject to L2 acquisition processes, which have left influences in these speakers who have long since lost their ancestral languages. In Minnesota, the very back and monophthongal /o/ has been frequently attributed to the influence of German and Scandinavian immigrants. In addition to transfer from ancestral languages, traces of U in American English are also evident by comparing U.S. and British English. A number of mergers and overgeneralizations in American English that do not occur in British English may be due to incomplete L2 acquisition (also see §5.5). Among them: the regularization of British *learnt* and *burnt* to American *learned* and *burned* (and in some Western dialects the plural of *house* is *hou*[s]*es*), the merger of British /ɑ/, /ɒ/, and /ɔ/ to American /ɑ/ and /ɔ/ or even to the single vowel /ɑ/, and the loss in most American dialects of the distinction between /w/ and /ʍ/.

5.3 BILINGUALISM AND MULTILINGUALISM

When isolation or assimilation does not occur, languages in contact often result in various forms of bilingualism and multilingualism, intermediate between complete language maintenance (isolation) and language shift (assimilation). Recall in chapter 4, §4.4.2 how the OPM treated bilingual acquisition. Figures 4.39 to 4.43 first showed an undifferentiated system, later separated systems but with a core system that both languages shared, and then finally completely separate phonological systems for the two languages. However, it was noted that this idealized case of two completely separate systems probably does not exist in any bilingual, as it is very unlikely for a situation to exist where there is no mutual influence of the two languages. Just as there is mutual influence of both languages in individual bilingual acquisition, so too in societal bilingualism is there mutual influence of both languages, the degree to which depends on a number of factors, including the relative dominance of one language over the other and the degree to which the two languages are interchangeable or not in social interactions.

The more they are interchangeable, the more mutual influence there is, for example, in situations where code switching is frequent. However, when the languages are not interchangeable, for example, in diglossia, less mutual influence occurs, yet nevertheless it is present.

Probably in all well-documented cases of societal bilingualism there is mutual influence of the two languages. As a result of this, the phoneme boundaries in bilinguals may be intermediate between monolingual speakers of both languages and the boundaries themselves may be the same or different in the two languages (Caramazza et al. 1973; Elman, Diehl, & Buchwald, 1977; Williams, 1977). For example, the VOTs in the French and English of bilingual Canadians are intermediate between monolingual speakers of both languages (Caramazza et al. 1973). According to many monolingual speakers of Spanish and English in the U.S. Southwest, a number of Spanish-English bilinguals have Spanish-accented English but English-accented Spanish. For example, it has been noted that some of these bilinguals make /b/ – /v/ distinctions in their Spanish even though native Latin American Spanish does not; they also merge /č/ and /š/ in their English, which is atypical of monolingual English speakers.

A close parallel exists between bilingual acquisition and societal bilingualism. Chapter 4 described the idealized bilingual learner where the two language systems eventually become completely separate, though probably this is nonexistent in any individual. Given this and the well-known fact that in bilingual societies there is mutual influence of both languages, societal bilingualism can be thought of as an intermediate stage in the bilingual acquisition process whereby groups of individuals have two language systems

having components of both languages (i.e., there is mutual transfer), as well as remnants of U and a mutually shared core system. In individuals who are fairly balanced in their proficiency of both languages A and B; that is, neither language is dominant (again probably a nonexistent idealized speaker; see §4.4.2), there are two separate but equal systems of A and B. However, part of each system has components of the other, in addition to U plus a mutually shared system. This situation is represented in Figs. 5.7 and 5.8. Thus, although a good portion of each system is identical to monolingual speakers, a portion of each is not, due to the mutual influence of the two systems. However, in most bilinguals one language is dominant over the other. If A is dominant over B, then in a sense speakers have practically mastered A, just as monolinguals have; thus, in these speakers' system of language A, the influence of B on A is minimal as will be the two other non-A components (U and the mutually shared A and B). On the other hand, these speakers' system of language B is highly

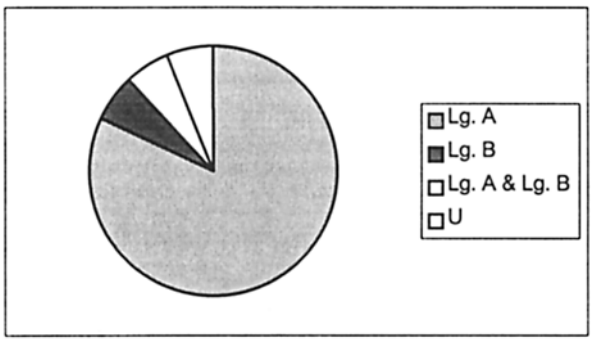

FIG. 5.7. Bilingualism. Language A: Neither A nor B dominant.

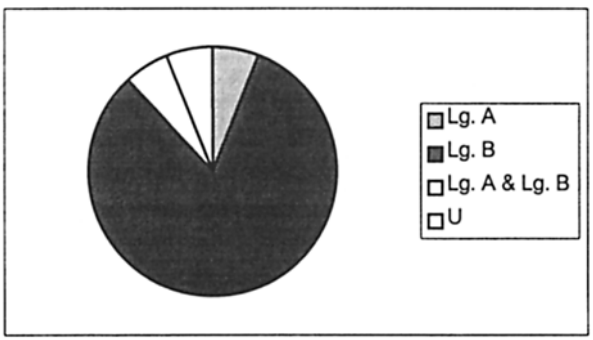

FIG. 5.8. Bilingualism. Language B: Neither A nor B dominant.

influenced by A, as A is dominant. This typically occurs in some Spanish-English bilinguals where Spanish is dominant. Syllable-timed rhythm and Spanish segmental phonology often characterize their English. The graphic representation of bilingualism, where one language is dominant is given in Figs. 5.9 and 5.10.

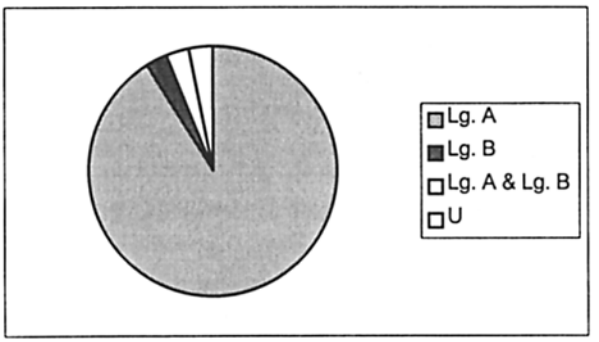

FIG. 5.9. Bilingualism. Language A: A dominant.

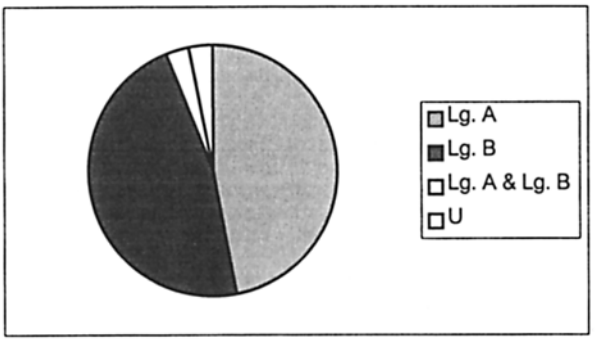

FIG. 5.10. Bilingualism. Language B: A dominant.

5.4 PIDGINS AND CREOLES

When groups of individuals who share no common language come into contact a pidgin can form, and if it becomes nativized it is termed a creole.[3] Schumann (1978a) likened L2 acquisition to a process of pidginization, using the now well-known case of the L2 learner Alberto's acquisition of English. Bickerton's (1981, 1984, 1988) bioprogram hypothesis emphasizes the importance of U in the formation of a pidgin, just as many researchers have emphasized its importance in traditional SLA research.

If the principles of the OPM hold true for an individual acquiring an L2 then these principles should be true for pidginization as well, because pidginization is a type of SLA. However, one of the criticisms leveled against Schumann's SLA pidginization hypothesis was that the parallels between pidginization and SLA in a traditional classroom were not valid. In pidginization speakers often do not have continual access to the dominant language, whereas in the classroom students often have continual contact with teachers (whether they are NSs or NNSs of the language). Yet, this is not always the case. Even in classroom situations and outside of class, students talk among themselves without the presence of a NS or near NS of the language they are learning. Although there may be degrees of the presence and absence of contact with NSs between pidgin learners and traditional L2 learners, both are indeed cases of SLA. Thus, the parallels between traditional SLA and pidginization are quite valid.

In the formation of most pidgins one language tends to dominate, at least at the lexical level. Thus, we speak of English pidgins, French pidgins, and so on. In order to represent pidginization in the OPM, let us consider a case where four languages are involved in contact, A, B, C, and D (more or fewer languages make no difference to the model), with language A being the dominant language. At the most rudimentary stage, when a pidgin begins to form it is purely a mixture of these languages, as no process of acquisition has taken place. Thus, the speakers involved have only their L1s, with no knowledge of the other languages. This situation is essentially the same as an L2 learner who at the beginning stage has only his or her L1. This beginning stage pidginization is represented in Fig. 5.11 (cf. Fig. 4.1). As a pidgin begins to form, speakers typically do not become proficient in each other's languages, but rather speakers of the various languages reach a consensus (often unconscious) and form a shared system. This shared system becomes formed and increasingly influenced

[3] For extensive coverage of pidgins and creoles see Baker and Corne, 1982; Bickerton, 1981; Romaine, 1988; and Singler, 1987.

by general acquisition principles, that is, U, and less and less influenced by the component languages. Therefore, when a pidgin is formed U begins to operate and then its influence increases, while the influence of the various component languages decreases, though language A still remains relatively more important than B, C, and D. As U increases, the component languages must decrease, because the component languages and U must add up to 100%. These various stages are represented in Figs. 5.11 to 5.15.

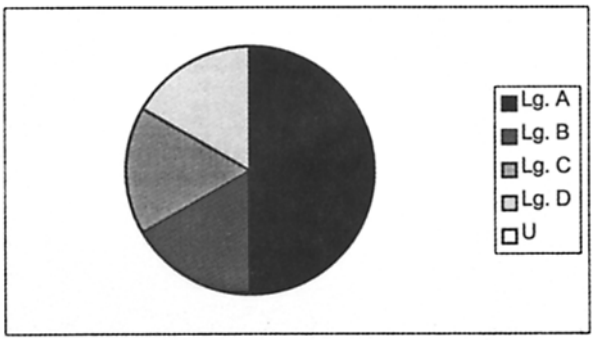

FIG. 5.11. Stage 1. Pidginization.

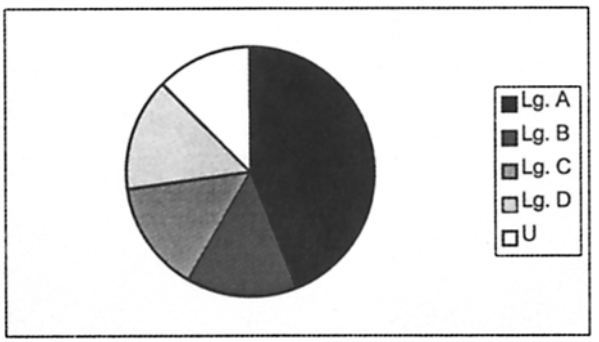

FIG. 5.12. Stage 2. Pidginization.

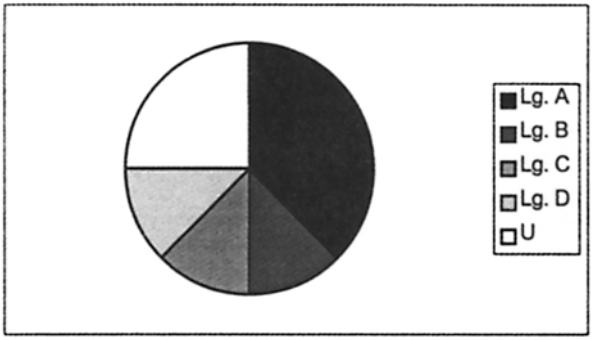

FIG. 5.13. Stage 3. Pidginization.

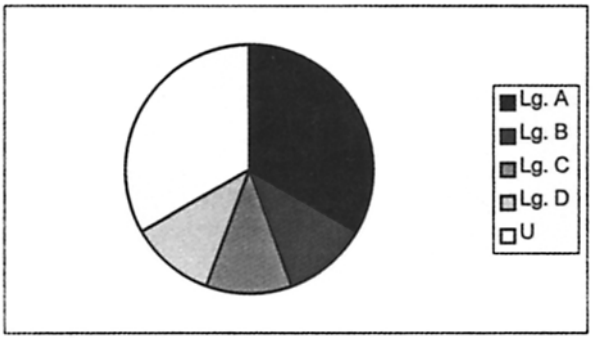

FIG. 5.14. Stage 4. Pidginization.

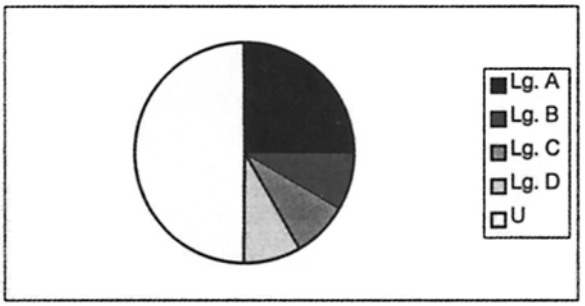

FIG. 5.15. Stage 5. Pidginization.

One reason why U is very important in the formation of a pidgin is because speakers have very little or no shared knowledge of each other's languages; therefore, they resort to universal principles in order to communicate, which besides linguistic principles also includes paralinguistic phenomena, such as gestures and other body language. If these principles are universal they necessarily are shared. In a language classroom students may choose not to communicate because they are not confident that the form they have in mind is correct. In contrast, for pidgin speakers, communication at practically any cost is of prime concern; therefore, speakers resort to whatever means they can. Being "correct" has practically no meaning or is of little importance, as the language being formed has no set standards. Being able to get the point across is all-important, regardless of form. Thus, employing U makes better sense than using a language with which you know the other person has no familiarity.

After a pidgin forms, it may become a creole and subsequently evolve into a more elaborate form. In traditional pidgin and creole life cycle terminology, a creole may undergo decreolization or hypercreolization. The terms are somewhat self-explanatory. Decreolization means becoming less like a creole and more like the dominant language from which it originated, and hypercreolization means becoming more like a creole (a "super creole") or taking on a life of its own, independently of the original languages from which it developed. If the creole has continual contact with the dominant language, decreolization is favored and if contact with the dominant language is cut off then hypercreolization is favored. This situation is highly oversimplified, as there are a number of other factors influencing the outcome, for example, group identity and solidarity. For example, in Hawaii, though speakers most of Hawaiian Creole English have continual contact with standard English, the creole does not seem to be undergoing decreolization. Rather it seems to be evolving on its own and becoming even more distinct from standard English. This probably can be attributed to the importance of the creole in Hawaiian identity.

Whatever the forces that cause decreolization or hypercreolization, the importance of the various components of the system is clear: In decreolization the dominant language becomes increasingly important and thus the other components become less important (the other components being U and languages B, C, and D). In hypercreolization the situation is different: U becomes more important, but all the component languages, including the dominant language, become less important. Decreolization and hypercreolization are represented in Figs. 5.16 and 5.17. Decreolization is very similar to assimilation (Fig. 5.6), in that the dominant language A becomes more important as the other components diminish in importance. The percentages of

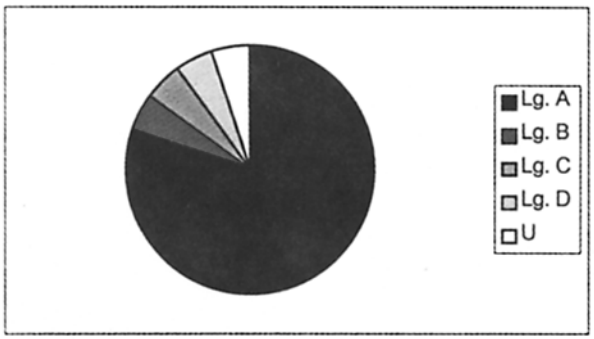

FIG. 5.16. Decreolization.

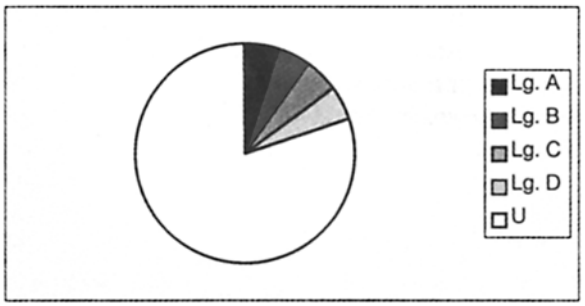

FIG. 5.17. Hypercreolization.

the components in Figs. 5.16 to 5.17, as with all other figures in the OPM, are hypothetical. The essential point depicted in these two figures is that the relative proportions of the various components are different in decreolization and hypercreolization.

Decreolization and hypercreolization are analogous to traditional SLA of an individual learner. Decreolization is similar to an L2 speaker who has continual contact and access to NSs or near NSs of the L2. Because of this, the speaker's L2 becomes more and more nativelike. Hypercreolization is similar to a speaker who is cut off from contact with NSs or near NSs of the L2 but this speaker continues to use the L2 with other NNSs with various language backgrounds. As this speaker continues to use the L2, this version of the L2 will then continue to develop on its own, with very little influence from other speakers' NLs or the original NS version of the L2. A process similar to hypercreolization is continually taking place in international Englishes. (For a reference guide to International Englishes, see Trudgill & Hannah, 1994).

5.5 DIALECTS IN CONTACT

The preceding sections of this chapter have dealt with the language contact phenomena, including loan phonology, isolation and assimilation, bilingualism and multilingualism, and pidgins and creoles. Dialects in contact should also be included in all of these phenomena, because the differences between language and dialect are not based on clear linguistic criteria but rather more on political, ethnic, and social criteria (see chapter 1, Footnote 9). Given that two varieties may be dialects of one language from one perspective but two separate languages from another perspective, the claims I have made above regarding languages in contact (§5.1, 5.2, 5.3, and 5.4) should also be true for dialects in contact. Because of the nebulousness of the difference between language and dialect, the differences I describe in the following between languages in contact and dialects in contact are more a matter of degree than of kind.

In contact situations there is mutual influence of the languages and dialects involved. It is widely known that the more intense and varied the contact, the more frequent the mergers. In bilingual communities distinctions are often lost, as in the case of Canadian French versus the French of Canada and Southwestern U.S. Spanish versus the Spanish of Latin America. In pidgins and creoles, mergers are legion. For example, Haitian Creole does not have front rounded vowels, and many speakers of Jamaican English do not have /æ/ – /a/ distinctions. In dialects in contact too, mergers are common. In U.S. Eastern English there are some distinctions that do not exist in the Midwest, and which are even less common in the West. This reflects the immigration and migration patterns of early and of late, where the greatest amount of movement has been in the West. For example, in Los Angeles, San Diego, San Francisco, and Phoenix the majority of the residents were not born in the respective cities of their residence, in contrast to many Midwestern and Eastern cities where there is a greater percentage of native residents. The distinction between /æ/ and /ɛ/ before /r/ as in *Harry/hairy*, occurring east of the Allegheny Mountains does not exist in the Midwest or West. The /ɑ/ – /ɔ/ distinction is lost in parts of the Midwest and in the entire West. In the West many speakers merge the following before /l/: /ɪ/ – /i/, /e/ – /ɛ/, /æ/ – /ɛ/, and /o/ – /ʌ/ – /ʊ/, for example, *wheel/will, sale/sell, Ellen/Allan, dole/dull, pole/pull.* Most Western speakers merge the stressed vowels in *rider* and *writer*, producing a vowel that is intermediate between [ʌy] and [ay]. Further mergers in many varieties of U.S. English (in contrast to many varieties of British English) are the loss of /ʍ/ – /w/ and /tyu/ – /tu/, /dyu/ – /du/ distinctions, for example, *where/wear*, *tune/toon*, *dew/do*.

There are other close parallels between the phenomena discussed in §5.1, 5.2, 5.3, and 5.4, and dialects in contact. Although loan phonology (see §5.1) traditionally only includes loans from different languages, it should also include loans from different dialects of the same language. The patterning is the same. In the United States, many young White speakers of standard English pronounce *cool* as [kuw], imitating AAVE (African American Vernacular English), but these same speakers pronounce *school* as [skul], whereas AAVE speakers pronounce it [skuw]. This is analogous to the example of *Bach* with final [x] but *Reich* with final [k]. Isolation is also common in dialects in contact, for example, New York retirees living in a community together in Miami often preserve their dialect. In other situations, assimilation occurs, for example, second generation New Yorkers in San Francisco have San Francisco rather than New York accents. Bidialectalism and multidialectalism are analogous to bilingualism and multilingualism, for example, a newscaster who uses standard English on radio and television but speaks non-standard English with friends and family.

The parallels between pidgins and creoles and dialects in contact are less obvious but nevertheless exist. In general, in contact situations the differences between the mother languages and the resulting pidgin or creole are much greater than the differences between the mother dialects and the resulting dialect. One reason for this is that in pidginization the languages involved are often very different from one another, whereas in dialects in contact the dialects usually include a large core of shared phenomena. For example, U.S. Western dialects have /θ/ and /ð/, final consonant clusters, and final voiced obstruents because the vast majority of the mother dialects also have these phenomena. In contrast, in many English creoles /θ/ and /ð/ merge with /t/ and /d/ and there are no final consonant clusters or voiced obstruents, for example, in Tok Pisin (see Verhaar, 1995). These modifications are perhaps not just due to a general process of simplification characteristic of pidginization, but rather because most of the mother languages do not have these phenomena. Thus, simplification occurs because there can be no positive transfer of these marked phenomena. However, in both pidginization and dialects in contact the result is a mixed variety, or hybrid that is not purely any of the mother varieties. When a child learns this mixed variety as the first language (hearing either a pidgin or mixed dialect), he or she will hear different variations of a particular phenomenon. During acquisition the child will form an intermediate category, or compromise. The result then is a creole or new dialect, now with NSs.

Let us now return to the basic claims of the OPM, in order to explicate dialect contact phenomena. The basic claim is that transfer decreases over time, L2 increases, and U increases and then decreases (§4.1.1). In dialect contact situations if one dialect is dominant, this is analogous to the speakers of the

other dialects learning an "L2"—the dominant dialect. At the initial stage, transfer predominates, that is, the speakers of the different dialects simply use their native dialects. As acquisition proceeds, the dominant dialect is acquired (the L2), the minority dialects diminish (the L1s) and U increases and decreases. Just as the case of an individual acquiring an L2, remnants of the minority dialects and U remain. Rather than depicting these several stages for dialects in contact, which would resemble Figs. 4.1 to 4.5, I have chosen to represent only two stages—the early and late stages, indicated in Figs. 5.18 and 5.19. Fig. 5.19 is analogous to the case of bilingualism, where the minority language is assimilated (Fig. 5.6); also to decreolization, where the creole becomes increasingly like the dominant language (Fig. 5.16). In cases of dialects in contact where there is no clear dominant dialect, a compromise results, that is, a combination of all the component dialects. When contact is cut off from the mother dialects, the emergent dialect can evolve in ways similar to hypercreolization, that is, where the role of U becomes increasingly important (Fig. 5.17; cf. Fig. 5.21).

The similarity and markedness corollaries of OPM are also relevant to contact phenomena. The OPM claims that in similar phenomena L1 plays a larger role than U, compared to less-similar phenomena (§4.1.3), where U plays a more important role. In contrast, in marked phenomena U has a larger role than L1, compared to less-marked phenomena. We are now in position to understand why in general U predominates in pidgins and creoles but in dialects in contact U is much less important. Pidginization typically gives rise to a language that is very different from the mother languages, indicating that U is a strong factor. However, in dialects in contact, the resulting dialect is often very similar to one or more of the mother dialects, indicating that transfer is a strong factor. This is because in dialects in contact often the mother dialects are very similar to each other; hence, the smaller role of U and the larger role of transfer. On the other hand, in pidginization the mother languages are often very dissimilar to one another (often completely unrelated to one another), hence the increased role of U and the lesser role of transfer.

According to the OPM, in marked phenomena the role of U is greater than in similar phenomena. The persistence of transfer in similar dialects is represented in Fig. 5.20, and the larger role of U in marked dialects is represented in Fig. 5.21. It is important to note that these figures represent an idealization of relevant phenomena. Clearly there is no dialect that is marked in all respects, just as there are no two dialects that are similar in all respects, unless they are identical. Figure 5.20 (similar dialects) is analogous to an initial

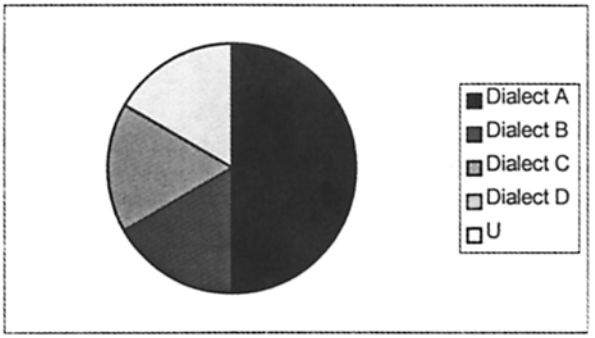

FIG. 5.18. Dialects in contact. Early stage. Dialect A dominant.

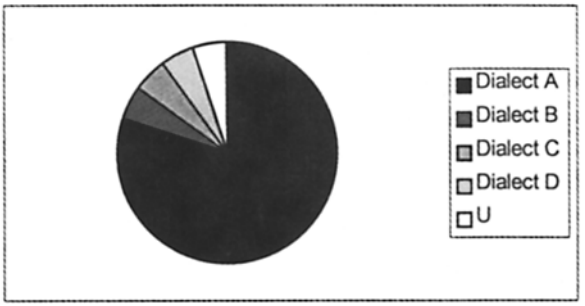

FIG. 5.19. Dialects in contact. Late stage. Dialect A dominant.

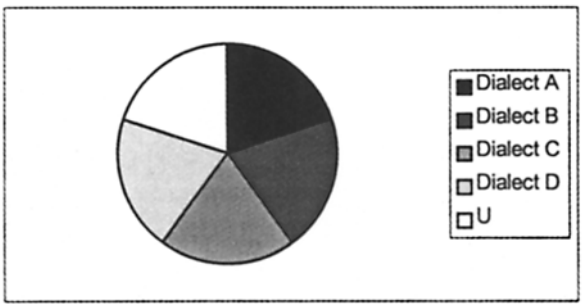

FIG. 5.20. Dialects in contact. Similar dialects.

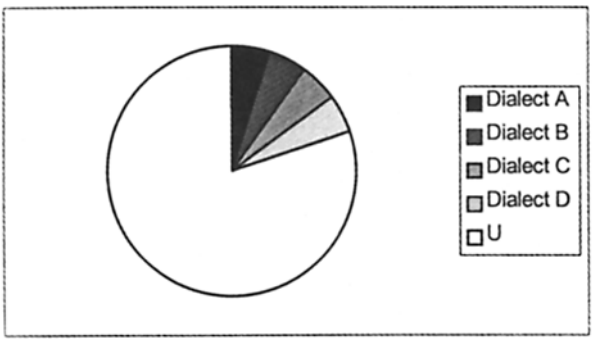

FIG. 5.21. Dialects in contact. Marked dialects.

stage of pidginization, where all of the mother languages are important components (Fig. 5.12; note in Fig. 5.20 there is no dominant dialect). However, the difference between these two figures is that in Fig. 5.20 the component languages persist, based on the OPM principle that transfer persists in similar phenomena, whereas in Fig. 5.12 the component languages do not persist because they are not similar (rather they diminish as indicated in Figs. 5.13–5.15). Figure 5.21 is analogous to hypercreolization, where U has an important role (Fig. 5.17). In the case of hypercreolization, U becomes increasingly important because the creole is cut off from the dominant language; in marked dialects in contact U has a large role because in marked phenomena U plays a major role.

In pidgins and creoles, marked forms frequently merge with less-marked forms but in dialects in contact many marked forms survive. For example, U.S. Western dialects have /θ/ and /ð/, final consonant clusters, and final voiced obstruents, all of which are marked; however, these phenomena are rare in English based pidgins and creoles. As pointed out previously, one reason for the survival of these forms in U.S. dialects is that the mother dialects also have these forms. These resulting Western dialects have these forms simply because of positive transfer. On the other hand, there are other marked forms not mutually shared by all the mother dialects. Consequently U processes occur, resulting in loss of distinctions and mergers. For example, all U.S. Western dialects have /ɑ/ – /æ/ – /ɛ/ contrasts, which can be considered quite marked; however, these contrasts are not maintained in certain environments; /ɛr/ and /ær/ merge to [ɛr] (*merry/marry*).

5.6 CONCLUSION

The OPM claims an explicit interrelationship between first language transfer, second or foreign languages, and U; this interrelationship is also mediated by similarity and markedness. It is claimed that these principles are the same, regardless of whether they characterize an individual or groups of speakers over generations.

Chapter 6

Conclusion

This volume has been devoted to the investigation of general principles in the formation and development of a second language phonological system. Research in interlanguage in general and second language phonology in particular has demonstrated the importance of three interacting factors involved in the formation of an interlanguage: L1 transfer, L2, and U. The nature and the relative importance of these interactions continue in importance in second language acquisition research.

The Ontogeny Phylogeny Model (OPM) is explicit about the interrelationship of these factors, in addition to how they are affected by similarity and markedness. The OPM claims IL patterns in the following manner: Over time and as style becomes increasingly formal, L2 increases, L1 decreases, and U increases and then decreases. In addition, the relative proportions of U and L1 depend on whether phenomena are normal, similar, or marked. L2 increases more slowly in similar and marked phenomena, in comparison to normal phenomena. However, in similar phenomena L1 is relatively more important than U, whereas in marked phenomena U is relatively more important than L1. I claim the principles of the OPM also apply to multiple second and foreign language acquisition, L1 loss, and monolingual and bilingual acquisition, and furthermore both to individuals and to groups of speakers over generations, as in languages and dialects in contact.

The claims of the OPM are as follows.

Chronological Corollary of the OPM. IL develops chronologically in the following manner: (a) L2 increases, (b) L1 decreases, and (c) U increases and then decreases.

Stylistic Corollary of the OPM. IL varies stylistically in the following manner: As style becomes more formal, (a) L2 increases, (b) L1 decreases, and (c) U increases and then decreases.

Similarity Corollary of the OPM. In similar phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases slowly, and (c) U increases slowly and then decreases slowly. Thus, the role of L1 is much greater than U, compared to less-similar phenomena.

Markedness Corollary of the OPM. In marked phenomena, IL develops chronologically in the following manner: (a) L2 increases slowly, (b) L1 decreases and then decreases slowly, and (c) U increases rapidly and then decreases slowly. Thus, except for the earliest stages, the role of U is much greater than L1, compared to less-marked phenomena.

SLA research and general principles of learning theory support the OPM. The predominance of L1 during beginning stages and the later emergence of U are in part the result of general principles of transfer. In many types of behavior, going from the learned, or known, to the unlearned, or unknown involves transfer. The known is transferred to the unknown, that is, L1 transfers to L2. Gradually, as more of the unknown becomes known, more non-transfer principles apply, that is, U. Furthermore, the more similar the phenomenon the more likely the transfer; the more marked the phenomenon the more likely universal principles will operate as marked phenomena are intrinsically difficult.

The OPM makes general claims concerning the interaction of L1, L2, and U but makes no detailed claims concerning specific phenomena, for example, the phonetic and phonological details in the acquisition of [r] and [l] in onsets or the acquisition of fricatives and stops in coda clusters. The OPM's lack of specifics is not necessarily a weakness, because claims about particular phenomena in all their myriad detail might be falsified as data are increasingly collected and as newer linguistic frameworks replace older frameworks. Furthermore, an encompassing theory with specific claims for all phenomena would have to include an inordinate number of details. The OPM is stated in a general way that it is macrocosmic in scope. Microcosmic levels of investigation regarding particular phenomena are an important ongoing endeavor in SLA, and numerous specifics continue to be investigated in great detail. Because the OPM provides a framework in order to test individual phenomena, ongoing and future research may result in supporting or falsifying the OPM. If this research supports the OPM, it would suggest that the OPM provides us with a very general claim of how the human linguistic mind operates.

References

Abrahamsson, N. (1994). Some observations of child adult differences in second language pronunciation. *Scandinavian Working Papers on Bilingualism, 9,* 1–15.

Abrahamsson, N. (1996). Natural phonology and second language acquisition: Problems and consequences. In E. Kellerman, B. Weltens, & T. Bongaerts (Eds.), *EUROSLA 6: A selection of papers* (pp. 9–21). Amsterdam: Anéla.

Abrahamsson, N. (1997). Vowel epenthesis of initial /sC(C)/ clusters in Spanish speakers' L1 and L2 production: Puzzle or evidence for Natural Phonology? In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 8–17). Klagenfurt, Austria: University of Klagenfurt.

Abrahamsson, N. (1999). Vowel epenthesis of /sC(C)/ onsets in Spanish/Swedish interphonology. *Language Learning, 49,* 473–508.

Abramson, A., & Lisker, L. (1970). Discriminability along the voicing continuum: Cross-language tests. In B. Hála, M. Romportal, & P. Janota (Eds.), *Proceedings of the 6th International Congress of Phonetic Sciences* (pp. 569–573). Prague: Academia.

Acton, W. R. (1979). *Second language learning and perception of difference in attitude.* Unpublished doctoral dissertation, University of Michigan.

Adamson, H. D., & Regan, V. M. (1991). The acquisition of community speech norms by Asian immigrants learning English as a second language. *Studies in Second Language Acquisition, 13,* 1–22.

Adjemian, C. (1976). On the nature of interlanguage systems. *Language Learning, 26,* 297–320.

Alshalawi, H. (1998). *The acquisition of Arabic pharyngeals by native speakers of English.* Unpublished manuscript, Arizona State University at Tempe.

Altenberg, E., & Vago, R. (1983). Theoretical implications of an error analysis of second language phonology production. *Language Learning, 33,* 427–447.

Anan, F. (1981). A study of intonation interference (translation from Japanese). *The Bulletin, The Phonetic Society of Japan, 167,* 9–13.

Andersen, R. (1983). Transfer to somewhere. In S. M. Gass & L. Selinker (Eds.), *Language transfer in language learning* (pp.177–201). Rowley, MA: Newbury House.

Anderson, J. (1987). The Markedness Differential Hypothesis and syllable structure difficulty. In G. Ioup & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 279–291). New York: Newbury House/Harper & Row.

Anderson-Hsieh, J., Johnson, R., & Koehler, K. (1992). The relationship between native speaker judgments of nonnative pronunciation and deviance in segmental prosody, and syllable structure. *Language Learning, 42,* 529–555.

Archangeli, D., & Langendoen, D. T. (Eds.). (1997). *Optimality Theory: An overview.* Malden, MA/Oxford, England: Blackwell.

Archibald, J. (1992). Transfer of L1 parameter settings: Some empirical evidence from Polish metrics. *Canadian Journal of Linguistics / Revue canadienne de Linguistique, 37,* 301–339.

Archibald, J. (1993a). *Language learnability and L2 phonology: The acquisition of metrical parameters.* Dordrecht/Boston/London: Kluwer Academic.

Archibald, J. (1993b). The learnability of English metrical parameters by Spanish speakers. *International Review of Applied Linguistics, 31,* 129–141.

Archibald, J. (1993c). Metrical phonology and the acquisition of L2 stress. In F. R. Eckman (Ed.), *Confluence: Linguistics, L2 acquisition, and speech pathology* (pp. 37–48). Amsterdam: John Benjamins.

Archibald, J. (1993d). The learnability of English metrical parameters by adult Spanish speakers. *International Review of Applied Linguistics, 31,* 129–142.

Archibald, J. (1997a). The acquisition of second language phrasal stress: A pilot study. In S. J. Hannahs & M. Young-Scholten (Eds.), *Focus on phonological acquisition* (pp. 263–289). Amsterdam: John Benjamins.

Archibald, J. (1997b). The acquisition of English stress by speakers of nonaccentual languages: Lexical storage versus computation of stress. *Linguistics*, 35, 167–181.

Archibald, J. (1998a). *Second language phonology*. Amsterdam/Philadelphia: John Benjamins.

Archibald, J. (1998b). Second language phonology, phonetics, and typology. *Studies in Second Language Acquisition, 20,* 189–211.

Asher, J., & Garcia, R. (1969). The optimal age to learn a foreign language. *Modern Language Journal, 53,* 334–341.

Ausubel, D. P. (1963). *The psychology of meaningful verbal learning*. New York: Grune & Stratten.

Ausubel, D. P. (1967). *Learning theory and classroom practice*. Toronto: The Ontario Institute for Studies in Education.

Ausubel, D. P., Novak, J. D., & Hanesian, H. (1978). *Educational psychology: A cognitive view* (2nd ed.). New York: Holt, Rinehart, & Winston.

Ausubel, D. P., & Robinson, F. G. (1969). *School learning: An introduction to educational psychology*. New York: Holt, Rinehart, & Winston.

Baker, C. L. (1979). Syntactic theory and the projection problem. *Linguistic Inquiry, 10,* 533–581.

Baker, P., & Corne, C. (1982). *Isle de France creole: Affinities and origins*. Ann Arbor, MI: Karoma.

Banu, R. (1986). Child vs. adult in second language acquisition: Some reflections. *WATESOL Working Papers, 3.* [ERIC Document Reproduction Service No. ED 274 207]

Baptista, B., & da Silva Filho, J. (1997). The influence of markedness and syllable contact on the production of English final consonants by EFL learners. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 26–34). Klagenfurt, Austria: University of Klagenfurt.

Basson, S. H. (1986). *Patterns of pronunciation errors in English by native Japanese and Hebrew speakers: Interference and simplification processes. Dissertation Abstracts International,* A: The Humanities and Social Sciences, 47, 4, Cct, 1113-A.

Bayley, R., & Preston, D. R. (Eds.), *Second language acquisition and linguistic variation* (pp. 245–252). Amsterdam: John Benjamins.

Beckman, M. E. & Ayers, G. M. (1994). Guidelines for ToBI labeling (Version 2.0) [computer software]. Columbus: Ohio State University, Department of Linguistics.

Beebe, L. M. (1980). Sociolinguistic variation and style shifting in second language acquisition. *Language Learning, 30,* 433–447.

Beebe, L. M., & Giles, H. (1984). Speech accommodation theory: A discussion in terms of second-language acquisition. *International Journal of the Sociology of Language, 46,* 5–32.

Benson, B. (1988). Universal preference for the open syllable as an independent process in interlanguage phonology. *Language Learning, 38,* 221–242.

Bergman, C. (1976). Interference vs. dependent development in infant bilingualism. In G. Keller, R. Teschner, & S. Viera (Eds.), *Bilingualism in the bicentennial and beyond* (pp. 86–96). New York: Bilingual Press.

Bertoncini, J., Bijeljac-Babic, R., Blumstein, S. E., & Mehler, J. (1987). Discrimination in neonates of very short CVs. *Journal of the Acoustical Society of America, 82,* 31–37.

Best, C. T. (1994). The emergence of language-specific phonemic influences in infant speech perception: The transition from speech sounds to spoken words. In J. C. Goodman & H. C. Nusbaum (Eds.), *The Development of speech perception: The transition from speech sounds to spoken words* (pp. 167–224). Cambridge, MA: MIT Press.

Best, C. T. (1995). A direct-realist view of cross-language speech perception. In W. Strange (Ed.), *Speech perception and linguistic experience: Theoretical and methodological issues* (pp. 171–204). Timonium, MD: York Press.

Best, C. W., & McRoberts, G. W. (1989, April). *Phonological influence in infants' discrimination of two nonnative speech contrasts.* Paper presented at the Society for Research in Child Development, Kansas City, Kansas.

Best, C. T., McRoberts, G. W., Goodell, E., Womer, J. S., Insabella, G., Kim, P., Klatt, L., Luke, S., & Silver, J. (1990, April). *Infant and adult perception of nonnative speech contrasts differing in relation to the listener's native phonology.* Paper presented at the International Conference on Infant Studies, Montreal.

Best, C. T., McRoberts, G. W., & Sithole, N. N. (1988). The phonological basis of perceptual loss for non-native contrasts: Maintenance of discrimination among Zulu clicks by English-speaking adults and infants. *Journal of Experimental Psychology: Human Perception and Performance, 14,* 345–360.

Bialystok, E., & Hakuta, K. (1999). Confounded age: Linguistic and cognitive factors in age differences for second language acquisition. In D. Birdsong (Ed.), *Second language acquisition and the critical period hypothesis* (pp. 161–181). Mahwah, NJ: Lawrence Erlbaum Associates.

Bickerton, D. (1981). *Roots of language.* Ann Arbor, MI: Karoma.

Bickerton, D. (1984). The language bioprogram hypothesis. *The Behavioral and Brain Sciences, 7,* 173–221.

Bickerton, D. (1988). Creole languages and the bioprogram. In F. J. Newmeyer (Ed.), *Linguistics: The Cambridge survey* (pp. 264–267). Cambridge: Cambridge University Press.

Bilá, M. (1997). Durations of syllables and rhythm in oral production of Slovak teacher trainees. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 35–37). Klagenfurt, Austria: University of Klagenfurt.

Birdsong, D. (Ed.). (1999). *Second language acquisition and the critical period hypothesis*. Mahwah, NJ: Lawrence Erlbaum Associates.

Bley-Vroman, R. (1989). What is the logical problem of foreign language learning? In S. Gass & J. Schachter (Eds.), *Linguistic perspectives on second language acquisition* (pp. 41–68). Cambridge: Cambridge University Press.

Bley-Vroman, R. (1990). The logical problem of foreign language learning. *Linguistic Analysis, 20,* 3–49.

Bley-Vroman, R., & Chaudron, C. (1988). Review essay: A critique of Flynn's parameter-setting model of second language acquisition. *UHWPESL 7 (1),* 67–107.

Bley-Vroman, R., Felix, S., & Ioup, G. (1988). The accessibility of universal grammar in adult language learning. *Second Language Research, 4,* 1–32.

Bohn, O.-S. (1995). Cross-language speech perception in adults: First language transfer doesn't tell it all. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-linguistic research* (pp. 279–303). Timonium, MD: York Press.

Bohn, O. –S, & Flege, J. E. (1990). Perception and production of a new vowel category by adult second language learners. In J. Leather & A. James (Eds.), *New Sounds 90: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 37–56). Amsterdam: University of Amsterdam.

Bohn, O. –S, & Flege, J. E. (1992). The production of new and similar vowels by adult German learners of English. *Studies in Second Language Acquisition, 14,* 131–158.

Bohn, O.-S., & Flege, J. E. (1993). Perceptual switching in Spanish/English bilinguals. *Journal of Phonetics, 21,* 267–290.

Bongaerts, T. (1999). Ultimate attainment in L2 pronunciation: The case of very advance late L2 learners. In D. Birdsong (Ed.), *Second language acquisition and the critical period hypothesis* (pp. 133-159). Mahwah, NJ: Lawrence Erlbaum Associates.

Bongaerts, T., Planken, B., & Schils, E. (1995). Can late starters attain a native accent in a foreign language? A test of the Critical Period Hypothesis. In D.

Singleton & Z. Lengyel (Eds.), *The age factor in second language acquisition: A critical look at the critical period hypothesis* (pp. 30–50). Clevedon, England: Multilingual Matters.

Bongaerts. T., Van Summeren, C., Planken, B., & Schils, E. (1997). Age and ultimate attainment in the pronunciation of a foreign language. *Studies in Second Language Acquisition, 19,* 447–465.

Borrell, A. (1996). Systematisation des erreurs de production et donc de perception chez les apprenants etrangers. [Foreign learners' production and perception errors systematization] *Revue de Phonetique Appliquée, 118–119,* 1–16.

Brière, E. (1966). An investigation of phonological interference. *Language, 42,* 768–796.

Brière, E. (1968). *A psycholinguistic study of phonological interference.* The Hague: Mouton.

Broeders, A. (1982). Engels in Nederlandse oren: Uitspraakvoorkeur bij Nederlandse studenten Engels [English in Dutch Ears: Pronunciation preference in Dutch students of English]. *Toegepaste Taalkunde in Artikelen 9,* 127–128.

Broselow, E. (1983). Non-obvious transfer: On predicting epenthesis errors. In S. M. Gass & L. Selinker (Eds.), *Language transfer in language learning* (pp. 269–280). Rowley, MA: Newbury House.

Broselow, E. (1984). An investigation of transfer in second language phonology. *International Review of Applied Linguistics, 22,* 253–269.

Broselow, E., Chen, S-I., & Wang, C. (1998). The emergence of the unmarked in second language phonology. *Studies in Second Language Acquisition, 20,* 261–280.

Broselow, E., & Finer, D. (1991). Parameter setting in second language phonology and syntax. *Second Language Research, 7,* 35–59.

Broselow, E., Hurtig, R. R., & Ringen, C. (1987). In G. Ioup & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 350–361). New York: Newbury House/Harper & Row.

Brown, H. D. (1980). The optimal distance model of second language acquisition. *TESOL Quarterly, 14,* 157–164.

Brown, H. D. (1994). *Principles of language learning and teaching (3rd ed.).* Englewood Cliffs, NJ: Prentice-Hall Regents.

Bruce, R. W. (1933). Conditions of transfer of training. *Journal of Experimental Psychology, 16,* 343–361.

Bugelski, B. R. (1942). Interferences with recall of original responses after learning new responses to old stimuli. *Journal of Experimental Psychology, 30,* 368–379.

Bunta, F. (1999). *Acquiring /ɛ/ and /æ/ by Hungarian ESL learners: A constraint-based approach to L2 segmental acquisition.* Unpublished master's thesis. Arizona State University, Tempe, AZ.

Burling, R. (1973). Language development of a Garo and English-speaking child. In A. Bar-Adon & W. Leopold (Eds.), *Child language: A book of readings* (pp. 170–184). Englewood Cliffs, NJ: Prentice-Hall.

Butters, R. R. (1987). Linguistic convergence in a North Carolina community. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 52–60). Stanford, CA: Department of Linguistics, Stanford University.

Caramazza, A., Yeni-Komshian, G. H., Zurif, E. B., & Carbone, E. (1973). The acquisition of a new phonological contrast: The case of stop consonants in French-English bilinguals. *Journal of the Acoustical Society of America, 54,* 421–428.

Carlisle, R. S. (1986). The influence of markedness on epenthesis in Spanish/English interlanguage phonology. *PALM, 2,* 88–96.

Carlisle, R. S. (1988). The effect of markedness on epenthesis in Spanish/English interlanguage phonology. *IDEAL, 3,* 15–23.

Carlisle, R. S. (1991a). The influence of environment on vowel epenthesis in Spanish/English interphonology. *Applied Linguistics, 12,* 76–95.

Carlisle, R. S. (1991b). The influence of syllable structure universals on the variability of interlanguage phonology. In A. D. Volpe (Ed.), *The seventeenth LACUS forum, 1990* (pp. 135–145). Lake Bluff, IL: Linguistic Association of Canada and the United States.

Carlisle, R. S. (1992). Environment and markedness as interacting constraints on vowel epenthesis. In J. Leather & A. James (Eds.), *New Sounds 92: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 64–75). Amsterdam: University of Amsterdam.

Carlisle, R. S. (1994). Markedness and environment as internal constraints on the variability of interlanguage phonology. In M. Yavaş (Ed.), *First and second language phonology* (pp. 223–249). San Diego, CA: Singular.

Carlisle, R. S. (1997). The modification of onsets in a markedness relationship: Testing the Interlanguage Structural Conformity Hypothesis. *Language Learning, 47,* 327–361.

Carlisle, R. S. (1998). The acquisition of onsets in a markedness relationship: A longitudinal study. *Studies in Second Language Acquisition, 20,* 245–260.

Carr, P. *Phonology.* (1993). New York: St. Martin's Press.

Castino, J. M. (1992). *Markedness as a predictor of difficulty in the second language acquisition of Spanish phonology.* Unpublished doctoral

dissertation, University of Pittsburgh, PA. Dissertation Abstracts International. May, 52:11, 3904A DAI No.: DA9209396.

Cebrian, J. (1997). Markedness and prosodic domain in the transferability of voicing rules in Catalan-English interlanguage. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 47–54). Klagenfurt, Austria: University of Klagenfurt.

Chabanova, J. (1997). *Strategies for teaching American English pronunciation to native Russian speakers.* Unpublished applied project, Arizona State University, Tempe.

Cheng, N. Y. (1929). Retroactive effect and degree of similarity. *Journal of Experimental Psychology, 12,* 444–449.

Chomsky, N., & Halle, M. (1968). *The sound pattern of English.* New York: Harper & Row.

Clahsen, H., & Muysken, P. (1986). The availability of universal grammar to adult and child learners: A study of the acquisition of the German word order. *Second Language Research, 2,* 93–119.

Clarke, S. (1987). Dialect mixing and linguistic variation in a non-overtly stratified society. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 74–85). Stanford, CA: Department of Linguistics, Stanford University.

Clements, G. N., & Hume, E. V. (1995). The internal organization of speech sounds. In J. Goldsmith (Ed.), *The handbook of phonological theory* (pp. 245–306). New York: Blackwell.

Clements, G. N., & Keyser, S. (1983). *CV phonology: A generative theory of the syllable.* Cambridge, MA: MIT Press.

Clyne, M. (1972). *Perspectives on language contact.* Melbourne, Australia: Hawthorn.

Clyne, M. (1980). Typology and grammatical convergence among related languages in contact. *Review of Applied Linguistics, 49,* 21–35.

Coates, J. (1986). *Pronunciation and personality.* Bochum, West Germany: AKS-Verlag.

Collins, B. & Mees, I. M. (1995). Approaches to articulatory setting in foreign language teaching. In J. Windsor Lewis (Ed.), *Studies in general and English phonetics: Essays in honour of Professor J. D. Connor* (pp. 415–424). London: Routledge.

Conrad, B. K. (1992). *The relationship between empathy and pronunciation ability: A study of elementary level college students of German as a foreign language.* Unpublished doctoral dissertation, University of Texas at Austin.

Contreras, H. (1961). *The phonological system of a bilingual child.* Unpublished doctoral dissertation, Indiana University, Bloomington.

Cook, V. (1993). *Linguistics and second language acquisition.* New York: St. Martin's Press.

Corder, S. P. (1967). The significance of learner's errors. *International Review of Applied Linguistics, 5,* 161–170.

Corder, S. P. (1971). Idiosyncratic dialects and error analysis. *International Review of Applied Linguistics, 9,* 147–159.

Cruttenden, A. (1997). *Intonation* (2nd ed.). Cambridge: Cambridge University Press.

Cruz-Ferreira, M. (1987). Non-native interpretive strategies for intonational meaning: An experimental study. In A. James & J. Leather (Eds.), *Sound patterns in second language acquisition* (pp. 103–120). Dordrecht, The Netherlands: Foris.

Curtiss, S. (1974). The linguistic development of Genie. *Language, 50,* 528–554

Curtiss, S. (1977). *Genie: A psycholinguistic study of a modern-day "wild child."* New York: Academic Press.

Dalton-Puffer, C., Kaltenboeck, G., & Smit, U. (1997). Learner attitudes and L2 pronunciation in Austria. *World Englishes, 16,* 115–128.

de Bot, K. (1994). The transfer of intonation and the missing data base. In E. Kellerman & M. Sharwood Smith (Eds.), *Crosslinguistic influence in second language acquisition.* Elmsford, NY: Pergamon Press.

de Boysson-Bardies, B., & Vihman, M. M. (1991). Adaptation to language: Evidence from babbling and first words in four languages. *Language, 67,* 297–319.

de Boysson-Bardies, B., Halle, P., Sagart, L., & Durand, C. (1989). A cross-linguistic investigation of formants in babbling. *Journal of Child Language, 16,* 1–17.

DeGaytan, M. (1997). *A longitudinal study of the interlanguage phonology of a Haitian immigrant learning English as a second language.* Unpublished applied project, Arizona State University, Tempe.

de Jonge, C. E. (1996). *Interlanguage phonology: Perception and production.* Unpublished doctoral dissertation. Dissertation Abstracts International, p. 2658. Publications Number/Order Number: AAI9539993.

Delamere, T. (1996). The importance of interlanguage errors with respect to stereotyping by native speakers in their judgments of second language learners' performance. *System, 24,* 279–297.

Derwing, T., & Munro, M. J. (1997). Accent, intelligibility, and comprehensibility: Evidence from four L1s. *Studies in Second Language Acquisition, 19,* 1–16.

Dickerson, L. B. (1974). *Internal and external patterning of phonological variability in the speech of Japanese learners of English.* Unpublished doctoral dissertation, University of Illinois at Urbana.

Dickerson, L. B. (1975). The learner's interlanguage as a system of variable rules. *TESOL Quarterly, 9,* 401–407.

Dickerson, L. B., & Dickerson, W. B. . (1977). Interlanguage phonology: Current research and future directions. In S. P. Corder & E. Roulet (Eds.), *Actes du 5ème colloque de linguistique appliquée* (pp. 18–29). Neuchâtel, Switzerland: Faculté de Lettres.

Dickerson, W. B. (1976). The psycholinguistic unity of language learning and language change. *Language Learning, 26,* 215–231.

Dickerson, W. B. (1977). Language variation in applied linguistics. *ITL Review of Applied Linguistics, 35,* 43–66.

Donegan, P., & Stampe, D. (1979). The study of Natural Phonology. In D. A. Dinnsen (Ed.), *Current approaches to phonological theory* (pp. 126–173). Bloomington: Indiana University Press.

Dorian, N. C. (1973). Grammatical change in a dying dialect. *Language, 49,* 414–438.

Dorian, N. C. (1981). *Language death.* Philadelphia: University of Pennsylvania Press.

Dowd, J. L. (1985). *Phonological variation in L2 speech: The effects of emotional questions and field dependence/field independence on second language performance.* Unpublished doctoral dissertation.

Dreasher, L. M., & Anderson-Hsieh, J. (1990). Universals in interlanguage phonology: The case of Brazilian ESL learners. *Papers and Studies in Contrastive Linguistics, 26,* 69–92.

Dressler, W. U. (1972). On the phonology of language death. *Papers from the Chicago Linguistic Society, 8,* 448–457.

Dressler, W. U., & Wodak-Leodolter, R. (1977). *Language death.* The Hague, The Netherlands: Mouton.

Eckert, P. (1996). The whole woman: Sex and gender differences in variation. In Brenneis, D. & Macaulay, R. (Eds.), *The matrix of language: Contemporary linguistic anthropology* (pp. 116–137). Boulder, CO: Westview Press.

Eckman, F. R. (1977). Markedness and the contrastive analysis hypothesis. *Language Learning, 27,* 315–330.

Eckman, F. R. (1981). On predicting phonological difficulty in second language acquisition. *Studies in Second Language Acquisition, 4,* 18–30.

Eckman, F. R. (1984). Universals, typologies and interlanguage. In W. Rutherford (Ed.), *Language universals and second language acquisition* (pp. 79–105). Amsterdam: John Benjamins.

Eckman, F. R. (1985). Some theoretical and pedagogical implications of the Markedness Differential Hypothesis. *Studies in Second Language Acquisition, 7,* 289–307.

Eckman, F. R. (1991). The Structural Conformity Hypothesis and the acquisition of consonant clusters in the interlanguage of ESL learners. *Studies in Second Language Acquisition, 13,* 23–41.

Eckman, F. R. (1994). The competence-performance issue in second-language acquisition theory: A debate. In E. Tarone, S. Gass, & A. Cohen (Eds.), *Research methodology in second language acquisition* (pp. 3–15). Hillsdale, NJ: Lawrence Erlbaum Associates.

Eckman, F. R., & Iverson, G. K. (1993). Sonority and markedness among onset clusters in the interlanguage of ESL learners. *Second Language Research, 9,* 234–252.

Eckman, F. R., & Iverson, G. K. (1994). Pronunciation difficulties in ESL: Coda consonants in English interlanguage. In M. Yavaş (Ed.), *First and second language phonology* (pp. 251–265). San Diego, CA: Singular.

Eckman, F. R., & Iverson, G. K. (1997). Structure preservation in interlanguage phonology. In S. J. Hannahs, & M. Young-Scholten (Eds.), *Focus on phonological acquisition* (pp. 183–207). Amsterdam: John Benjamins.

Edge, B. A. (1991). The production of word-final voiced obstruents in English by L1 speakers of Japanese and Cantonese. *Studies in Second Language Acquisition, 13,* 377–393.

Edwards, M. L., & Shriberg, L. D. (1983). *Phonology: Applications in communicative disorders.* San Diego: College Hill Press.

Eimas, P. D. (1974). Auditory and linguistic processing of cues for place of articulation by infants. *Perception and Psychophysics, 16,* 513–521.

Eimas, P. D. (1975). Speech perception in early infancy. In B. Cohen & P. Salapatek (Eds.), *Infant perception* (Vol. 2, pp. 193–231). New York: Academic Press.

Eimas, P. D. (1986). The perception of speech in early infancy. In W. S. Wang (Ed.), *Language, writing, and the computer (Readings from Scientific American)* (pp. 17–23). New York: Freeman.

Elliott, A. R. (1995). Foreign language phonology: Field independence, attitude, and the success of formal instruction in Spanish pronunciation. *Modern Language Journal, 79,* 530–542.

Ellis, N. C. (1996). Sequencing in SLA: Phonological memory, chunking, and points of order. *Studies in Second Language Acquisition, 18,* 91–126.

Ellis, N. C., & Schmidt, R. W. (1997). Morphology and longer distance dependencies. *Studies in Second Language Acquisition, 19,* 145–171.

Ellis, R. (1994). *The study of second language acquisition.* Oxford: Oxford University Press.

Elman, J., Diehl, R., & Buchwald, S. (1977). Perceptual switching in bilinguals. *Journal of the Acoustical Society of America, 62,* 971–974.

Enomoto, K. (1992). Interlanguage phonology: The perceptual development of durational contrasts by English-speaking learners of Japanese. *Edinburgh Working Papers in Applied Linguistics, 3,* 25–35.

Erazmus, E. T. (1984). Teaching the phonology via articulatory settings. *American Language Journal, 2,* 48–62.

Escure, G. (1987). The acquisition of Putonghua (Mandarin) by speakers of the Wuhan dialect. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 121–136). Stanford, CA: Department of Linguistics, Stanford University.

Esling, J., & Wong, R. F. (1983). Voice quality settings and the teaching of pronunciation. *TESOL Quarterly, 17,* 89–95.

Eubank, L. (1994a). Optionality and the initial state in L2 development. In T. Hoekstra & B. Schartz (Eds.), *Language acquisition studies in generative grammar* (pp. 369–388). Amsterdam: John Benjamins.

Eubank, L. (1994b). Towards an explanation for the late acquisition of agreement in L2 English. *Second Language Research, 10,* 84–93.

Eubank, L., & Gregg, K. (1999). Critical periods and (second) language acquisition: Divide et impera. In D. Birdsong (Eds.), *Second language acquisition and the critical period hypothesis* (pp. 65–99). Mahwah, NJ: Lawrence Erlbaum Associates.

Eviatar, Z., Leikin, M., & Ibrahim, R. (1999). Phonological processing of second language phonemes: A selective deficit in a bilingual aphasic. *Language Learning, 49,* 121–141.

Fantini, A. (1985). *Language acquisition of a bilingual child: A sociolinguistic perspective.* Clevedon, England: Multilingual Matters.

Ferguson, C. A. (1963). Linguistic theory and language learning. In R. DiPietro (Ed.), *Georgetown University Round Table on languages and linguistics 1963* (pp. 115–124). Washington, DC: Georgetown University.

Ferguson, C. A. (1989). Language teaching and theories of language. In J. E. Alatis (Ed.), *Georgetown University Round Table on languages and linguistics 1989* (pp. 81–88). Washington, DC: Georgetown University.

Fischer, J. L. (1958). Social influences on the choice of a linguistic variant. *Word, 14,* 47–56.

Flege, J. E. (1987a). A critical period for learning to pronounce foreign languages. *Applied Linguistics, 8,* 162–177.

Flege, J. E. (1987b). The production of "new" and "similar" phones in a foreign language: Evidence for the effect of equivalence classification. *Journal of Phonetics, 15,* 47–65.

Flege, J. E. (1987c). Effects of equivalence classification on the production of foreign language speech sounds. In A. James & J. Leather (Eds.), *Sound patterns in second language acquisition* (pp. 9–39). Dordrecht, The Netherlands: Foris.

Flege, J. E. (1988a). Factors affecting degree of perceived foreign accent in English sentences. *Journal of the Acoustical Society of America, 84,* 70–79.

Flege, J. E. (1988b). The production and perception of foreign language speech sounds. In H. Winitz (Ed.), *Human communication and its disorders* (pp. 224–401). Norwood, NJ: Ablex.

Flege, J. E. (1990). English vowel production by Dutch talkers: More evidence for the "similar" vs. "new" distinction. In J. Leather & A. James (Eds.), *New Sounds 90: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 255–293). Amsterdam: University of Amsterdam.

Flege, J. E. (1991). Age of learning affects the authenticity of voice onset time (VOT) in stop consonants produced in a second language. *Journal of the Acoustical Society of America, 89,* 395–411.

Flege, J. E. (1992). The intelligibility of English vowels spoken by British and Dutch talkers. In R. D. Kent (Ed.), *Intelligibility in speech disorders: Theory, measurement, and management* (Vol. 1, pp. 157–232). Philadelphia: John Benjamins.

Flege, J. E. (1993). Production and perception of a novel, second language phonetic contrast. *Journal of the Acoustical Society of America, 93,* 1589–1608.

Flege, J. E. (1995). Second language speech learning: Theory, findings, and problems. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-linguistic research* (pp. 233–277). Timonium, MD: York Press.

Flege, J. E., & Davidian, R. (1984). Transfer and developmental processes in adult foreign language speech production. *Applied Psycholinguistics, 5,* 323–347.

Flege, J. E., Bohn, O.-S., & Jang, S. (1997). Effects of experience on non-native speakers' production and perception of English vowels. *Journal of Phonetics, 25,* 437–470.

Flege, J. E., Frieda, E. M., & Nozawa, T. (1997). Amount of native language (L1) use affects the pronunciation of an L2. *Journal of Phonetics, 25,* 169–186.

Flege, J. E., Frieda, E. M., Walley, A. C., & Randazza, L. A. (1998). Lexical factors and segmental accuracy in second language speech production. *Studies in Second Language Acquisition, 20,* 155–187.

Flege, J. E., Munro, M. J., & Fox, R. A. (1994). Auditory and categorical effects on cross language vowel perception. *Journal of the Acoustical Society of America, 95,* 3623–3641.

Flege, J. E., Munro, M. J., & MacKay, I. R. (1995). Effects of age of second language learning on the production of English consonants. *Speech Communication, 16,* 1–26.

Flege, J. E., Takagi, N. & Mann, V. (1996). Lexical familiarity and English-language experience affect Japanese adults' perception of /ɹ/ and /l/. *Journal of the Acoustical Society of America, 99,* 1161–1173.

Flores, B. C. (1993). On the acquisition of English rhythm: Theoretical and practical issues. *Lenguas Modernas, 20,* 151–164.

Flores, B., & Rodrigues, X. (1994). The influence of language transfer on consonant cluster production. *Revista de Filologia y Linguistica de la Universidad de Costa Rica, 20,* 99–112.

Flynn, S. (1987). *A parameter-setting model of L2 acquisition.* Dordrecht, The Netherlands: Reidel.

Flynn, S., & Lust, B. (1990). In defense of parameter-setting in L2 acquisition: A reply to Bley-Vroman and Chaudron '90. *Language Learning, 40,* 419–449.

Fox, R. A., Flege, J. E., & Munro, M. J. (1995). The perception of English and Spanish vowels by native English and Spanish listeners: A multidimensional scaling analysis. *Journal of the Acoustical Society of America, 97,* 2540–2551.

French, N., & Steinberg, J. (1946). Factors governing intelligibility of speech sounds. *Journal of the Acoustical Society of America, 19,* 90–119.

Gagné, R. M. (1977). *The conditions of learning* (3rd ed.). New York: Holt, Rinehart, & Winston.

Ganong, W. F. (1980). Phonetic categorization in auditory word perception. *Journal of Experimental Psychology: Human Perception and Performance, 6,* 110–125.

Gardner, R. C., Day, J. B., & MacIntyre, P. D. (1992). Integrative motivation, induced anxiety, and language learning in a controlled environment. *Studies in Second Language Acquisition, 14,* 197–214.

Gardner, R. C., & Lambert, W. E. (1972). *Attitudes and motivation in second language learning.* Rowley, MA: Newbury House.

Gardner, R. C., & MacIntyre, P. D. (1991). An instrumental motivation language study: Who says it isn't effective? *Studies in Second Language Acquisition, 13,* 57–72.

Gass, S. M. (1997). *Input, interaction, and the second language learner.* Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S. M., & Selinker, L. (Eds.). (1983). *Language transfer in language learning.* Rowley, MA: Newbury House.

Gass, S. M., & Selinker, L. (Eds.). (1992). *Language transfer in language learning.* Amsterdam: John Benjamins.

Gass, S. M., & Selinker, L. (in press). *Second language acquisition: An introductory course* (2nd ed.). Mahwah, NJ: Lawrence Erlbaum Associates.

Gass, S. M., & Varonis, E. (1984). The effect on familiarity on the comprehensibility on nonnative speech. *Language Learning, 34,* 65–89.

Gatbonton, E. (1975). *Systematic variations in second language speech: a sociolinguistic study.* Unpublished doctoral dissertation, McGill University, Montreal.

Gatbonton, E. (1978). Patterned phonetic variability in second-language speech: A gradual diffusion model. *Canadian Modern Language Review, 34,* 335–347.

Geschwind, N. (1970). The organization of language and the brain. *Science, 179,* 940–944.

Giannini, S., & Costamagna, L. (1997). Language learning strategies in interlanguage phonology of Italian as L2. A case history: The acquisition of consonant length. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 96–103). Klagenfurt, Austria: University of Klagenfurt.

Gierut, J. A. (1986). *On the relationship between phonological knowledge and generalization learning in misarticulating children.* Bloomington: Indiana University Linguistics Club.

Giles, H. (1973). Accent mobility: A model and some data. *Anthropological Linguistics, 15,* 247–252.

Giles, H., & Johnson, P. (1987). Ethnolinguistic identity theory: A social psychological approach to language maintenance. *International Journal of the Sociology of Language, 68,* 69–100.

Giles, H., Mulac, A., Bradac, J. J., & Johnson, P. (1987). Speech accommodation theory: The first decade and beyond. In M. L. McLaughlin (Ed.), *Communication yearbook 10* (pp. 13–48). Beverly Hills: Sage.

Givón, T. (1984). Universals of discourse structure and second language acquisition. In W. Rutherford (Ed.), *Language universals and second language acquisition* (pp. 109–136). Amsterdam: John Benjamins.

Goldsmith, J. A. (1976). *Autosegmental phonology.* Bloomington: Indiana University Linguistics Club.

Goldsmith, J. A. (1979). *Autosegmental phonology.* New York: Garland.

Goldsmith, J. A. (1990). *Autosegmental and metrical phonology.* Cambridge, MA: Basil Blackwell.

Goldstein, H. (1983). Word recognition in a foreign language: A study of speech perception. *Journal of Psycholinguistic Research, 12,* 417–427.

Gordon, H. W. (1980). Cerebral organization in bilinguals. *Brain and Language, 9,* 225–268.

Greenberg, J. (1966). *Language universals.* The Hague, The Netherlands: Mouton.

Greenberg, J. (1978). Some generalizations concerning initial and final consonant clusters. In J. Greenberg, C. Ferguson, & E. Moravcsik (Eds.), *Universals of human language* (Vol. 2, pp. 243–279). Stanford, CA: Stanford University Press.

Gregg, K. (1990). The Variable Competence Model of second language acquisition and why it isn't. *Applied Linguistics, 11,* 364–383.

Guiora, A. Z. (1992). The two faces of language ego: A psycholinguistic perspective. *Interface, 7,* 19–29.

Guiora, A. Z., Acton, W. R., Erard, R., & Strickland, F. W. (1980). The effects of benzodiazepine (Valium) on permeability of language ego boundaries. *Language Learning, 2,* 111–130.

Guiora, A. Z., Beit-Hallami, B., Brannon, R. C. L., Dull, C. Y., & Scovel, T. (1972). The effects of experimentally induced changes in ego states on pronunciation ability in second language: An exploratory study. *Comprehensive Psychiatry, 30,* 351–364.

Guiora, A. Z., Brannon, R. C. L., & Dull, C. Y. (1972). Empathy and second language learning. *Language Learning, 22,* 111–130.

Guiora, A. Z., Paluszny, M., Beit-Hallami, B., Catford, J. C., Cooley, R. E. & Yoder-Dull, C. (1975). Language and person: Studies in language behavior. *Language Learning, 25,* 43–61.

Guiora, A. Z., & Schronberger, R. (1990). Native pronunciation of bilinguals. In J. Leather & A. James (Eds), *New Sounds 90: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 26–36). Amsterdam: University of Amsterdam.

Gussenhoven, C. (1979). *Pronunciation preference among Dutch students.* Paper presented at the Second International Conference on the Teaching of Spoken English, University of Leeds, England.

Gussenhoven, C., & Jacobs, H. (1998). *Understanding phonology.* New York: Oxford University Press.

Haas, M. (1944). Men's and women's speech in Koasati. *Language, 20,* 142–149.

Haeri, N. (1987). Male/female differences in speech: An alternative interpretation. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 173–182). Stanford, CA: Department of Linguistics, Stanford University.

Halle, M., & Clements, G. N. (1983). *Problem book in phonology: a workbook for introductory courses in linguistics in modern phonology.* Cambridge: MIT Press.

Hammarberg, B. (1988). *Studien zur Phonologie des Zweitsprachenerwerbs.* [Studies in the phonology of second language acquisition]. *(Acta Universitatis Stockholmiensis, Stockholmer Germanistische Forschungen 38.)* Stockholm: Amqvist & Wiksell International.

Hammarberg, B. (1993). The course of development in second language phonology acquisition: A natural path or strategic choice? In K. Hyltenstam & Å. Viberg (Eds.), *Progression and regression in language: Sociocultural, neuropsychological, and linguistic perspectives* (pp. 439–462). Cambridge: Cambridge University Press.

Hammarberg, B. (1997). Conditions on transfer in second language phonology acquisition. In A. James & J. Leather (Eds.), *Second language speech: Structure and process* (pp. 161-180). Berlin/New York: Mouton de Gruter.

Hammond, M. (1997). Optimality Theory and prosody. In D. Archangeli & D. T. Langendoen (Eds.), *Optimality Theory: An overview* (pp. 33–58). Malden, MA/Oxford, England: Blackwell.

Hammond, R. M. (1990). Pronunciation proficiency and the affective filter attitudes and stereotypes in second language acquisition. *Mid-America Linguistics Conference Papers,* 138–150.

Hancin-Bhatt, B. (1992). Towards a formal model of second language phonology: Phonological theory and connectionism. *PALM, 7,* 61–81.

Hancin-Bhatt, B. (1994). Segment transfer: A consequence of a dynamic system. *Second Language Research, 10,* 241–269.

Hancin-Bhatt, B. & Bhatt, R. M. (1997). Optimal L2 syllables: Interactions of transfer and developmental effects. *Studies in Second Language Acquisition, 19,* 331–378.

Hardison, D. (1996). Bimodal speech perception by native and nonnative speakers of English: Factors influencing the McGurk effect. *Language Learning, 46,* 3–73.

Haugen, E. (1956). *Bilingualism in the Americas: A bibliography and research guide.* Baltimore: American Dialect Society.

Hawkins, P. (1984). *Introducing phonology.* London: Hutchinson.

Hecht, B. F., & Mulford, R. (1982). The acquisition of a second language phonology: interaction of transfer and developmental factors. *Applied Psycholinguistics, 3,* 313–328.

Hiang, T. C., & Gupta, A. F. (1992). Postvocalic /r/ in Singapore English. *York Papers in Linguistics, 16,* 139–152.

Hill, J. (1970. Foreign accents, language acquisition, and cerebral dominance revisited. *Language Learning, 20,* 237–248

Hinton, L. (1987). Sound change on purpose: A study of Highland Mixtec. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 197–211). Stanford, CA: Department of Linguistics, Stanford University.

Hodne, B. (1985). Yet another look at interlanguage phonology: The modification of English syllable structure by native speakers of Polish. *Language Learning, 35,* 405–422.

Hodson, B. W., & Edwards, M. L. (1997). *Perspectives in applied phonology.* Gaithersburg, MD: Aspen.

Holden, K. T. (1993). The emotive impact of foreign intonation: An experiment in switching English and Russian intonation. *Language and Speech, 36,* 67–88.

Hong, S-Y. (1997). The acquisition of consonant clusters by native speakers of Korean. Unpublished applied project, Arizona State University, Tempe.

Hoogshagen, S. (1959). Three contrastive vowel lengths in Mixe. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationforschung, 12,* 111–115.

Huebner, T. (1991). Second language acquisition: Litmus test for linguistic theory? In T. Huebner & C. Ferguson (Eds.), *Crosscurrents in second language acquisition and linguistic theories* (pp. 3–22). Amsterdam & Philadelphia: John Benjamins.

Husby, O. (1997). Rhythmical features in Norwegian spoken by Vietnamese. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 144–153). Klagenfurt, Austria: University of Klagenfurt.

Hyams, N. M. (1985). *Language acquisition and the theory of parameters.* Dordrecht, The Netherlands: Reidel.

Hyltenstam, K., & Viberg, Å. (Eds). (1993). *Progression and regression in language: Sociocultural, neuropsychological, and linguistic perspectives.* Cambridge: Cambridge University Press.

Hyman, L. (1975). *Phonology: Theory and analysis.* New York: Holt, Rinehart, & Winston.

Imedadze, N. V. (1967). On the psychological nature of child speech formation under condition of exposure to two languages. *International Journal of Psychology, 2,* 129–132.

Ingram, D. (1990). Toward a theory of phonological acquisition. In J. F. Miller (Ed.), *Research on child language disorders* (pp. 55–72). Austin, TX: Pro-Ed.

Ioup, G., Boustangui, E., El Tigi, M., & Moselle, M. (1994). Reexamining the critical period hypothesis: A case study of successful adult SLA in a naturalistic environment. *Studies in Second Language Acquisition, 16,* 73–98.

Jakobson, R. (1941). *Kindersprache, Aphasie, und Allgemeine Lautgestze.* Translated 1968 as *Child language, aphasia, and phonological universals* (A. R. Keiler, Trans.). The Hague: Mouton.)

James, A. R. (1983). Transferability and dialect phonology: Swabian: Swabian English. In A. James & B. Kettemann (Eds), *Dialektphonologie und Fremdsprachenerwerb* [*Dialect phonology and foreign language acquisition*] (pp. 162–188). Tübingen, Germany: Narr.

James, A. R. (1986). *Suprasegmental phonology and segmental forms.* Tübingen, Germany: M. Niemeyer.

James, A. R. (1988). *The acquisition of a second language phonology: A linguistic theory of developing sound structures.* Tübingen, Germany: Gunter Narr Verlag Tübingen.

James, A. R. (1989). Linguistic theory and second language phonological learning: A perspective and some proposals. *Applied Linguistics, 10,* 367–381.

James, A. R. (1996). Second language phonology. In P. Jordens & J. Lalleman (Eds.), *Investigating second language acquisition* (pp. 293–320). Berlin: Mouton de Gruyter.

Jamieson, D. G., & Morosan, D. E. (1987). Training nonnative speech contrasts in adults: Acquisition of the English /ə/ – /ø/ contrast by Francophones. *Perception and Psychophysics, 41,* 88–96.

Johansson, F. A. (1973). *Immigrant Swedish phonology.* Lund, Sweden: Gleerup.

Juffs, A. (1990). Tone, syllable structure and interlanguage phonology: Chinese learners' stress errors. *International Review of Applied Linguistics, 28,* 99–117.

Jusczyk, P. (1997). *The discovery of spoken language.* Cambridge, MA: MIT Press.

Kachru, B. B., & Nelson, C. L. (1996). World Englishes. In S. L. McKay & N. H. Hornberger (Eds.), *Sociolinguistics and language teaching* (pp. 71–102). Cambridge: Cambridge University Press.

Kaldor, S., & Malcolm, I. G. (1991). Aboriginal English—An overview. In S. Romaine (Ed.), *Language in Australia* (pp. 67–83). Cambridge: Cambridge University Press.

Kaltenbacher, E. (1997). German speech rhythm in L2 acquisition. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 158–166). Klagenfurt, Austria: University of Klagenfurt.

Kang, K.-Y. (1999). *The relationship of categorical perception of English phonemes to perception and production of English by Korean learners of English.* Unpublished applied project, Arizona State University, Tempe.

Karamarkovic, O. (1974). Correct pronunciation is conditioned by optimal hearing. *English Language Teaching Information, 4,* 62–67.

Kassai, I. (1990). Socio-Psycholinguistic notes on foreign accent. *Acta Linguistica Hungarica, 40,* 383–400.

Kaufman, D., & Aronoff, M. (1989a). Morphological disintegration and reconstruction in first language attrition. In H. W. Seliger & R. M. Vago (Eds.), *First language attrition: Structural and theoretical perspectives.* Cambridge: Cambridge University Press.

Kaufman, D., & Aronoff, M. (1989b). Morphological interaction between L1 and L2 in language attrition. In S. M. Gass & C. G. Madden (Eds.), *Variation in second language acquisition: Psycholinguistic issues.* Clevedon, England: Multilingual Matters.

Kellerman, E., & Sharwood Smith, M. (Eds.). (1986). *Cross-linguistic influence in second language acquisition.* New York: Pergamon Press.

Kenstowicz, M. (1994). *Phonology in generative grammar.* Oxford: Blackwell.

Kenyeres, A. (1938). Comment une petite Hongroise de sept ans apprend le français [How a little 7-year-old Hungarian girl learns French]. *Archives de Psychologie, 26,* 321–366.

Kim, E. (1994). *The production of new and similar sounds by Korean speakers of English.* Unpublished applied project, Arizona State University, Tempe.

Kiparsky, P. (1982). From cyclic to lexical phonology. In H. Van der Hulst & N. Smith (Eds.), *The structure of phonological representations* (pp. 131–175). Dordrecht, The Netherlands: Foris.

Klein, W. (1991). SLA theory: Prolegomena to a theory of language acquisition and implications for theoretical linguistics. In T. Huebner & C. Ferguson (Eds.), *Crosscurrents in second language acquisition and linguistic theories* (pp. 169–194). Amsterdam & Philadelphia: John Benjamins.

Kohler, K. (1971). On the adequacy of phonological theories for contrastive studies. In G. Nickel (Ed.), *Papers in contrastive linguistics* (pp. 83–88). Cambridge: Cambridge University Press.

Komar, S. (1997). Perception and production of the fall-rise tone by Slovene students of English. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 176–185). Klagenfurt, Austria: University of Klagenfurt.

Koster, C. J., & Koet, T. (1993). The evaluation of accent in the English of Dutchmen. *Language Learning, 43,* 69–92.

Krashen, S. (1973). Lateralization, language learning, and the critical period: Some new evidence. *Language Learning, 27,* 93–107.

Krashen, S. (1980). The input hypothesis. In J. Alatis (Ed.), *Current issues in bilingual education* (pp. 168–180). Washington, DC: Georgetown University Press.

Krashen, S. (1985). *The input hypothesis: Issues and implications*. New York: Longman.

Krashen, S. D. (1977). Some issues relating to the Monitor Model. In H. Brown, C. Yorio, & R. Crymes (Eds.), *On TESOL '77* (pp. 144–158). Washington, DC: TESOL.

Krashen, S. D. (1978). The Monitor Model for adult second language performance. In M. Burt, H. Dulay, & M. Finocchiaro (Eds.), *Viewpoints on English as a second language* (pp. 152–161). New York: Regents.

Labov, W. (1963). The social motivation of sound change. *Word, 19,* 273–309.

Labov, W. (1966). The social stratification of English in New York City. Arlington, VA: Center for Applied Linguistics.

Labov, W. (1969). The study of language in its social context. *Studium Generale, 23,* 30–87.

Labov, W. (1972). *Sociolinguistic patterns*. Philadelphia: University of Pennsylvania Press.

Labov, W. (1981). Resolving the Neogrammarian controversy. *Language, 57,* 267–309.

Labov, W. (1994). *Principles of linguistic change.* Oxford, England/Cambridge, MA: Blackwell.

Labov, W. (1996). Some notes on the role of misperception in language learning. In R. Bayley & D. R. Preston (Eds.), *Second language acquisition and linguistic variation* (pp. 245–252). Amsterdam: John Benjamins.

Ladefoged, P., & Maddieson, I. (1996). *The sounds of the world's languages*. Oxford, England: Blackwell.

Lado, R. (1957). *Linguistics across cultures.* Ann Arbor: University of Michigan Press.

Lado, R. (1964). *Language teaching: A scientific approach.* New York: McGraw-Hill.

Lamendella, J. (1977). General principles of neurofunctional organization and their manifestation in primary and non-primary language acquisition. *Language Learning, 27,*155–196.

Lane, H. L., & Schneider, B. (1963). *Methods for self-shaping echoic behavior. Modern Language Journal, 47,* 154–160.

Larsen-Freeman, D., & Long, M. H. (1991). *An introduction to second language research.* London & New York: Longman.

Lasky, R. F., Syrdal-Lasky, A., & Klein, R. E. (1975). VOT discrimination by four and six and a half month infants from Spanish environments. *Journal of Experimental Child Psychology, 20,* 215–225.

Lass, R. (1984). *Phonology: An introduction to basic concepts.* Cambridge: Cambridge University Press.

Leather, J. (1983). Speaker normalization in perception of lexical tone. *Journal of Phonetics, 11,* 373–382.

Leather, J. (1987). F0 pattern inference in the perceptual acquisition of second language tone. In A. James & J. Leather (Eds), *Sound patterns in second language acquisition* (pp. 59-80). Dordrecht, The Netherlands: Foris.

Leather, J. (1990). Perceptual and productive learning of Chinese lexical tone by Dutch and English speakers. In J. Leather & A. James (Eds.), *New Sounds 90: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 72–89). Amsterdam: University of Amsterdam.

Leather, J. (1991). Interrelation of perception and production in initial learning of second-language lexical tone. In *Actes du XIIème Congrès International des Sciences Phonétiques* (Vol. 5, pp. 138–141). Aix-en-Provence, France: Université de Provence.

Leather, J. (1997). Interrelation of perceptual and productive learning in the initial acquisition of second-language tone. In A. James & J. Leather (Eds.), *Second language speech: Structure and process* (pp. 75–101). Berlin/New York: Mouton de Gruter.

Leather, J., & James, A. (1991). The acquisition of second language speech. *Studies in Second Language Acquisition, 13,* 305–341.

Leather, J., & James, A. (1996). Second language speech. In W. C. Ritchie & T. K. Bhatia (Eds.), *Handbook of second language acquisition* (pp. 269–316). San Diego: Academic Press.

Leather, J., & James, A. (1997). *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech.* Klagenfurt, Austria: University of Klagenfurt.

Lee, J. P. (1994). *Age and acculturation as factors in phonological acquisition of English as a second language.* Unpublished doctoral dissertation.

Lee, M-J. (1997). *The acquisition of English liquids by native speakers of Korean.* Unpublished applied project, Arizona State University, Tempe.

Lee, S. K. (1997). *Child-adult differences in the auditory perception and pronunciation of foreign sounds.* Unpublished doctoral dissertation. Dissertation Abstracts International, A: The Humanities and Social Sciences, 57, 7, Jan, 2918-A.

Lehiste, I. (1966). *Consonant quality and phonological units in Estonian.* Bloomington: Indiana University.

Lehiste, I. (1970). *Suprasegmentals.* Cambridge, MA: MIT Press.

Lehiste, I. (1977). Isochrony reconsidered. *Journal of Phonetics, 5,* 253–263

Lenneberg, E. (1967). *Biological foundations of language.* New York: Wiley.

Leopold, W. (1939). *Speech development of a bilingual child: A linguist's record. Vol. 1: Vocabulary growth in the first two years.* Evanston, IL: Northwestern University Press.

Leopold, W. (1944). *Speech development of a bilingual child: A linguist's record. Vol. 2: Sound learning in the first two years.* Evanston, IL: Northwestern University Press.

Leopold, W. (1949a). *Speech development of a bilingual child: A linguist's record. Vol. 3: Grammar and general problems in the first two* years. Evanston, IL: Northwestern University Press.

Leopold, W. (1949b). *Speech development of a bilingual child: A linguist's record. Vol. 4: Diary from age two.* Evanston, IL: Northwestern University Press.

Lewis, P. (1994). *The acquisition of clicks by non-mother-tongue speakers.* RIES. (ERIC Document Reproduction Service No. ED 375 285).

Lisker, L., & Abramson, A. (1964). A cross-language study of voicing in initial stops. *Word, 20,* 384–422.

Lisker, L., & Abramson, A. S. (1970). The voicing dimension: Some experiments in comparative phonetics. In B. Hála, M. Romportal, & P. Janota (Eds.), *Proceedings of the 6th International Congress of Phonetic Sciences.* Prague: Academia.

Loewenthal, K., & Bull, D. (1984). Imitation of foreign sounds: What is the effect of age? *Language and Speech, 27,* 95–97.

Logan, J. S., Lively, S. E., & Pisoni, D. B. (1991). Training Japanese listeners to identify /r/ and /l/: A first report. *Journal of the Acoustical Society of America, 89,* 874–886.

Long, M. H. (1990). Maturational constraints on language development. *Studies in Second Language Acquisition, 12,* 251–285.

Luthin, H. W. (1987). The story of California (ow): The coming-of-age of English in California. In K. M. Denning, S. Inkelas, F. C. McNair-Knox, & J. R. Rickford (Eds.), *Variation in language NWAV-XV at Stanford: Proceedings of the fifteenth annual conference New Ways of Analyzing Variation* (pp. 312–324). Stanford, CA: Department of Linguistics, Stanford University.

MacKain, K. S., Best, C. T., & Strange, W. (1981). Categorical perception of English /r/ and /l/ by Japanese bilinguals. *Applied Psycholinguistics, 2,* 368–390.

Maddieson, I. (1984). *Patterns of sounds.* Cambridge: Cambridge University Press.

Major, R. C. (1977). Phonological differentiation of a bilingual child. *Ohio State University Working Papers in Linguistics, 22,* 88–122 (ERIC Document Reproduction Service No. ED 149 644).

Major, R. C. (1981). Stress-timing in Brazilian Portuguese. *Journal of Phonetics, 9,* 343–351.

Major, R. C. (1985). Stress and rhythm in Brazilian Portuguese. *Language, 61,* 259–282.

Major, R. C. (1986a). The Ontogeny Model: Evidence from L2 acquisition of Spanish *r. Language Learning,36,* 453–504.

Major, R. C. (1986b). Paragoge and degree of foreign accent in Brazilian English. *Second Language Research, 2,* 53–71.

Major, R. C. (1987a). English voiceless stop production by speakers of Brazilian Portuguese. *Journal of Phonetics, 15,* 197–202.

Major, R. C. (1987b). Phonological similarity, markedness, and rate of L2 acquisition. *Studies in Second Language Acquisition, 9,* 63–82.

Major, R. C. (1987c). *Variation in second language phonology.* Paper presented at the Eastern States Conference on Linguistics, Columbus, OH.

Major, R. C. (1987d). A model for interlanguage phonology. In G. Ioup & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 101–125). New York: Newbury House/Harper & Row.

Major, R. C. (1987e). The natural phonology of second language acquisition. In A. James & J. Leather (Eds.), *Sound patterns in second language acquisition* (pp. 207–224). Dordrecht, The Netherlands: Foris.

Major, R. C. (1988). Variation in second language phonology. In A. Miller & J. Powers (Eds.), *ESCOL '87: Proceedings of the fourth Eastern States Conference on Linguistics* (pp. 40–51). Columbus: Ohio State University.

Major, R. C. (1990). Phonological universals in second language variation. In H. Burmeister & P. Rounds (Eds.), *Proceedings of the tenth meeting of the Second Language Research Forum* (pp. 473–488). Eugene: University of Oregon.

Major, R. C. (1992). Losing English as a first language. *The Modern Language Journal, 76,* 190–208.

Major, R. C. (1993). Sociolinguistic factors in loss and acquisition of phonology. In K. Hyltenstam & Å. Viberg (Eds.), *Progression and regression in language: Sociocultural, neuropsychological, and linguistic perspectives* (pp. 463–478). Cambridge: Cambridge University Press.

Major, R. C. (1994). Chronological and stylistic aspects of second language acquisition of consonant clusters. *Language Learning, 44,* 655–680.

Major, R. C. (1995). Native and nonnative phonological representations. *International Review of Applied Linguistics in Language Learning, 33,* 143–161.

Major, R. C. (1996). Markedness in second language acquisition of consonant clusters. In R. Bayley & D. R. Preston (Eds.), *Variation linguistics and second language acquisition* (pp. 75–96). Amsterdam: John Benjamins.

Major, R. C. (1997a). L2 acquisition, L1 loss and the Critical Period Hypothesis. In A. James & J. Leather (Eds.), *Second language speech: Structure and process* (pp. 147–159). Berlin/New York: Mouton de Gruyer.

Major, R. C. (1997b). Further evidence for the Similarity Dissimilarity Rate Hypothesis. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 215–222). Klagenfurt, Austria: University of Klagenfurt.

Major, R. C. (1998). Interlanguage phonetics and phonology: An introduction. *Studies in Second Language Acquisition, 20,* 131–137.

Major, R. C. (2000). Male and female differences in second language phonology. In V. V. Buzhinsky & S. V. Pavlova (Eds.), *Contemporary issues in teaching phonetics and pronunciation* (pp. 96–107). Kursk, Russia: Kursk State Pedagogical University.

Major, R. C., & Faudree, M. C. (1996). Markedness universals and the acquisition of voicing contrasts in Korean speakers of English. *Studies in Second Language Acquisition, 18,* 69–90.

Major, R. C., & Fitzmaurice, S. M. (in press). *The effects of nonnative, regional, ethnic, and international accents on listening comprehension.* (TOEFL Monograph Series). Princeton, NJ: Educational Testing Service.

Major, R. C., Fitzmaurice, S. M., Bunta, F., & Balasubramanian, C. (in press). The effects of nonnative accents on listening comprehension: Implications for TOEFL. *TESOL Quarterly, 35.*

Major, R. C., & Kim, E. (1996). The Similarity Differential Rate Hypothesis. *Language Learning, 46,* 465–496.

Markham, D. (1997). *Phonetic imitation, accent, and the learner.* Lund: Lund University Press; Kent, England: Chartwell-Bratt.

Mayo, L. H., Florentine, M., & Buus, S. (1997). Age of second language acquisition and perception of speech in noise. *Journal of Speech and Hearing Research, 40,* 686–693.

McGeogh, J. A. (1942). *The psychology of human learning.* New York: Longmans, Green.

McGroarty, M. (1996). Language attitudes, motivation, and standards. In S. L. McKay & N. H. Hornberger (Eds.), *Sociolinguistics and language teaching* (pp. 3–46). Cambridge: Cambridge University Press.

McLaughlin, B. (1978). The monitor model: Some methodological considerations. *Language Learning, 28,* 309–332.

Mendes, F. M. (1991). Acquisition of second language pronunciation: The critical period. *CTJ Journal, 24,* 41–47.

Miller, G., & Nicely, P. (1955). An analysis of perceptual confusions among some English consonants. *Journal of the Acoustical Society of America, 27,* 338–352.

Milroy, L. (1988). Gender as a speaker variable: The interesting case of the glottalised stops in Tyneside. *York Papers in Linguistics 13: Selected papers from the sociolinguistics symposium.*

Miyawaki, K., Strange, W., Verbrugge, R. R., Liberman, A. M., Jenkins, J. J., & Fujimura, O. (1975). An effect of linguistic experience: The discrimination of [r] and [l] by native speakers of Japanese and English. *Perception & Psychophysics, 18,* 331–340.

Mossop, J. W. (1996). Markedness and fossilization in the interlanguage phonology of Brunei English. *World Englishes, 15,* 171–182.

Moulton, W. (1962). Toward a classification of pronunciation errors. *Modern Language Journal, 46,* 101–109.

Moyer, A. (1996). *Ultimate attainment in second language phonological acquisition: Evidence from adult learners of German.* Unpublished doctoral dissertation, University of Texas at Austin.

Moyer, A. (1999). Ultimate attainment in L2 phonology. *Studies in Second Language Acquisition, 21,* 81–108.

Munro, M. J. (1995). Nonsegmental factors in foreign accent: Ratings of filtered speech. *Studies in Second Language Acquisition, 17,* 17–34.

Munro, M. J. (1998a). The effects of speaking rate on listener evaluation of native and foreign-accented speech. *Language Learning, 48,* 159–182.

Munro, M. J. (1998b). The effects of noise on the intelligibility of foreign-accented speech. *Studies in Second Language Acquisition, 20,* 139–154.

Munro, M. J., & Derwing, T. (1995a). Foreign accent, comprehensibility, and intelligibility in the speech of second language learners. *Language Learning,* 45, 173–97.

Munro, M. J., & Derwing, T. (1995b). Processing time, accent, and comprehensibility in the perception of native and foreign-accented speech. *Language and Speech, 38,* 289–306.

Munro, M. J., & Derwing, T. (1997). Accent, intelligibility, and comprehensibility: evidence from four L1s. *Studies in Second Language Acquisition, 19,* 1–16.

Munro, M. J., Flege, J. E., & MacKay, I. R. (1996). The effects of age of second language learning on the production of English vowels. *Applied Psycholinguistics, 17,* 313–334.

Musau, P. M. (1993). Aspects of interphonology: The study of Kenyan learners of Swahili. Bayreuth, Germany: Bayreuth University.

Nagai, K. (1997). Mora timing by British learners of Japanese. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 240–248). Klagenfurt, Austria: University of Klagenfurt.

Nemser, W. (1971a). Approximative systems of foreign learners. *International Review of Applied Linguistics, 9,* 115–124.

Nemser, W. (1971b). *An experimental study of phonological interference in the English of Hungarians.* Bloomington: Indiana University Press.

Neufeld, G. G. (1979). Towards a theory of language learning ability. *Language Learning, 29,* 227–241.

Neufeld, G. G. (1980). On the adult's ability to acquire phonology. *TESOL Quarterly, 14,* 285–298.

Neufeld, G, G. (1988). Phonological asymmetry in second-language learning and performance. *Language Learning, 38,* 531–559.

Neufeld, G. G. (1997). Phonological asymmetry in L2 perception and production. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 257–261). Klagenfurt, Austria: University of Klagenfurt.

O'Grady, W., Dobrovolsky, M., & Aronoff, M. (1997). *Contemporary linguistics* (3rd ed.). New York: St. Martins.

Obrzut, J., Conrad, P., Bryden, M. P., & Boliek, C. (1988). Cued dichotic listening with right-handed, left-handed, and bilingual and learning disabled children. *Neuropsychologia, 26,* 199–131.

Odlin, T. (1989). *Language transfer: Cross-linguistic influence in language learning.* Cambridge: Cambridge University Press.

Oller, D. K., & Eilers, R. E. (1988). The role of audition in babbling. *Child Development, 59,* 441–449.

Oller, J. W., & Ziahosseiny, S. M. (1970). The contrastive analysis hypothesis and spelling errors. *Language Learning, 20,* 183–189.

Olson, L. L., & Samuels, S. J. (1973). The relationship between age and accuracy of pronunciation. *Journal of Educational Research, 66,* 262–268.

Osburne, A. G. (1996). Final consonant cluster reduction in English L2 speech: A case study of a Vietnamese speaker. *Applied Linguistics, 178,* 164–181.

Osgood, C. A. (1949). The similarity paradox in human learning: A resolution. *Psychological Review, 56,* 132–143.

Oyama, S., (1976). A sensitive period for the acquisition of non-native phonological system. Journal of *Psycholinguistic Research, 5,* 261–283.

Paik, Y.-J. (1977). Pronunciation difficulties of Korean students learning English as a second language. *Dhak Yonku, 13,* 177–189.

Paradis, M., & Lebrun, Y. (1983). *La Neurolinguistique du bilingualisme* [The neurolinguistics of bilingualism]. Paris: Larousse (Langages 72).

Parkinson, D. (1997). The acquisition of phonology in an Optimality Theoretic framework. *Cornell Working Papers in Linguistics, 15,* 282–308.

Parrondo-Rodrigues, A. (1997). Acquisition of syllable structure: A real case of subset-superset relationship? In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 262–265). Klagenfurt, Austria: University of Klagenfurt.

Patkowski, M. (1990). Age and accent in a second language: A reply to James Emil Flege. *Applied Linguistics, 11,* 73–89.

Patkowski, M. (1994). The critical age hypothesis and interlanguage phonology. In M. Yavaş (Ed.), *First and second language phonology* (pp. 205–221). San Diego: Singular.

Penfield, W. (1965). Conditioning the uncommitted cortex for language learning. *Brain, 88,* 787–798.

Pennington, M. C. (1992). Discourse factors in second language phonology: An exploratory study. In J. Leather & A. James (Eds.), *New Sounds 92: Proceedings of the Amsterdam Symposium on the Acquisition of Second-Language Speech* (pp. 137–155). Amsterdam: University of Amsterdam.

Petrenko, A. D. (1989). Stilistische Varianten der Aussprache im Fremdsprachenunterricht [Stylistic variants of pronunciation in second language instruction]. *Deutsch als Fremdsprache, 26,* 267–272.

Piazza-Gordon, D., & Zattore, R. J. (1981). A right ear advantage for dichotic listening in bilingual children. *Brain and Language, 13,* 389–396.

Pica, T. (1983). Adult acquisition of English as a second language under different conditions of exposure. *Language Learning, 33,* 465–497.

Pihko, M. K. (1994). Cross-linguistic intelligibility of native and non-native L2 speech varieties. *Korkeakoulujen Kielikeskuksen Tutkimuksia,* 1–135.

Pilleux, M. (1980). Lateralizacion cerebral y el aprendizaje de un idioma extranjero [Cerebral lateralization and the learning of a foreign language]. *RLA: Revista de Linguistica Teorica y Aplicada, 18,* 131–138.

Piper, T. (1984). Observations on the second-language acquisition of the English sound system. *Canadian Modern Language Review, 40,* 542–551.

Pisoni, D. B., Aslin, R. N., Perey, A. J., & Hennesy, B. L. (1982). Some effects of laboratory training on identification and discrimination of voicing contrasts in stop consonants. *Journal of Experimental Psychology: Human Perception and Performance, 8,* 297–341.

Polka, L. (1991). Cross-language speech perception in adults: Phonemic, phonetic, and acoustic contribution. *Journal of the Acoustical Society of America, 89,* 2961–2977.

Polka, L. (1992). Characterizing the influence of native experience on adults speech perception. *Perception and Psychophysics, 52,* 37–52.

Preston, D. R. (1989). *Sociolinguistics and second language acquisition.* Oxford: Blackwell.

Preston, D. R. (1996). Variationist perspectives on second language acquisition. In R. Bayley & D. R. Preston (Eds.), *Second language acquisition and linguistic variation* (pp. 1–45). Amsterdam: John Benjamins.

Prince, A., & Smolensky, P. (1993). *Optimality Theory: Constraint interaction in generative grammar.* Unpublished manuscript, Rutgers University, New Brunswick, NJ and University of Colorado, Boulder.

Prince, A., & Smolensky, P. (1997). Optimality: From neural networks to Universal Grammar. *Science, 275,* 1604–1610.

Purcell, E. T., & Suter, R. W. (1980). Predictors of pronunciation accuracy: A reexamination. *Language Learning, 30,* 271–287.

Rebello, J. T. (1997). The acquisition of initial /s/ clusters by Brazilian EFL learners. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 336–342). Klagenfurt, Austria: University of Klagenfurt.

Redard, F. (1973). *Contrastive phonemics: Notes and exercises.* Neuchâtel, Switzerland: Centre de Linguistique, Université de Neuchâtel.

Riney, T. J. (1989). Syllable structure and interlanguage phonology. *Kansas Working Papers in Linguistics, 14.* Lawrence: University of Kansas.

Riney, T. J., & Flege, J. E. (1998). Changes over time in global foreign accent and liquid identifiability and accuracy. *Studies in Second Language Acquisition, 20,* 213–243.

Riney, T. J., & Takagi, N. (1999). Global foreign accent and voice onset time in Japanese EFL learners. *Language Learning, 49,* 275–302.

Rissel, D. A. (1989). Sex, attitudes, and the assibilation of /r/ among young people in San Luis Potosi, Mexico. *Language Variation and Change, 1,* 269–283.

Roca, I., & Johnson, W. (1999). *A course in phonology.* Malden, MA: Blackwell.

Rochet, B. (1995). Perception and production of second language speech sounds by adults. In W. Strange (Ed.), *Speech perception and linguistic experience: Theoretical and methodological issues* (pp. 379–410). Timonium, MD: York Press.

Romaine, S. (1988). *Pidgin and creole languages.* London/New York: Longman.

Ronjat, J. (1913). *Le dévelopment du langage observé chez un enfant bilingue* [The development of language observed in a bilingual child]. Paris: Campion.

Roug, L., Landberg, I., & Lundberg, L.-J. (1989). Phonetic development in early infancy: A study of Swedish during the first 18 months of life. *Journal of Child Language, 16,* 19–40.

Sapir, E. (1949). The psychological reality of phonemes. In D. Mandelbaum (Ed.), *Selected writings of Edward Sapir in language, culture, and personality* (pp. 22-31). Berkeley: University of California Press. (Original work published 1933)

Sato, C. J. (1984). Phonological processes in second language acquisition: Another look at interlanguage syllable structure. *Language Learning, 34,* 43–57.

Sato, C. J. (1985). Task variation in interlanguage phonology. In S. M. Gass & C. G. Madden (Eds.), *Input in second language acquisition* (pp. 181–196). Rowley, MA: Newbury House.

Saxton, M. (1997). The Contrast Theory of negative input. *Journal of Child Language, 24,* 139–161.

Schachter, J. (1988). Second language acquisition and its relationship to Universal Grammar. *Applied Linguistics, 9,* 219–235.

Schmidt, A. M. (1982). Cross-language identification of consonants. Part 1. Korean perception of English. *Journal of the Acoustical Society of America, 99,* 3201–3211.

Schmidt, R. W. (1977). Sociolinguistic variation and language transfer in phonology. *Working Papers in Bilingualism, 12,* 79–95.

Schmidt, R. W. (1990). The role of consciousness in second language learning. *Applied Linguistics, 11,* 29–158.

Schmidt, R. W. (1992). Psychological mechanisms underlying second language fluency. *Studies in Second Language Acquisition, 14,* 357–385.

Schnitzer, M. L., & Krasinski, E. (1994). The development of segmental phonological production in a bilingual child. *Journal of Child Language, 21,* 585–622.

Schultz, R. W. (1960). Problem solving behavior and transfer. *Harvard Educational Review, 30,* 61–77.

Schumann, J. H. (1975). Affective factors and the problem of age in second language acquisition. *Language Learning, 25,* 209–235.

Schumann, J. H. (1976). Social distance as a factor in second language acquisition. *Language Learning, 26,* 135–143.

Schumann, J. H. (1978a). *The pidginization process: A model for second language acquisition.* Rowley, MA: Newbury House.

Schumann, J. H. (1978b). The acculturation model for L2 acquisition. In R. C. Gringas (Ed.), *Second language acquisition and foreign language teaching* (pp. 27–50). Arlington, VA: Center for Applied Linguistics.

Schumann, J. H. (1986). Research on the acculturation model for second language acquisition. *Journal of Multilingual and Multicultural Development, 7,* 379–392.

Schumann, J. H., Holroyd, J., & Campbell, R. N. (1978). Improvement of foreign language pronunciation under hypnosis: A preliminary study. *Language Learning, 28,* 143–148.

Scovel, T. (1969). Foreign accents, language acquisition and cerebral dominance. *Language Learning, 19,* 245–253.

Scovel, T. (1976). *Contrastive analysis is alive and well and living in phonology.* Paper presented at the Tenth Annual National TESOL Convention, New York.

Scovel, T. (1981). The recognition of foreign accents in English and its implications for psycholinguistic theories of language acquisition. In J.-G. Savard & L. Laforge (Eds.), *Proceedings of the 5th International Association of Applied Linguistics* (pp. 389–401). Montreal: Laval University Press.

Scovel, T. (1988). *A time to speak: A psycholinguistic inquiry into the critical period for human speech.* New York: Newbury House/Harper & Row.

Seliger, H. W., Krashen, S., & Ladefoged, P. (1975). Maturational constraints in the acquisition of second language accent. *Language Sciences, 36,* 20–22.

Seliger, H. W., & Vago, R. M. (Eds.). (1989). *First language attrition: Structural and theoretical perspectives.* Cambridge: Cambridge University Press.

Selinker, L. (1972). Interlanguage. *International Review of Applied Linguistics, 10,* 209–231.

Setter, J. (1997). Rhythm and timing in Hong Kong English. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 305–313). Klagenfurt, Austria: University of Klagenfurt.

Sharwood Smith, M. (1983a). On explaining language loss. In S. Felix & H. Wode (Eds.), *Language development at the crossroads: Papers from the Interdisciplinary Conference on Language Acquisition at Passau* (pp. 49–59). Tübingen, Germany: Narr.

Sharwood Smith, M. (1983b). On first language loss in the second language acquirer: Problems of transfer. In S. M. Gass & L. Selinker (Eds.), *Language transfer in language learning* (pp. 222–231). Rowley, MA: Newbury House.

Sharwood Smith, M. (1996). Crosslinguistic influence with special reference to the acquisition of grammar. In P. Jordens & J. Lalleman (Eds.), *Investigating second language acquisition* (pp. 71–83). Berlin: Mouton de Gruyter.

Sheldon, A., & Strange, W. (1982). The Acquisition of /r/ and /l/ by Japanese learners of English: Evidence that speech production can precede speech perception. *Applied Psycholinguistics, 3,* 243–261.

Shibamoto, J. (1987). The womanly woman: Manipulation of stereotypical and nonstereotypical features of Japanese female speech. In S. Philips, S. Steele, & C. Tanz (Eds.), *Language, gender, and sex in comparative perspective* (pp. 26–49). Cambridge/New York: Cambridge University Press.

Singh, R., & Ford, A. (1985). L'interference et la theorie phonologique [Interference and phonological theory]. *Lingvisticae Investigationes, 9,* 365–375.

Singh, S., & Black, J. W. (1966). Study of twenty-six intervocalic consonants as spoken and recognized by four language groups. *Journal of the Acoustical Society of America, 39,* 371–387.

Singler, J. (1987). Remarks in response to Derek Bickerton's "Creoles and universal grammar: The unmarked case?" *Journal of Pidgin and Creole Languages, 1,* 141–145.

Singleton, D., & Lengyel, Z. (Eds.). (1995). *The age factor in second language acquisition: A critical look at the critical period hypothesis.* Clevedon, England: Multilingual Matters.

Snow, C. E., & Hoefnagel-Höhle, M. (1977). Age differences in the pronunciation of foreign sounds. *Language and Speech, 20,* 357–365.

Soudak, L. I. (1977). Error analysis and the system of English consonants. *ELT Journal, 31,* 125–130.

Spencer, A. (1996). *Phonology.* Cambridge, MA: Blackwell.

Stampe, D. (1969). The acquisition of phonetic representation. *Papers from the Fifth Regional Meeting of the Chicago Linguistic Society,* 443–453.

Stampe, D. (1979). *A dissertation in Natural Phonology.* New York: Garland.

Stockwell, R., & Bowen, J. (1965). *The sounds of English and Spanish.* Chicago: University of Chicago Press.

Stockwell, R., Bowen, J., & Martin, J. (1965). *The grammatical structures of English and Spanish.* Chicago: University of Chicago Press.

Stølen, M. (1987). The effect of affect on interlanguage phonology. In G. Ioup & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 389–400). New York: Newbury House/Harper & Row.

Strange, W. (1992). Learning non-native phoneme contrasts: Interactions among subject, stimulus, and task variables. In E. Tohkura, E. Vatikiotis-Bateson, & Y. Sagisaka (Eds.), *Speech perception, production, and linguistic structure* (pp. 197–219). Tokyo: Ohmsha.

Strange, W., & Dittmann, S. (1984). Effects of discrimination training on the perception of /r – l/ by Japanese adults learning English. *Perception and Psychophysics, 36,* 131–145.

Streeter, L. A. (1976). Language perception of 2-month-old infants shows effects of both innate mechanisms and experience. *Nature, 259,* 38–41.

Suter, R. W. (1976). Predictions of pronunciation accuracy in second language learning. *Language Learning, 26,* 233–254.

Swain, M., & Wesche, M. (1973). Linguistic interaction: A case study of a bilingual child. *Working Papers in Bilingualism, 1,* 10–34.

Tahta, S., Wood, M., & Loewenthal, K. (1981a). Age changes in the ability to replicate foreign language pronunciation and intonation. *Language and Speech, 24,* 363–372.

Tahta, S., Wood, M., & Loewenthal, K. (1981b). Foreign accents: Factors relating to transfer of accent from the first language to a second language. *Language and Speech, 24,* 265–272.

Tarone, E. (1979). Interlanguage as chameleon. *Language Learning, 29,* 181–191.

Tarone, E. (1982). Systematicity and attention in interlanguage. *Language Learning, 32,* 69–82.

Tarone, E. (1983). On the variability of interlanguage systems. *Applied Linguistics, 4,* 142–164.

Tarone, E. (1988). *Variation in interlanguage.* London: Edward Arnold.

Taylor, B. P. (1975). The use of overgeneralization and transfer learning strategies by elementary and intermediate students of ESL. *Language Learning, 25,* 73–107.

Tees, R. C., & Werker, J. F. (1984). Perceptual flexibility: Maintenance of recovery of the ability to discriminate nonnative speech sounds. *Canadian Journal Psychology, 38,* 579–590.

Thakerar, J. N., Giles, H., & Cheshire, J. (1982), Psychological and linguistic parameters of speech accommodation theory. In C. Fraser and K. Scherer (Eds.), *Advances in the sociology of language* (pp. 205–255). Cambridge: Cambridge University Press.

Thogmartin, C. (1982). Age, individual differences in musical and verbal aptitude, and pronunciation achievement by elementary school children learning a foreign language. *International Review of Applied Linguistics, 20,* 66–72.

Thomason, S. G., & Kaufman, T. (1988). *Language contact, creolization, and genetic linguistics.* Berkeley: University of California Press.

Thornbury, S. (1993). Having a good jaw: Voice-setting phonology. *English Language Teaching Journal, 47,* 126–131.

Tomaszczyk, J. (1980). On accented speech: The Polish of Polish Americans. *Studia Anglica Posnaniensia, 12,* 121–137.

Travers, R. M. W. (1977). *Essentials of learning, fourth edition.* New York: Macmillan.

Trubetzkoy, N. (1958). Grundzüge der Phonologie [Fundamentals of Phonology] (Travaux du cercle linguistique de Prague 7). Göttingen: Vandenhoek & Ruprecht. (Original work published 1939)

Trubetzkoy, N. S. (1967). *Principes de phonologie* [Principles of phonology]. Paris: Klincksieck. (Original work published 1939)

Trudgill, P. (1984). Sex and covert prestige: Linguistic change. In J. Baugh, & J. Sherzer (Eds.), *Language in use: Readings in sociolinguistics* (pp. 54–66). Englewood Cliffs, NJ: Prentice-Hall .

Trudgill, P. (1986). *Dialects in contact.* Oxford/ New York: Blackwell.

Trudgill, P., & Hannah, J. (1994). *International English: A guide to varieties of standard* English (3rd *ed.*). London & New York : Edward Arnold.

Vaid, J., & Hall, D. G. (1991). Neuropsychological perspectives on bilingualism: Right, left, and center. In A. G. Reynolds (Ed.), *Bilingualism, multiculturalism, and second language learning: The McGill*

conference in honour of Wallace E. Lambert (pp. 81–112). Hillsdale, NJ: Lawrence Erlbaum Associates.

Vainikka, A., & Young-Scholten, M. (1994). Direct access to X′ theory: Evidence from Korean and Turkish adults learning German. In T. Hoekstra & B. Schartz (Eds.), *Language acquisition studies in generative grammar* (pp. 265–316). Amsterdam: John Benjamins.

Van Coetsem, F. (1988). *Loan phonology and the two transfer types in language contact.* Dordrecht, The Netherlands: Foris.

Vance, T. J. (1977). Tonal distinctions in Cantonese. *Phonetica, 34,* 93–107.

Verhaar, J. W. M. (1995). *Toward a reference grammar of Tok Pisin: An experiment in corpus linguistics.* Honolulu: University of Hawaii Press.

Vihman, M. M., Ferguson, C. A., & Elbert, M. (1986). Phonological development from babbling to speech: Common tendencies and individual differences. *Applied Psycholinguistics, 7,* 3–40.

Vihman, M. M., Macken, M., Miller, R., Simmons, H., & Miller, J. (1985). From babbling to speech: A reassessment of the continuity issue. *Language, 61,* 397–445.

Wardhaugh, R. (1970). The contrastive analysis hypothesis. *TESOL Quarterly, 4,* 123–130.

Wardhaugh, R. (1997). *An introduction to* sociolinguistics (3rd ed.). Oxford: Blackwell.

Wayland, R. (1997). Non-native production of Thai: Acoustic measurements and accentedness ratings. *Applied Linguistics, 18,* 345–373.

Weinberger, S. H. (1987). The influence of linguistic context on syllable simplification. In G. Ioup & S. H. Weinberger (Eds.), *Interlanguage phonology: The acquisition of a second language sound system* (pp. 401–417). New York: Newbury House/Harper & Row.

Weinberger, S. H. (1994). Functional and phonetic constraints on second language phonology. In M. Yavaş (Ed.), *First and second language phonology* (pp. 283–302). San Diego: Singular.

Weinreich, U. (1953). *Languages in contact.* New York: Linguistic Circle of New York.

Weiss, L. (1970). Auditory discrimination and pronunciation of French vowel phonemes. *Dissertation Abstracts International, 31,* 4051-A.

Wenk, B. J. (1979). Articulatory setting and de-fossilization. *Interlanguage Studies Bulletin, 4,* 202–220.

Wenk, B. J. (1983). Articulatory setting and the acquisition of second language phonology. *Revue de Phonetique Appliquée, 65,* 51–65.

Wenk, B. J. (1986). Crosslinguistic influence in second language phonology: Speech rhythms. In E. Kellerman & M. Sharwood Smith (Eds.),

Crosslinguistic influence in second language acquisition (pp. 120–133). Elmsford, NY: Pergamon Press, Inc.

Werker, J. F., Gilbert, J. H. V., Humphrey, K., & Tees, R. C. (1981). Developmental aspects of cross-language speech perception. *Child Development, 52*, 349–355.

Werker, J. F., & Lalonde, C. E. (1988). Cross-language speech perception : Initial capabilities and developmental change. *Developmental Psychology, 24(5)*, 672–683.

Werker, J. F., & Logan, J. S. (1985). Cross-language evidence for three factors in speech perception. *Perception and Psychophysics, 37*, 35–44.

Werker, J. F., & Pegg, J. E. (1992). Infant speech perception and phonological acquisition. In C. A. Ferguson, L. Menn, & C. Stoel-Gammon (Eds.), *Phonological development: Models, research, implications* (pp. 285–311). Timonium, MD: York Press.

Werker, J. F., & Tees, R. (1983). Developmental changes across childhood in the perception of non-native speech sounds. *Canadian Journal of Psychology, 37*, 278–286.

Werker, J. F., & Tees, R. C. (1984a). Cross-language speech perception: Evidence for perceptual reorganization during the first year of life. *Infant Behavior & Development, 7*, 49–63.

Werker, J. F., & Tees, R. C. (1984b). Phonemic and phonetic factors in adult cross-language speech perception. *Journal of the Acoustical Society of America, 75*, 1866–1878.

Westernoff, F. (1994). L1 Loss: Implications for speech and language assessment. *Journal of Speech Language Pathology and Audiology/Revue d'orthophonie et d'audiologie, 18*, 163–168.

White, L. (1985). The "pro-drop" parameter in second language acquisition. *Language Learning, 35*, 47–62.

White, L. (1989). *Universal grammar and second language acquisition*. London: Hodder & Stoughton.

White, L. (1996). The tale of the ugly duckling (or the coming of age of second language acquisition research). In A. Stringfellow, D. Cahana-Amitay, E. Hughes, & A. Zukowski (Eds.), *Proceedings of the Boston University Conference on Language Development* (pp. 1–17). Somerville, MA: Cascadilla Press.

Whitman, R. (1970). Contrastive analysis: Problems and procedures. *Language Learning, 20*, 191–197.

Whitman, R., & Jackson, K. L. (1972). The unpredictability of contrastive analysis. *Language Learning, 22*, 29–41.

Williams, L. (1977). The perception of stop consonant voicing by Spanish-English bilinguals. *Perception and Psychophysics, 21*, 289–297.

Williams, L. (1979). The modification of speech perception and production in second language learning. *Perception and Psychophysics, 26,* 95–104.

Wilson, D., & Møllergard, E. (1981). Errors in the production of vowel no. 10 /ʌ/ by Norwegian learners of English. *International Review of Applied Linguistics, 19, 69–76.*

Wingstedt, M., & Schulman, R. (1987). Comprehension of foreign accents. In W. Dressler (Ed.), *Phonologica 1984: Proceedings of the Fifth International Phonology Meeting* (pp. 339–344). New York: Cambridge University Press.

Wode, H. (1977). On the systematicity of L1 transfer in L2 acquisition. In C. Henning (Ed.), *Proceedings of the Los Angeles Second Language Research Forum* (pp 160–169). Los Angeles: University of California.

Wode, H. (1978). The beginning of non-school room L2 phonological acquisition. *International Review of Applied Linguistics in Language Learning, 16,* 109–125.

Wode, H. (1980). Phonology in L2 acquisition. In S. Felix (Ed.), *Second language development* (pp. 123–136). Tübingen, Germany: Narr.

Wode, H. (1981). *Phonology in L2 acquisition: Learning a second language.* Tübingen, Germany: Narr.

Wode, H. (1983a). Phonology in L2 acquisition. In H. Wode (Ed.), *Papers on language acquisition, language learning and language teaching* (pp. 175–187). Heidelberg, Germany: Groos.

Wode, H. (1983b). Contrastive analysis and language learning. In H. Wode (Ed.), *Papers on language acquisition, language learning and language teaching* (pp. 202–212). Heidelberg, Germany: Groos.

Wode, H. (1994). Nature, nurture, and age in language acquisition. *Studies in Second Language Acquisition, 16,* 325–345.

Wode, H. (1995). Speech perception, language acquisition, and linguistics: Some mutual implications. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-linguistic research* (pp. 322–347). Timonium, MD: York Press.

Wode, H. (1996). Speech perception and L2 phonological acquisition. In P. Jordens & J. Lalleman (Eds.), *Investigating second language acquisition* (pp. 321–353). Berlin: Mouton de Gruyter.

Wode, H. (1997a). Perception and production in learning to talk. In S. J. Hannahs & M. Young-Scholten (Eds.), *Focus on phonological acquisition* (pp. 17–46). Amsterdam/Philadelpia: John Benjamins.

Wode, H. (1997b). Where do features come from? A perception-based approach. In J. Leather & A. James (Eds.), *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 343–350). Klagenfurt, Austria: University of Klagenfurt.

Yamada, R. A. (1995). Age and acquisition of second language speech sounds perception of /ɹ/ and/l/ by native speakers of Japanese. In W. Strange (Ed.), *Speech perception and linguistic experience: Issues in cross-linguistic research* (pp. 306–320). Timonium, MD: York Press.

Yasuta, T. (1996). *The acquisition of English consonant clusters by Japanese speakers*. Unpublished applied project, Arizona State University, Tempe.

Yavaş, M. (1982). Natural phonology and borrowing assimilations. *Linguistics, 20,* 123–132.

Yavaş, M. (1994). Final stop devoicing in interlanguage. In M. Yavaş (Ed.), *First and second language phonology* (pp. 267–282). San Diego, CA: Singular.

Yavaş, M. (1996). Differences in voice onset time in early and later Spanish-English bilinguals. In A. Roca & J. B. Jensen (Eds.), *Spanish in contact: Issues in bilingualism* (pp. 131–141). Somerville, MA: Cascadilla.

Yavaş, M. (1997). The effects of vowel height and place of articulation in interlanguage final stop devoicing. *International Review of Applied Linguistics, 35,* 115–125.

Yip, Y. M. (1990). *The phonology of Cantonese loan words: Evidence for unmarked settings for prosodic parameters.* Paper presented at the Northeastern Conference on Chinese Linguistics, University of Pennsylvania, Philadelphia.

Yip, Y. M. (1996). Cantonese loan phonology and Optimality Theory. *Journal of East Asian Linguistics, 2,* 261–291.

Young-Scholten, M. (1985). Interference reconsidered: The role of similarity in second language acquisition. *Selecta, 6,* 6–12.

Young-Scholten, M. (1993). *The acquisition of prosodic structure in a second language.* Tübingen, Germany: Niemeyer.

Young-Scholten, M. (1995). The negative effects of 'positive' evidence on L2 phonology. In L. Eubank & L. Selinker (Eds.), *The current state of interlanguage* (pp. 107–122). Amsterdam: John Benjamins.

Young-Scholten, M. (1996). A new research programme for the L2 acquisition of phonology. In P. Jordens & J. Lalleman, J. (Eds.), *Investigating second language acquisition* (pp. 263–292). Berlin: Mouton de Gruyter.

Young-Scholten, M. (1997). Second language syllable simplification: Deviant development or deviant input? In A. James & J. Leather (Eds.). *New Sounds 97: Proceedings of the Third International Symposium on the Acquisition of Second-Language Speech* (pp. 351–360). Klagenfurt, Austria: University of Klagenfurt.

Zampini, M. L. (1994). The role of native language transfer and task formality in the acquisition of Spanish spirantization. *Hispania, 77,* 470–481.

Zampini, M. L. (1996). Voiced stop spirantization in the ESL speech of native speakers. *Applied Psycholinguistics, 17,* 335–354.

Zampini, M. L. (1997). L2 Spanish spirantization, prosodic domains, and interlanguage rules. In S. J. Hannahs & M. Scholten (Eds.), *Focus on phonological acquisition* (pp. 209–234). Amsterdam: John Benjamins.

Zampini, M. L. (1998). L2 Spanish spirantization: A prosodic analysis and pedagogical implications. *Hispanic Linguistics, 10,* 154–188.

Zampini, M. L. (1998). The relationship between the production and perception of L2 Spanish stops. *Texas Papers in Foreign Language Education,3,* 85–100.

Zampini, M. L., & Green, K. P. (2001). The voicing contrast in English and Spanish: The relationship between production and perception. In J. Nicol (Ed.), *Two languages, one mind: Language processing in the bilingual* (pp. 23-48). Oxford: Blackwell.

Zobl, H. (1980a). The formal and developmental selectivity of L1 influence on L2 acquisition. *Language Learning, 30,* 43–57.

Zobl, H. (1980b). Developmental errors: Their common bases and (possibly) differential effects on subsequent learning. *TESOL Quarterly, 14,* 469–479.

Zobl, H. (1982). A direction for contrastive analysis: The comparative study of developmental sequences. *TESOL Quarterly, 16,* 169–183.

Zuengler, J. (1988). Identity markers and L2 pronunciation. *Studies in Second Language Acquisition, 10,* 33–49.

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