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Allan Bäck

Aristotle's Theory of Abstraction

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Preface

...ἀφαιρέσει δέ· πολλοὶ γὰρ τρόποι ὑπάρξεως

[(Ps.) Alexander, *in Metaph*. 734,17].

This has been a long project. Parts of it were written when I had a Humboldt-Forschungspreis at Albert-Ludwigs-Universität Freiburg, and others when I was at the Institute for Advanced Study at the University of Edinburgh. I thank Klaus Jacobi and Dory Scaltsas respectively for their hospitality, encouragement and comments. I have presented parts of this work at various meetings, including the American Philosophical Association (Eastern and Central Divisions), the Society for Ancient Greek Philosophy, Humboldt University, the University of Bonn, the University of Edinburgh, and the Pontifical Catholic University of Chile. There I benefitted especially from comments by Ignacio Angelelli, George Boger, Manuel Correia Machuca, Michael Ferejohn, Kit Fine, Lenn Goodman, Ed Halper, Russell Jones, Anthony Kenny, Anna Marmodoro, Keith McPartland, Deborah Modrak, Christof Rapp, Richard Sorabji, Nicholas Smith, Robin Smith, Zoltan Szabo, Paul Thom, Marc Wheeler et al.

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Contents

Chapter 1
Introduction

First the problem of abstraction. It is well known that Aristotle said little about it.

(Lloyd 1981: 55)

Philosophers deal with abstractions. Being reflective, they also have come up with theories about what these abstractions are. Aristotle is no exception. Indeed, he gave what turned into a canonical account of abstraction (Weinberg 1965: 5). Here I shall investigate what Aristotle thinks abstraction is and how he uses it.

Abstraction has a central role in Aristotle's thought. Sense perception abstracts the forms of singular things from their matter. Universals are abstracted from individuals. A science cuts off a part of being and considers it in isolation by abstraction. Mathematics deals with the ultimate abstractions; metaphysics is the study of being *qua* being. If Aristotle is to avoid returning, like a prodigal son, to the Platonism of his teacher, it is his theory of abstraction that will make this possible.

Aristotle returned to first philosophy after doing detailed work in the various sciences. There he appeals often to their doctrines and tries to integrate them. I have found that by taking the same approach I can understand much better his curt, summary remarks in the *Metaphysics*. The Aristotelian tradition views his first philosophy as the culmination of his theory. Yet, like the road between Athens and Thebes, culminations have two directions. I choose the mortal way: from what is most evident to us to what is most evident in itself. Accordingly, I focus on the scientific detail and only then approach the metaphysical claims. Above all, understanding the details of his theory of relations and abstraction will illuminate his theory of universals.

The main difficulty in discussing Aristotle's theory of abstraction lies in the scarcity of explicit texts. Although Aristotle refers to "abstraction" and "cutting off" at key points in discussing issues central to his philosophy, he does not explain much what is involved. Whatever theory he has to be reconstructed from scattered remarks. He does not even use the term 'abstraction' much. For instance, after

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mentioning that perception consists in a process of abstraction [*An*. 424a17–24], he has a long treatment of perception without talking explicitly about "abstraction". The same holds for his account of the knowledge of universals. Often he merely notes the presence of an abstraction by using the '*qua*' locution. So my project requires a lot of reconstruction. I hope that the reconstructed theory will explain many puzzles of Aristotle's thought. Their successful solutions would offer confirmation to my reconstruction of Aristotle's theory of abstraction. Accordingly, while proceeding I shall be offering solutions to various puzzles in Aristotle's thought in order to motivate accepting my position.

'Abstraction' ('ἀφαίρεσις') in Greek has many uses. The central one that I find in Aristotle is: selective attention. This consists in focussing on an aspect, typically a general one, and then looking at features belonging to that aspect, while ignoring the remaining ones. Aristotle often indicates the presence of such an abstraction by speaking of something "*qua*" this or "*qua*" that.[1]

Although Aristotle has no treatise on abstraction, he does discuss its formal properties *en passant* while pursuing other issues. I list below some of the features of Aristotle's theory of abstraction on the interpretation that I shall be developing:

- Abstraction is a relation.
- Perception and knowledge are types of abstraction.
- The objects generated by abstractions are *relata*.
- *Relata* can serve as subjects in their own right, in the mode of 'as if', while being "least of all" substances.
- When *relata* serve as subjects in their own right, they can appear as items in other categories.
- Distinguish the concrete from the abstract paronym. Strictly, the items in accidental categories are abstract paronyms; the concrete paronyms are the abstract ones being in a subject.
- In science, universals come from individuals via perceiving and knowing in a repeated, recursive process of abstraction. For instance, the quality of snubness comes from sense perceptions of noses, and the mathematical quality of concavity comes from thinking about snubness.
- Induction is a type of abstraction, typically moving from the perceived individuals to universals. The universals are already present "in" or are constituents "of" the individuals being perceived but in a scattered way. (We do not "perceive", *per se* and strictly, individual substances, but only accidents.) As far as our experience is concerned, the universals existing *in re* have been "routed". *Noûs* is the ability to see universal patterns in what is being perceived.
- Aristotle's Metaphysical vocabulary is ''relational': although the expressions do not name items in the category of relation, they satisfy the relational criteria, like relational conversion: for instance, 'matter' and 'form'; 'potentiality' and 'actuality'; 'part' and 'whole'.

[1] In Bäck 1996 I have already reconstructed his theory of qua propositions.

- These relational structures are "intrinsic"; that is, they describe constituents of the essence or individual substance.
- The relation of an individual substance to its universals is along the lines of the structure of parts and wholes.
- Only individual substances exist in the full, primary sense. Other things exist only in relation to them. Universals, accidents, forms, causes, and potentialities have being only as abstract aspects of individual substances.
- An individual substance is identical to its essence. The definition of such an essence is a statement about it, and so gives its necessary, universal predicates. This sort of definition does not give a synonym of the individual essence but is a statement *about* that essence.
- The essence has universal features but is the singularity making the individual substance what it is. In fact the world turns out to have such singularities forming natural kinds.

One main attraction in working out the details of Aristotle's views on abstraction lies in understanding his metaphysics of universals as abstract objects. These universals will have a real basis in reality without existing apart from their exemplars as Plato's Forms do. Aristotle thinks that this is possible because he thinks that abstract objects have a relational structure. On his view relations have no independent existence or persistence through change. Still in theorizing they may be considered as if they were independent.

So I stress heavily the importance of Aristotle's views of abstraction. You might see this too as a medievalist bias: the scholastics were the masters of abstraction. On the other hand, perhaps I am reclaiming past ground. From a historical perspective the main philosophical tradition of abstraction has been ignored in recent times, so much so that 'abstract' has come to mean 'non-physical'.[2] For instance Quine calls sets abstract objects even though he takes them to be real individuals (Quine 1960: 119–23, 233–4, 269–70).[3]

My approach has a great advantage: it fits the text, not only in its details but in its relative length. Aristotle does not agonize much over the status of his forms, despite his ongoing debate with Plato and his successors. On my view this follows from his already having constructed most of the details of his position "before" he gets to the *Metaphysics*, in the order of exposition if not in time.

I shall end up attributing to Aristotle a version of Avicenna's threefold distinction of quiddity. I have also attributed to Aristotle elsewhere a theory of predication that I have located in Avicenna. So do I have an Avicennian or Islamic agenda? No. Indeed that would be ironic, given my bäckground. Rather, I am romantic enough to suppose that I have gone where the truth has led me. Indeed I can see scholars of ancient philosophy rediscovering the past and reclaiming this very interpretation willy-nilly (despite not seeming to know the medieval literature well).

[2] On the history of 'abstraction' see Angelelli 2005.

[3] Cf. Lewis 1986: 81–6.

I know that some modern scholars of ancient philosophy reject medieval, especially Islamic, interpretations on the grounds of their being linguistically incompetent: they had no Greek and no critical editions. I agree that we must be critical in our accepting what they say. Still, they have the advantage over modern scholarship that they are using and working within Aristotle's theory, not talking about it perhaps as antiquarian curiosity.[4] In any case, as always, the proof lies in the details and in the adequacy of the interpretations of the texts. So I turn to them.

I use the Revised Oxford translation of Aristotle's works, except when noted. When quoting the Greek of the original texts, I do not change but use the accent marks given there.

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[4] Cf. Hintikka 1996; Bäck 1999.

Part I
LOGIC: The Formal Structure of Abstraction

These days in particular, 'abstraction' is said in many ways. Aristotle uses it mostly in the sense of:

- *Selective Attention* This consists in focussing on an aspect, typically a general one, and then looking for features that "filter through" (as Lear puts it) so as to agree with it, while ignoring the rest. So I may consider Socrates *qua* philosopher. Therein I would be concentrating upon the content of what he is saying, although not upon whether or not he is speaking hoarsely, is wearing shoes, or is walking about.

Abstraction may be considered also as:

- *Extraction* This: may result (1) in two individual, determinate things, the splinter and the wounded hand, when I pull out the splinter from it. (2) in one determinate, and one less determinate thing, as gold ore turns into gold and slag. The latter sense is more compatible with selective attention.
- *Subtraction* (as opposed to arithmetical addition) This cannot be a general sense but one restricted to quantity; Aristotle does use this sense of 'abstraction' at times. Here both what is being removed and what remains are determinate numbers. The more general sense of selection attention does not require this. There it is indeterminate what is being left out. Instead we focus on what remains. Extraction in the first sense (1) is compatible with mathematical subtraction.
- *Paring away* Platonists have a sense like this: pare away the imperfections so as to get to the ideal Form. Modern science has used this approach to get to ideal objects like frictionless surfaces and mass points. Aristotle does this somewhat in ignoring monstrosities, the imperfections of matter, and what holds for the lesser or least part.
- *Mental selection* Modern empiricists like Locke and Berkeley consider abstraction to operate on a psychological level. In our fuzzy thinking about real individuals we come up with universal concepts or expressions having no real analogue *in re*.
- *Pseudo* Here take 'abstract' as 'incorporeal'.

Frege has an influential account and critique of abstraction. There he distinguishes or uses various conceptions of abstraction. I shall discuss it somewhat in the first chapter. To get our bearings let me summarize his conceptions:

- The ordinary: from an individual ("object") to its features. This gets us from individuals, 'a', 'b', 'c', to their predicate functions or features ("concepts"), 'Fx', 'Rxy'… This amounts to selective attention.
- The contextual: This concerns introducing a new "abstract" term through its use in various definitions of principles.
- The "magical": do ordinary abstraction and then claim that what is abstracted is an individual in its own right. (Aristotle allows for this in the mode of "as if".)

Where does abstraction fit into Aristotle's ontology? As will become clear in looking at his psychology, Aristotle considers perception and knowledge types of abstraction. As Aristotle places perception and knowledge explicitly in the category of relation, it is plausible to put abstraction there too.

Working out the details of his doctrines on relations will clarify how Aristotle views abstractions like universals to exist. Strictly, the *relata*, the items being related, are paronyms named from the relation. Just as Aristotle has qualities and not *qualia* located in the category of quality, so too relations and not *relata* are in the category of relation: just as the brave come from bravery, so too the wing and the winged come from being-a-wing-of. [*Cat*. 1a14–5; 7a1–2] Aristotle admits that ordinary language obscures the relational structure; he comments that at times we must invent better names. [7a5–7] A *relatum* is what has the relation: concretely, this is the substance plus its having that relation; abstractly it is the substance considered solely with respect to being in that relation. Aristotle allows for such an abstract *relatum* also to be considered "as if" it existed independently from its substance, as a thing in its own right.

These distinctions are subtle; Aristotle often does not express them clearly. Piecing together these doctrines will help us, in Chap. 10, to understand his position on the parts of animals: how, on the one hand, a part like a head or a finger is a *relatum*, and how, on the other, it is a substance. It also will help us, in Chap. 11, to understand how Aristotle has his sciences dealing with universals, while insisting that universals depend upon individual substances to exist. I shall suggest that Aristotle takes his universals, like other *abstracta*, to have the structure of *relata*.

Chapter 2
The Conception of Abstraction

Philosophers have used 'abstraction' for a long time. As they offer theories and themselves critique the structure of their own theories, they have developed various conceptions of abstraction. Yet their critiques are not neutral. They come from their philosophical positions. In order to grasp Aristotle's theory of abstraction, I thus find it useful to discuss his conception of 'abstraction' and where it fits into his philosophical landscape. With this preliminary sketch, we might endeavor to avoid anachronism.

As its Greek etymology suggests, abstracting (ἀφαιρέω) consists in taking away something from an object. The root verb, 'αἱρέω', suggests additionally a sense of grasping or of choosing, of taking for oneself something that lies ready to hand.[1]

These lexical meanings leave open a wide range of conceptions of 'abstraction'. Does the abstraction consist in taking out something and discarding the rest? Or does it consist in taking away something and keeping what is left? We can call the first one the selection view, and the latter the subtraction view. The Greek gives an ambiguity between the two because 'ἀφαίρεσς', being a verbal noun, could be derived from the active form 'ἀφαιρεῖν', which generally does have the sense of 'removal', or from the middle form, 'ἀφαιρεῖσθαι' which generally has the sense of 'take away for oneself' or 'steal'. On linguistic grounds of common usage, the selective reading of 'ἀφαίρεσις' has the advantage, as the middle voice forms are far more common than the active voice forms. Yet, as Aristotle is a philosopher, and philosophy stretches or distorts the ordinary usage of language, the philological evidence does not settle the issue. For that, we must turn to Aristotle's texts.

[1] LSJ s. v. ἀφαιρέω and αἱρὲω.

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2.1 Origins of Aristotle's Theory

Originally, so some have speculated, Aristotle may have developed his conception of abstraction (ἀφαίρεσις) in order to have an alternative to Platonism (Wieland 1962: 197 n. 12). Such an abstraction theory claims to provide a way to distinguish and recognize the different aspects of things, both universal and (perhaps) singular, but without granting any of these an independent, substantial existence *in re*, such as Plato claimed the Forms to have. On this account, we can consider an object with respect to some of its attributes, take them out, and thereby create a new abstract thing consisting in that object in only those respects. We can then use this new thing as a subject in its own right. Yet we have only one object, the original substance existing *in re*, although with many attributes. In contrast, for Plato, everything that is a subject in its own right is or refers to an object existing independently *in re*. In this way, the doctrine of abstraction lies at the heart of Aristotle's metaphysical enterprise, of constructing a theoretical alternative to Platonism.

For Aristotle, there is a natural basis for some such abstractions as opposed to others: some are scientific, like the genus dog and the *differentia* rational; others are sophistical, like "musical Coriscus" (Bäck 2000: 59–96). [*Metaph.* 1026b17–28] In making the scientific abstractions, we isolate the proper subjects for the statements being made about real attributes of individual substances. In this way, we can start from sense perceptions of individuals and arrive at sciences of universals like numbers, plane figures, and motion. Yet we are still talking about the real individual substances, not some fictitious, transcendent Forms, existing over and in addition to those individuals.

In accord with this approach, Aristotle explains how attributes are abstracted from individual substances in his account of perception, and how universals are abstracted from particulars in his account of thought. [*An.* III.4; *Metaph.* I.1; *Phys.* I.1] Likewise, he speaks of "cutting off a part of being" and making a science about it. [*Metaph.* 1003a24–5] Physics concerns substances *qua* movable; geometry considers substances *qua* figure. [*Metaph.* 1026a7–10; 1061a28–1062b11; 1077b22–1078a21] We start with the individual substances given in sense perception and then isolate aspects of them, *abstracta*, for study in particular sciences.

Aristotle seems to recognize several types of these scientific *abstracta.* First, he recognizes universals in all the categories. The sciences study universals: not only species and genera of substance like dog, rose, plant and animal, but also those from other categories, like square, figure, sight, perception, justice and virtue. As items in the categories exist and further as the sciences study only things that exist [*An. Po.* 89b31–5], clearly Aristotle holds these universal species and genera to exist in reality. Yet, if Aristotle is to avoid Platonism, it is thereby quite likely that he holds these universals, or our knowledge of them, to be abstracted somehow from singular things.

Second, Aristotle might recognize also singular *abstracta*, like mathematical objects (Mueller 1990: 463–4). For not only do scientists need to speak of number, triangle, bird, redness, and walking in general. They also need to speak of particular

instances of 'two' in '2+2=4', of the particular triangles used in the diagram of a geometrical proof bisecting a square on the diagonal, and of more than one bird in the mating process. These particulars do not seem to be sense objects.[2] In modern terms, they seem to be tokens of a universal type. In support of this interpretation, Aristotle speaks of an intelligible matter and not of perceptible matter, providing a basis for having more than a single instance of a type of mathematical object. Thus he seems to be indicating that there can be several instances of the same species, differing in number, even when there is no corporeal matter to differentiate.[3] [*Metaph.* 1036a2–12; 1059b14–6.] These instances are particulars of some type. For they are composed of matter and form, and, being singulars, are not definable. Aristotle seems to state clearly that some mathematical objects are individuals. [*Metaph.* 1036a2–3] But, if they are singular, they are individuals quite differently than the sensible individuals are.[4]

Whether these intelligible particulars be taken as universal or as particular, they are going to create complications for a theory of abstraction, especially if the mathematical objects cannot be physical, strictly speaking. For a diagram would then be a token of a type of sign signifying a mathematical object. These tokens too have a certain universality: it is not merely the ones here: '2+2=4', on this particular page that are being discussed. Rather, when I write that equation, the marks on the page are signs not only of themselves but also of some other tokens or token types. In order to have that equation, we need two instances of the number two, each represented by an instance of the numeral '2'.

So we can see why Aristotle would think that mathematical objects need to have some sort of intelligible matter, in order to have many instances of the same species (or type) of number.[5] Still, Aristotle thinks that they are "abstracted" somehow from our sense experience of the world.

Aristotle thinks also that the things thus abstracted are objects existing *in re* that are in some sense independent from their bases, the things from which they are

[2] Although some have argued that Aristotle or some Aristotelian commentators took geometry to be about the particular figures and diagrams perceived by the senses. See Mueller 1979 for a general discussion.

[3] Reeve (2000) also recognizes both universal and particular intelligible matter, as I shall discuss more below.

[4] Unless Aristotle holds that these individuals are abstracted directly from perceptions of individual substances. On this account, e.g., when I see a particular bronze sphere, upon abstraction I have also an individual sphere, the mathematical object. So too when I see the iron sphere I see another individual sphere. Also, looking at the spheres, I have upon abstraction an individual 2, an individual mathematical object. Cf. Simplicius, *in Cat*. 124, 28–125, 2. Yet, even so, if we are to have items in mathematics for which we have no exemplars *in re*, such as very large numbers or very complex geometrical figures, we still cannot reduce mathematical individuals directly to perceptible individuals.

[5] Moreover, as the equation itself can be stated or written in many particular speech acts or writing acts, the numeral itself will need to have some way to have many instances, just as we can have many repetitions of the same statement (λόγος), as when we all utter the same true sentence in a chorus. Yet Aristotle does not seem to pursue this issue much, although some medieval Aristotelians did, in subdivisions of material supposition.

abstracted. For the universal *abstracta* include the species and genera, the secondary substances that are the objects of science. To be sure, Aristotle does say that, if the individual, primary substances did not exist, neither would these secondary substances or accidents. [*Cat.* 2b5–6] Yet he does not deny that these species and genera really exist. So he seems to be saying that these abstract objects exist *in re*, but not independently and separately from their concrete individuals, the primary substances. Mind (*noûs*) makes these items separate in thought by separating them off from the whole sense perceptions of individuals.

One might then think that for Aristotle these *abstracta* are mere concepts, artifacts of the human mental process with no real correlates (Klein 1968: 100–13). That is, on human, pragmatic grounds, we might focus on certain features of individual things in a particular science. Still, such grounds do not give any assurance that this science does more than to provide a useful, heuristic model nor that its objects have more than a conventional unity.

Nevertheless, Aristotle has a different view. As he recognizes that universal substances and accidents exist *in re*, he is assuming that these *abstracta* have a real basis. In performing at least certain abstractions, the scientifically respectable ones, we are affirming or presupposing the real existence of common structures of individuals *in re*. In our sciences, we may then be said to be "recognizing" (ἀναγιγνώσκειν) a certain aspects of real things that apply in fact to more than a single individual in a basic sense of the word. That is, we are "re-cognizing", or representing again in thought, what already has *in re* a basis to be distinguished. A science then becomes more than a mere model but a "theory" (θεωρία) in an original, literal sense: of observing or looking at real structures existing in the world.[6]

So we have two basic phenomena or data about Aristotle's conception of abstraction. First, a process of abstraction is not supposed to create or presuppose new objects existing *in re* over and about the individual substances given in sense perception. Aristotle does not take abstract objects to be real, self-subsistent objects. The species man does not exist *in re* over and above the individual human beings. Second, the abstract objects themselves do seem to include the universal substances and accidents, the universal species and genera asserted to exist and studied by scientists. So, on the one hand, abstract objects are not independent, and, on the other, they are objective: they are real although not independently real.

We see this tension exemplified in Aristotle's account of substance in the *Metaphysics*. There again, he does not want the substantial forms to be separate, universal objects, existing independently from individual substances. At the same time, he wants them to be "objective", to represent ("re-present") structures present in these real individuals, not merely in our conventional thought. Aristotle wants objective universal structures but admits only individuals existing primarily *in re*. That is, Aristotle takes substantial forms to be abstract, merely abstract, objects. Aristotle uses abstraction to explain how we can come to know universals from having sense perceptions, to give an account of mathematical objects without

[6] "…objects in the world…present themselves as concrete individuals and simultaneously as exemplifications of universals" (Modrak 2001: 96).

positing universals *in re*, and to discuss the universal features of what it is to be an individual substance without relapsing, he thinks, into Platonism.

These explanations lie at the very core of Aristotle's thought. Abstraction lies at the very core of these explanations. Accordingly, if we can but get clear on the structure of the sort of abstraction that he is using, we can gain insight into his theory as well as gaining increased ability to evaluate it.

2.2 The Meaning of 'Abstraction'

The general discussion so far might suggest thinking of abstraction as extraction. Aristotle does speak of "cutting off a part of being" and making a science about it. Such talk suggests that we are cutting out, or extracting, certain aspects from the object and erecting them as separate objects. Yet this sort of extraction cannot be 'extraction' in the usual sense, though. E.g., when I "extract" a splinter from my foot, or gold from the ore, I end up with a pair of independent, individual substances: the splinter and my wounded foot, and the gold and the slag. If abstract objects were "abstracted" in this way, they would indeed have a separate existence over and above the individual substances from which they are abstracted. Thus Aristotle's 'abstraction' would have to be thought of as a type of extraction where the items being extracted do not have a separate, independent existence. Consequently, it is not clear how helpful viewing abstraction as extraction is.

Accordingly, John Cleary has suggested that, rather, Aristotle conceives "abstraction" (ἀφαίρεσις) as a process of subtraction (Cleary 1985: 18–9, 1995: 304, 309–14). Here the individual substance remains, and we merely subtract everything that does not pertain to the respects stated. In support of his view, he notes that in the *Topics* Aristotle contrasts the method of "ἀφαίρεσις"with that of "πρόσθεσις", which at the time had the common meaning of 'addition' in the arithmetical sense. [*Top*. 118b10–9; 140a33–b15; 152b10–6] Plato too, he says, seems to use 'addition' and 'subtraction' in this sense. [*Phaed*. 95c; *Euthyd*. 296b; *Cart*. 393d; *Prm*. 131d; 158c] Aristotle himself contrasts the natural scientist's use of "addition" with the mathematician's use of "subtraction". [*Cael*. 299a14–8; *Phys*. 193b22–194a12; *An.* 403b9–19; *Metaph.* 1077b9–11]

Indeed, Cleary objects to calling 'ἀφαίρεσις' 'abstraction' altogether, partly because this translation suggests a conception of extraction, and partly because Aristotle does not view the process as psychological or epistemological, as in the later discussions of "abstraction" in Locke and Berkeley. For on their account of abstraction we make up general concepts or signs for our convenience after having experiences of individual existing *in re* (Locke, *An Essay Concerning Human Understanding*, II11.9; IV.7.9; Berkeley, *Principles of Human Knowledge*, "Introduction," §§15–6). The things abstracted may have use for us but need not reflect real structures in reality: they may be far removed from the "secret springs" of physical objects (Hume, *An Enquiry Concerning Human Understanding*, V.1). In contrast, Aristotle holds the things abstracted to reflect reality.

Cleary insists that 'ἀφαίρεσις' does not signify the way by which we come to have a certain sort of knowledge. Rather, it is the way by which the primary subjects for each science are isolated: it is that by which we "chop off a piece of being" so as to make it the proper subject of a special science. We do this by subtracting or removing attributes from the totality of those constituting an experienced object until we get a primary subject. However, although we do the paring down, still the process is not so much a merely psychological process by which we come to have perception and science, as an objective process by which we come to be aware of the attributes and types of individual substances. That is, although abstraction is a mental process, it is grounded upon real distinctions between aspects of things in the world. Other, non-rational animals also make abstractions in their sense perceptions, memories, and imaginings, although they do not make the ultimate abstractions whereby rational beings can locate the proper subjects for science, the universals. Cleary then sees that for Aristotle abstraction proper is primarily an ontological process whereby we locate and isolate the primary subjects for each science from our perceptions of individual substances with their full array of attributes—not a way by which we come to know the objects that we are locating and isolating in a peculiarly human, conventional way of knowing.[7]

Cleary's main evidence for Aristotle's not viewing 'ἀφαίρεσις' as an epistemological process whereby we acquire knowledge of objects lies in this passage:

> Now it is also evident that, if some [type of] perception is lacking, it is necessary also that some [type of] knowledge is lacking, if indeed we learn either by induction or by demonstration, where demonstration is from the universals and induction from the particulars, and it is impossible to contemplate the universal if not through induction (for since also those said from abstraction will be able to be made familiar through induction, because [or: that[8]] some things belong to each genus, even if not separate, *qua* each such thing [sc., the genus]), it is impossible for those who do not have the [type of] perception to make the induction [literally: be led to, sc., have the induction made for them]. For perception is of the singulars: for it is not possible to take knowledge of them: for neither from the universals without induction, nor through induction without perception. [*An. Po.* 81a38–b9]

The main points of the passage are clear: we have no acquaintance with singulars except through sense perception. We may then come to become acquainted with universals through induction on the singulars once acquired.[9] Then we may come to have knowledge of universals through performing demonstrations on these universals. So all knowledge comes from, or depends upon, sense perceptions, directly or indirectly. [*Eth. Nic.* 1139b27–31] As Cleary stresses, Aristotle does not say here that we perceive or know anything through abstraction. Rather, we come to grasp "even the things said from abstraction" through induction. Consequently, abstraction appears to be a process different from induction or demonstration. Its products are "the things said from abstraction". [*An. Po.* 81b3]

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[7] The account of Cleary 1995: 308 agrees mostly with Lear 1982: 168.

[8] I agree with Cleary (1985: 15) that either translation is possible.

[9] Barnes (1975: 161) notes that Aristotle claims here only that induction can make abstractions familiar to us, not that it alone can do so. He claims that Aristotle argues for that stronger claim at *An.* 432a3–6 [discussed below].

This phrase (τὰ ἐξ ἀφαιρέσεως λεγόμενα ἔσται δι' ἐπαγογῆς γνώρψα ποιεῖν [81b3]) may appear ambiguous: it may signify those said from abstraction, sc., statements made as a result of abstraction, or the objects that we are now able to talk about as a result of the abstraction. Yet the dilemma of: words or objects? is misleading. For, as I have argued elsewhere, as Aristotle wants in his scientific language an isomorphism between the words and the objects, what is said will match the actual properties of those objects (Bäck 2000: 91). So we may as well take the phrase realistically, to mean the objects signified by such subject terms as 'triangle' and 'sphere'. Indeed, as Aristotle takes "the things said from abstraction" to be the objects for the mathematical sciences, and science concerns only what exists *in re*, he is committed to a realistic views of these things. Accordingly, I call the "things said by abstraction" 'abstract objects'.

Also, we might see two possible ways of understanding 'from' (ἐξ) in "the things said from abstraction". On one reading, we would be inventing abstract objects, by treating aspects of real objects as if they were real, independent objects, without their really existing as such. On another reading, we would be discovering real abstract objects. The former gives a nominalist reading; the latter a Platonist. As Aristotle insists that he rejects Platonist accounts of abstract objects, like the objects of mathematics, we should take the first reading. Yet, given that Aristotle speaks of cutting off parts of being and of secondary substances existing in their own right, he does seem to want these *abstracta* to be extracted so as to constitute independent objects, albeit derivative, dependent ones. So the nominalism will be a "realistic" nominalism, one making us wonder if Aristotle avoids Platonism. Hence Aristotle's theory of abstraction becomes crucial—for seeing if he does.

Aristotle has a *transcendent* sort of abstraction. For the abstraction goes beyond the original objects perceived so as to generate, or at any rate to recognize, new objects. We perceive individual things and then via abstraction are able to know the universal objects of mathematics. These new objects have quasi-independence if not a real independence. For, as they serve as the objects of the sciences, they are the most intelligible objects of the things that are. Abstract terms are more than mere *façons de parler*.

Aristotle says that these abstract objects become familiar to us through induction. Induction is a process whereby simple apprehension, via *noûs*, of the things apprehended is achieved. [*An. Po.* 100b3–15] So we become directly acquainted with these objects apprehended by induction. Then induction makes us able to apprehend and know abstract objects. The abstraction would have to serve a function other than enabling us to apprehend abstract objects, as indeed Cleary himself maintains.

Aristotle implies at 81b4–5 (whether we take the 'ὅτι' at 81b4 to indicate the reason or to indicate the content of what has become familiar to us) also that each genus has some of the things said by abstraction given by induction. An abstract object belongs to a genus not in the way that a separate thing, sc., an individual substance, does. Rather each belongs to one "*qua* each such thing," i.e., *qua* itself. [81b5] Thus number belongs to discrete *quantum* and to *quantum qua* number; likewise number belongs to two *qua* two, or to two *per se* (καθ' αὑτό), *qua* number.

Neither number (the genus) nor even individual numbers exist *in re* as separate substances. Still, we may legitimately treat them as if they were separate individuals and put them under a genus, so as to have a science of arithmetic.

Posterior Analytics I.18 does then give us strong grounds not to view abstraction as a merely psychological process. It also gives us strong grounds not to identify abstraction with induction. Yes it does not follow, as Cleary seems to say, that the induction is not a type of abstraction.[10] It could be that induction is one application of a process of abstraction, where abstraction could have other applications. This text by itself does not resolve this issue. For instance, take induction as the process whereby the universals arise from the relevant singulars, and the abstraction proper, used to generate the abstract, proper objects of mathematics, as the process whereby universals inseparable *in re* in the individual substance and even *in intellectu* initially come to be treated as if they were separate. E.g., we might start off with individual physical objects and then via induction come to the general concept of body. Such a body would have color and shape (in general). Yet we may then "abstract" and treat the color and the shape as if they were separate, even though these universals necessarily go together. A non-rational animal could not make the final abstraction, Aristotle might say, although it can have experience and general notions ("primitive universals" as in *Phys*. 184a24–5; *An. Po.* 100a16) via some less ultimate processes of abstraction.

Again, should we agree with Cleary and translate 'ἀφαίρεσος' as 'subtraction'? This translation has the advantage that we can see the parallel with 'addition' clearly. Cleary seems to dislike the use of 'abstraction' because it, like 'extraction', suggests that the item to be abstracted already lies there ready to hand, and needs be only plucked out, like a raisin in a pudding. Rather, we should understand 'αφαίρεσις' to indicate a process whereby we take the object and pare away, or subtract, attributes until we arrive at the abstract object desired.

I see several problems with this approach. First, as we do not know all the items to be subtracted, the analogy with mathematical subtraction breaks down. I can fix upon only the numerical or geometrical attributes to an individual substance by stipulating, '*qua* number' or '*qua* shape'. I do not thereby list all the items to be subtracted and then see what is left. The process of subtraction generates two things, two numbers, the number subtracted and the remainder, each of which can be known determinately. In contrast abstraction generates one abstract object and an indefinite residue.[11] Aristotle makes a similar point about the process of defining. [97a6–7]

Again, taking the abstraction process as one of subtraction, or paring away, makes an individual substance something like an uncarved block, ready to be shaped

[10] Cleary (1995: 488) agrees that abstraction/subtraction is not a third way of learning, in addition to demonstration and induction.

[11] Scaltsas (1994: 11–2, 34, 116) suggests that abstraction generates two objects. However he focuses on the abstraction of matter and form from a substance, and there we have a form, capable of definition, and, with the ultimate if not the proximate matter, an indefinite stuff. So unlike subtraction abstraction does not yield two equally definite things.

according to the whim of the sculptor.[12] Yet Aristotle seems to view the abstract objects apprehended to have a real basis in the individual substance. For science is of real beings. Remember that Aristotle holds that both individuals and universals exist *in re*. For he says that both the primary substances and the secondary substances, the universal substances, exist *in re*. To be sure, he does say that the existence of the latter depends upon the existence of the appropriate singular substances, which are primary. Still the universal substances exist nonetheless. Likewise, Aristotle admits that universal accidents exist. Apart from saying so in the *Categories*, Aristotle needs them in order to have science. For *propria* and *differentiae* are in accidental categories, and these *per se* accidents, along with substances, serve as the main items discussed in science.[13]

Consequently, the 'subtraction' interpretation has its problems too. Just as Aristotle appropriates many geometrical terms in his theory of syllogistic (like 'term' and 'figure') and demonstration, but uses them differently or at any rate extends their usage, so too he may be doing likewise in his use of 'αφαίρεσις'. I am inclined to admit that 'αφαίρεσις' does end up having the negative function or result of eliminating, or paring away, all those attributes that do not agree with the aspect specified. Yet we need not do this in advance. Rather, we subject the predications presented to a test, namely whether or not they agree with the aspect specified. Then, if they pass that test, we admit them into this particular scientific discourse; if they do not pass, then we eliminate or "subtract" them. However, unlike arithmetical subtraction, we need not specify, in advance or all at once, all the predications, all the items to be removed. We need only to look at those attributes of which we have come to be aware, and require that those that do not pass the test of relevance be excluded. We need not "subtract" all possible irrelevant attributes. Accordingly, I shall opt for the traditional translation of 'abstraction' for 'αφαίρεσις' to signify a process *sui generis*. Too, although we do not have the same problem, of not being able to specify all the objects to be added, perhaps it is best, to emphasize that the mathematical use has only a limited scope, also to translate 'πρόθεσις' not as 'addition' but as 'combination' or 'synthesis'.[14]

I do concede, however, that at times Aristotle does use 'ἀφαίρεσις' in the sense of mathematical subtraction. [E.g., 1061b20; 1023b13–5; 1024a27] Here we can indeed think of abstraction as removal. [Cf. (ps.) Alexander, *in Metaph*. 427, 18; Simplicius, *in Phys*. 496, 13–6] (Ps.) Alexander suggests that 'ἀφαίρεσις' means subtraction in the category of *quantum* strictly speaking but only metaphorically so in other categories. [*in Metaph*. 423, 36–9] Perhaps this is the solution. For the mathematical conception of subtraction applies in full force only to quantities. To avoid ambiguity I think it better not to have two uses of the same term, and so will continue to call the non-quantitative "subtraction" 'abstraction'.

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[12] Lewis (1991: 286–7, 307) takes 'ἀΦαίρεσις' as 'stripping off' as Descartes speaks of stripping off the attributes of the piece of wax in *Meditation* 2. He ends up calling this "selective inattention".

[13] On the status of *differentiae* and *propria*, see Bäck (2000: 151–8).

[14] Reeve (2000: 40) translates 'πρόσθεσις' as "positing", with "abstraction" for 'ἀφαίσις'. But this seems too far removed from the mathematical background of the two terms.

2.3 Abstraction as Selective Attention

> Abstraction is a powerful tool in mathematics; by concentrating only on certain essentials of a situation, and disregarding other aspects, one is free to pursue new results. (Ronan 2006: 9)

In order to mark off an abstract object, like 'two' or 'number', we must be able to specify the aspect that we wish to separate off. We specify an aspect like number so as to generate abstract objects. We then look at our sense perceptions, examine the phenomena, to see what content they have under this aspect. As Lear puts it, we "filter" our experience in order to get at what we have chosen to find relevant (Lear 1988: 23). We do not invent the phenomena, but can choose what we want to notice. Hence I suggest conceiving abstraction as selective attention.[15]

I agree with Zev Bechler that "Aristotle's theory of…abstraction depends on an interpretation of his technical term…'qua'" (Bechler 1995: 166).[16] He objects to claiming that in a phrase of form 'P qua M', 'qua M' restricts the content of P to what it has in common with M. He says that "if qua is taken as a predicate filter there is the problem that 'P qua M' just gives you M and so already presupposes that M already preexists in its purity." I do grant that talking of "P qua M" thus already presupposes that we have some grasp of what M is. But I submit that Aristotle has that problem: the common complaint about using abstraction to explain our knowledge of universals is that it begs the question: we must already know that in virtue of which the abstraction is to be performed in order to come up with the abstraction (Bertrand Russell, *The Problems of Philosophy*, Chap. 4). Still, I submit, that is Aristotle's problem and not a fault of the interpretation. Moreover it is not an ontological but an epistemological problem. To anticipate, I shall claim that for Aristotle we do gain a rather fuzzy, inchoate acquaintance with universals via sense perception. As for the logical structure of the qua operator, it does a bit more than filter, when taken restrictively or abstractively. See Chap. 8 and the Appendix for more discussion (Bäck 1996: 3–83).

Construing abstraction as selective attention has the advantage of unifying the two different sorts of abstraction that Alain de Libera finds in Aristotle: (1) the sort in the mathematical sciences, of taking the form from the matter (in effect, what I have called 'extraction') and (2) subtracting as opposed to adding on attributes (de Libera 1999: 30). Selective attention performs both functions.

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[15] Rollinger (1993: 13, n. 21) has likewise used 'selective attention' to characterize Meinong's view, although not in the same sense. Studtmann (2002: 219) has noted that some scholars have taken Aristotle's abstraction as selective attention. Annas (1976: 29–30) finds this vague, as Aristotle has no formal theory of abstraction. We shall see.

Bodéüs (2001: 124) defines *periaireo* as 'to find a remainder while suppressing all the rest'; cf. *Metaphysics* 1029a11–2. This interpretation of Aristotle would make him fit in not too badly with work on perception and cognition in modern psychology. See, e.g., Ballard 1996: 116–9.

[16] Bechler (1995: 171) goes on to say that "…by qua as an abstraction operator Aristotle means an infinite, or absolute potentiality, construction." (He gets this from the mathematical texts, where the items abstracted, like line and point, do not seem to exist in perceptible substances.)

Likewise, taking abstraction as selective attention provides a common basis for the different views about Aristotle's theory of mathematical objects distinguished by Mueller (1990: 464–5).[17] It leaves open the question whether the *abstracta* are universal or singular (or some other option[18]). It allows for mathematical objects to be either *abstracta* of the physical objects themselves, as Lear and Cleary take them, or of certain features of extension as such, underlying physical objects, as in Mueller's view (Mueller 1979). For this pure extension itself would be an *abstractum*, on which we then perform another abstraction operation. Indeed, we can classify these different interpretations according to what the abstraction is performed upon and what features are being abstracted from.

Thinking of abstraction as selective attention has another advantage. For it gives the intellect, and even the sense organs, an active role in locating these structures in its sense experience: it must "attend" to those features. Still, as I shall stress below, selective attention need not be a self-conscious, deliberate process. View attention then as a sort of 'aiming at'. Aristotle himself seems to have this sort of conception when he attributes ὄρεξις to all animals able to perceive and imagine. [*An.* 413b23] We can translate 'ὄρεξις' as 'desire', but only 'desire' in a basic sense in which all animals can be said to "desire" food when they move towards a source of food. I mean 'attention' in the definition of 'abstraction' in this way too. Again, selectivity also need not imply any sort of deliberation or even of thought. Indeed, the sense organs themselves interact with the environment so as to be responsive to only certain types of stimuli as input. So they respond to stimuli "selectively" without any consciousness or choice being required.[19] (Likewise in modern science particles "respond selectively" to different sorts and quanta of forces.) This interpretation will fit nicely with Aristotle's psychology, particularly with the recursive abstractions constituting the perceptual and cognitive processes.

As opposed to the modern empiricists, Aristotle does not view abstraction as a merely human psychological operation (Bechler 1995: 185). To be sure, he takes abstraction to be a psychological operation. Still for him psychological operations are just as real as other natural operations. So too Aristotle puts the particulars of perception and knowledge in the same category as colors and shapes: quality. For Aristotle we shall see abstraction naturalized. It is no mirror, reflecting nature while being outside of it. It is part of nature. It arises from certain interactions of a human organism with other parts of nature. Thus it will reflect the activity of other natural objects. It also has some special abilities of reflecting upon them. To this extent I can agree that Aristotle holds human mental experience is the mirror of

[17] Likewise Detel (1993: 211–4) takes intelligible matter to be the spatial continuum.

[18] As discussed above *re* types and tokens.

[19] Of course, in the case of animals, certain types of selective attention may require consciousness. My conception of selective attention agrees with Caston 2002: 759: "…Aristotle cannot plausibly mean that animals are continually aware of such changes as a result of deliberately observing them and directing their intention towards them." I.e., not introspection; rather: "not unaware" [*Phys.* 244b12–245a2; cf. 437a26–9; 447a15–7] in "an unobtrusive way". Also Wedin 1993: 153: "…an object is suitable for consideration in abstraction only if there is no such object, but we nevertheless have some idea of what such an object would be like." Cf. Wedin 1989.

nature: as it is a part of nature, it will reflect, and reflect upon, other natural phenomena (Rorty 1979: 38–41).

John N. Martin claims that in antiquity 'abstraction' ('ἀφαίρεσις') in the general sense has two aspects: it conserves something while taking something else away. He goes on to claim that 'ἀφαίρεσις' came to acquire two special meanings: roughly, one Aristotelian and one Platonist: the former consisting in the process of subtraction, or, as I prefer to think of it, in selective attention; the latter in the inverse relation of construction.

Martin takes Aristotle to have a specialized sense of abstraction as concept formation, which is vaguer than the general one, as Aristotle has no theory of conceptual abstraction.[20] However, he says, Porphyry and Boethius made the process explicit. I would say that that Aristotle's commentators were merely restating his views—as Martin himself goes on to imply. Moreover, so I shall be arguing, Aristotle takes both mathematical abstraction and conceptual abstraction as different applications of the abstraction operation, for which Aristotle does offer a theory.

Martin claims that Plotinus and Proclus, following the Pythagoreans and Plato, have a different, special sense of 'ἀφαίρεσις'. In their ontology they construct the more complex things from the more basic ones, ultimately the One, by *adding* features on to it (Martin 2004: xi–xiii, 37–9). Martin holds that going in reverse, so as to break down composites would be ἀφαίρεσις as "subtraction".

> Abstraction is the epistemic converse of the process of physical composition…the mental process of reversion to the One. Ontologically, the Chain of Being proceeds downwards through the process of causation, but the Understanding remounts backwards from the bottom to the top. The process of remotion is called abstraction. (Martin 2004: 163)

Martin does not want to attribute the mathematical or Aristotelian sense of abstraction to Plotinus on account of the standard Hegelian complaint that then the One, arrived at via abstraction, would have less content than the beings emanating from it (Martin 2004: 40, 115 n. 58). Rather, the One is the set of all things, with the things emanating from it its "smaller effect sets" (Martin 2004: 45).

I see some problems with Martin's claim that the Platonists had another conception of. ἀφαίρεσις First, he offers little textual support in favor of this view *re* the occurrences of 'ἀφαίρεσις'. What textual support there is can be explained by the general, mathematical use of 'ἀφαίρεσις', common to both Platonists and Aristotelians, where 'ἀφαίρεσις' just means subtraction, contrasted with addition. It's just that what is left for the Platonists once the differentiations and divisions of the lower genera are removed is a whole or One embracing them all. Moreover, 'ἀνάλυσις' in the *Prior Analytics* etc. seems to mean what Martin is taking 'ἀφαίρεσις' to mean. Alexander of Aphrodisias says that "analysis is the rendering of every composite into its highest principles, and is the way back to the highest principles from the last conclusions." [*in An. Pr.* 7, 14–8] Second, Martin gives a

[20] So too Spruyt 2004: 126–7.

false etymology for 'ἀφαιρέω': as coming from 'φέρω', while in fact it comes from 'αἱρέω' 'to take' or 'to choose' (Martin 2004: xiii n. 8).

Coniglione (2004: 70–80) has a much more convincing account of the difference between Platonist and Aristotelian abstraction: Unlike Aristotle, Plato did not derive universals as common elements from perceptions of individuals. For Plato abstraction is the process of leaving out all the imperfections of the exemplars of Forms and ascending to the Forms themselves. [*Resp*. 525c] Abstraction thus becomes a purifying, intellectual process for apprehending Forms via being reminded of them by sense perception. The Forms themselves are causal principles governing the behavior of their instances. In contrast, Aristotle denies that mathematics can be applied to astronomy. [Cf. *Metaph*. 997b] In the modern period, scientists like Galileo, Descartes and Newton returned to Platonism when they constructed idealized objects like point masses and frictionless bodies by which to formulate laws of nature.[21] "Only by creating fictitious, ideal entities and then descending from them by means of experiment and approximation to the "roughness of experience" is it possible to combine mathematics and reality" (Coniglione 2004: 72). Later philosophers took up this conception: Descartes and Leibniz (despite their protests), Cassirer (1923: 83), Lotze (1880: 151–2),[22] Husserl (1970b).[23]

On Coniglione's account Aristotle and Plato do not have difference conceptions of abstraction proper. In both cases we have selective attention: some things are selected; others omitted. Rather, they differ in what they take to be the results of the abstraction process: on the one hand, universals; on the other, reminders of universals.

Despite the differences between Platonic and Aristotelian uses of abstraction, we can find both uses of 'abstraction' in Aristotle anyway. Abstraction as selective attention concerns the process whereby the *abstracta* are generated; the *abstracta* themselves are "ideal objects". As we shall see, in constructing a universal, Aristotle at best has to go with what holds for the most part, and ignore *im-perfections* etc. He comes up with his universal species, genera, properties, principles from what holds for the most part. Somehow Aristotle gets to perfect geometrical shapes and lines, which have no instances in the actual things *in re* (Mueller 1979: 465). [Alexander, *in Metaph*. 52, 15–25]

When we look in detail, so far as possible, at how Aristotle views universals to be constructed, we shall then find Aristotle having a view of abstraction as selective attention where the content is somewhat idealized: its imperfections stripped away. Later Aristotelians tended to do that too.[24] Accordingly Lear claims that, when a proof holds of some object 'as a triangle' for Aristotle, it holds for one that is perfectly triangular not for it "more or less" (Lear 1988: 242). This switches the sense of '*qua*' from his original conditions—and makes him agree more with Plato.

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[21] Cf. McMullin 1985; Funkenstein 1986: 89.

[22] Cf. Coniglione 2004: 81–2; Rollinger 2004: 151–2.

[23] Trans. Findlay 1970 II.

[24] E.g., Avicenna, *Al-Ibāra* 16, 3–10; Aquinas *ST* I.85.1. Frede 2001: 177: "Abstraction, so Aquinas explains, means to inspect whatever is part of the thing in question without looking at individual features that do not belong to the essence of that thing."

Mathematics and even biology deal with objects where we focus on idealized, typical cases and ignore the imperfections and monstrosities.

Let me close by mentioning other conceptions of abstraction current today, so as to make Aristotle's views clearer by contrast. I have already mentioned the modern empiricist way, of using abstraction pretty much like Aristotle except for restricting it to the psychological and withholding it from the ontological.[25]

Some consider Locke a transitional figure. The selective attention arising when we consider common general features of the objects comes from properties of the objects themselves. The mind is just registering and recording them as universal ideas.[26] But Locke seems to take the mind as doing some selecting and editing on its own. Winkler then charges that Locke is violating what Winkler calls "the content assumption": "the content of thought is determined by its object" (Winkler 1989: 39–41). For instance, Locke wants there to be a general idea of man or triangle (*Essays* II.11.9; III.3.6; III.3.9). But there isn't one in nature; it must be imagined in the mind, apart from the particular images or ideas of triangles or men (Winkler 1989: 23–4). Hence general ideas must be produced via some sort of mental invention.

Berkeley takes abstraction to be selective attention in terms of the mind doing the selecting on the basis of what it wants to look at—perhaps for pragmatic or social reasons just as much as for scientific ones (Flage 1987: 35; Winkler 1989: 42). Winkler claims that Berkeley has two conceptions of selective attention (1) the contemplative: the intellect fixes its attention on certain features in its experience and ignores others (2) and the behavioral: by conversation: talking about some features of a man and not others; or by demonstration: using some features of the object in the demonstration and not others (Winkler 1989: 86–8). In either case, the abstractions produced need not reflect what exists *in re*. Theory based on such abstractions may be merely heuristic, a mere model. In contrast, Aristotle wants more realistic abstractions, representing real structures.

The rationalists differ from the empiricists in holding that innate ideas, as opposed to sense experience, make abstraction of the universal from particulars possible (Winkler 1989: 69). Still, to some degree, the mind is operating on the sensory content and not recording its general features passively. As we shall see in Chap. 6, Aristotle perhaps would agree.

Another usage, common to empiricists and rationalists, distinguishes 'abstraction' from 'exclusion'. Thus Descartes says:

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[25] Thus, for instance according to Priest (2006: 73) abstraction occurs when "the factors which are deemed to be of central importance are selected out …other factors which are of no or of only secondary importance are ignored."

[26] Mackie (1976: 107–12) and Taylor (1978) argue that Locke takes abstraction to be selective attention. Cf. *Essays* II.13.13. Winkler (1989: 40–1) claims that Locke does not connect up selective attention with abstraction. Donald Baxter (1997: 314–5) takes Locke, Berkeley and Hume to remove properties to get an idea in abstraction. But see his n. 59 & 328–9 where Baxter cites many who take Locke to have a view of selective attention. Baxter attributes that to Berkeley but not to Locke.

> There is a great difference between abstraction and exclusion. If I said simply that the idea of which I have of my soul does not represent it to me as being dependent on the body and identified with it, this would be merely an abstraction, from which I could form only a negative argument that would be unsound. But I say that the idea represents to me as a substance that can exist even though everything belonging to the body be excluded from it, from which I form a positive argument, and conclude that it can exist without the body. ("Letter to [Mesland]," May 2, 1644 [AT, Vol. IV, p. 120; CSM, p. 236]; "Letter to Cleselier," Jan. 12. 1646 [AT, Vol. IV, pp. 357–8; *Principles* I.53])[27]

Both abstraction and exclusion agree with Aristotle's conception of abstraction. Descartes distinguishes the two in terms of the sort of objects produced by the abstraction operation: if the *abstracta* cannot exist as separate substances, the operation is "mere abstraction"; if they can, it is "exclusion", which I have called 'extraction' above. Generally, abstract objects for Aristotle do not exist independently from their bases as separate substances. Descartes has introduced 'exclusion' for "abstract" objects that are such separate substances, like souls once physical attributes are "excluded" from the conception of human beings. Some empiricists and later philosophers like Stout have similar views (Stout 1901–1902: 13).[28]

Another, more modern usage, aggravating to and documented by Angelelli, makes 'abstract' amount to 'incorporeal' or 'universal': not existing in space-time (Angelelli 1984: 462; 2004: 18–25). This use seems to have its roots in the Platonist, idealized sense of 'abstraction'. However now it has lost the Platonism and has assumed, explicitly or implicitly, a materialism or a positivism. Thus the ideal objects, particularly those used in scientific theory, no longer are taken as more real than their exemplars, but rather are taken as mere shadows of them or as heuristic devices for our knowledge of them. All it would take to give 'abstract' this sense is for people to take the Platonist, idealizing usage of abstraction and to add on a materialist attitude that only physical singulars accessible to sense perception have reality in a robust sense.

Peirce has a way of reconciling these two uses. For him "abstraction" includes two processes, the "subjective", where an abstract noun is made from a predicate, and the "precisive", where a verb or predicate is generated from a noun by universalizing it. In a geometrical proof, the subjective is used to make the figure of a particular triangle from the general predicate, 'is a triangle', and the precisive then to generalize the conclusion made from that figure (Shin 2010: 41–58, 51; Peirce N3.917).

Frege has not only (1) the traditional, Aristotelian use of 'abstraction' but also two more (Angelelli 1984: 459, 2004: 17). (2) He suggests but finally rejects *definition*

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[27] Cf. Skirry 2004; Flage 1987: 21; Winkler 1989: 37.

On the empiricist side: John Norris (1701–1704) says that when things are really distinct considering them separately is not abstraction. Abstraction is "the drawing away of a thing from its self." Isaac Watts (1725: 200) says that negative abstraction: consider things apart which can exist separately; precisive abstraction: consider things apart which cannot exist separately. Thomas Reid (*Essays on the Intellectual Powers* V.vi) calls the separation of two singular qualities that appear together "abstraction strictly so called"; the latter "generalizing". Cf. Winkler 1989: 26–8.

[28] Cf. van der Schaar 2004: 208.

by abstraction. Here a term is introduced in the context of an equivalence relation, of the form of Hume's Law: if we have a relation '$\Phi(\xi,\zeta)$' that is commutative and associative then we can write instead of it '$\S\xi = \S\zeta$'.[29] To use the classic example from the *Grundlagen*: the number of F's ↔ the number of G's iff the F's and the G's are equinumerous (Frege 1953: 56). The point is that the term introduced, '§' or 'number', is completely uninterpreted. Its only content comes from this equivalence, the "definition by abstraction". So then we "look around" and see if we can use the term in some interpretation useful to us (Carnap 1956: 1, 117; Angelelli 1979: 108–23). Frege ended up rejecting this method because it leaves the term completely undefined for things that cannot be put into the equivalence. This is the Caesar problem: in the definition of 'number': as Caesar cannot be put into the relation of equinumerosity, it is left open whether Caesar is or is not a number. So we cannot rule out that Caesar is a number and hence whether we are right in our interpretation for 'number' when the domain is our ordinary world (Frege 1976; *Grundgesetze*, Vol. 1 §10; *Grundlagen*, §§55–6, 65).[30]

Frege also discusses and ridicules (3) a "magical" sort of abstraction, where different things are made identical by abstracting away all their differences. He was objecting here to mathematicians like Cantor and Ballue, who wanted to generate a set of identical units to use as numbers (Hill 2004: 222–3, 234). Indeed he goes so far as to ridicule this sort of abstraction as a miraculous divine force, "Shiva", beyond the comprehension of ordinary mortals (Frege 1979: 69).

For Frege "ordinary abstraction" (1) consists in comparing objects with respect to their properties and taking the ones in which they agree so as to arrive at a concept under which all the individuals fall. "Now this concept has neither the properties abstracted from nor those common to" those individuals (Frege 1979: 71). Thus the concept 'female mammal' does not bear young or give milk, although the objects that are female mammals do.

In contrast, the "divine" abstraction (3) sticks to the level of the original individuals, but takes them now as stripped of some of those properties. Frege ridicules this sort of procedure often (Frege 1984a: 204–5). He criticizes Husserl for using a type of numerical abstraction that makes "things absolutely identical without changing them."[31] But, Frege insists, this is possible only in "the washtub of the mind". He objects that "the way of considering an object, and the abstractions performed in the mind of a subject, seem to be being taken for qualities of the object" (Frege 1984c: 231). If we consider Jupiter, he says, as an isolated object, it still does not

[29] Quoted in Angelelli 1984: 458.

[30] Cf. Dummett 1981: 402: "Frege has laid down that the value-range of a function f is the same as that of a function g…just in case f and g have the same value for every argument." Frege then says that this does not suffice "to determine uniquely the reference of every value-range term." "…for an object not given as a value-range, we have no means of deciding whether it is a value-range …"

Frege's method of definition by abstraction is having a current renaissance though. Cf. K. Fine 2002; the articles by Fine and Wright in Schirn 1998; Wright 1983, 1997, 1999; Schirn 1996.

[31] Husserl claims to base number on a type of abstraction different from Locke and Aristotle: we get concept of a number from taking a set of like elements and retaining each "only insofar as it is a something…" (Husserl 1970a: 88–92, 165–6; 1981: 16–7).

lose its shape, mass or gravitational relations. It would be silly he says to think that the mental act of abstraction creates a new object, an impoverished Jupiter if you like (Frege 1984c: 232). So too he writes,

> By abstraction the logician acquires the concept pea, and to him it does not usually matter whether he has a handful more or less. The individual peas remain completely unchanged in the process and are not thereby transformed into the concept pea or replaced by it, but continue to exist beside it. The present process is much more marvelous: each individual pea divests itself entirely of its nature as a pea, but—and this is the most marvelous part—continues nevertheless to have a shadowy being separate from its fellow peas and without fusing with them. (Frege 1984b: 254)

Frege objects that the abstract peas, now stripped of all difference, have no right to claim any plurality of objects. Rather what is abstracted is the general concept of pea.

I have described Frege's views in some detail because they have some relevance to how we understand Aristotle. As we shall see, Aristotle insists that we are not creating transcendent, magical objects via abstraction. When the geometer abstracts from physical objects to consider them only as spheres and lines, she is not creating new individual substances, Aristotle says. Yet she is treating them "as if" they were independent substances. Moreover, the objects so considered are hypostasized so as to be subjects and not, as with Frege's reputable abstraction (1), unsaturated concepts of objects (in the formal language: predicate functions of individual constants). That is, unlike Frege, Aristotle allows for these *abstracta* to have properties of the same types as those that the original substances have. Thus not only is the Cube in Mecca cubical but so too is the cube studied in geometry. In contrast, Frege rejects Aristotle's antepredicamental rule, that the predicates of the predicates of an object are predicates of the object (Angelelli 1967: 52–3; Bäck 2000: 178–85). Frege holds that the predicates of an object are concepts, and their predicates are higher-order predicates not predicated of the object. Universals of the sort that Aristotle allows are objects formed by abstraction. Like Frege, Aristotle will reject the magical abstractions (3) leading us to Plato's transcendent Forms. Yet, by ending up with objects and not concepts, Aristotle might have become a bit too magical for Frege's taste. But now we need to see how Aristotle works his magic.

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Chapter 3
Abstract *Relata*

Just as Aristotle himself says about 'perception' and 'knowledge', 'abstraction' seems to signify a relation, requiring two correlatives: what is abstracted and that from which that originates, its base, connected by the relation of abstraction. Working out what Aristotle says about the relational features of perception and knowledge will help us to understand Aristotle's views on abstraction.

Aristotle takes perception and knowledge to be mental states. Mental states are *relata* simultaneously coming to be along with their objects. Aristotle denies perception and knowledge to be alterations because they have no process of coming to be. [*Phys*. 247b1–12] Aristotle speaks likewise of the moral traits, which are "…the states of the soul, all of which too exist in virtue of particular relations…" [247a1–2] Since abstraction is a mental state, it too will be relational.[1] Likewise it and its object come into being simultaneously and instantaneously.

As the details of his psychological theory (to be discussed in later chapters) make quite clear, Aristotle takes perception and knowledge to be types, if not species, of abstraction. That is, both of these consist in abstracting something from something else. We can see this already in his account of perception, where the attributes of the substance are given without the matter. [*An.* 424a18–24; quoted in Chap. 5] In perceiving, the perceiver's sense organ is impressed or stimulated by individual material substances. However, these individual substances do not affect the perceiver insofar as they are material, but only in respect of their "sensible forms", namely, those attributes to which the particular sense organ is sensitive. Thus the eyeballs (*qua* seeing) are affected by only the visual attributes of the individual substances. Moreover, although perceiving represents these forms, it leaves out the matter. In seeing Madonna, we do not produce a material girl inside our eyes. Aristotle views perceiving then as a process that abstracts certain attributes: first, it abstracts the

[1] Sometimes Aristotle calls perception a type of motion. [*An*. 416b33–5; *Phys*. 201a18–9; *Insom*. 460b16–20] Elsewhere he puts perception under measurement. [*Metaph*. 1020b30–2] Motion and perception will qualify as relations. Cf. Luna 1987: 140–5; Alexander of Aphrodisias, *On Aristotle's Metaphysics 5* [= 406, 35–407, 4; translated & comm. William E. Dooley SJ 1993: 163, n. 365, on 406, 27–9].

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'sensible forms' from the matter of their individual substances, and, second, it is affected by, or attends selectively to, only some of those forms: only to the visual or the audible or the tactile ones. Perceiving then does a lot of abstracting.

Likewise Aristotle considers knowledge a type of abstraction. The sciences "cut off a part of being and investigate the attributes of this part—this is what the mathematical sciences for instance do." [*Metaph*. 1003a24–5; cf. 1025b7–10] The mathematical objects, dealing with the simplest objects, deal with "the ultimate abstractions." [*Metaph*. 1078a13]

Now for Aristotle it does not follow that, just because types or species of abstraction are relations, abstraction must *ipso facto* be a relation. For he himself says that perception and knowledge are relations whereas their species are not, as with grammar: "for grammar is not the grammar *of* something." [11a27–8] Likewise it might be that species of abstraction are relations while it, their genus, is not. Nevertheless, an abstraction is an abstraction *of* or *from* something, and so seems to be relational. Indeed, on Aristotle's own criterion for relation, abstraction is a relation. That is, in its very definition or account, reference must be made to another: abstraction is the selection *of* certain features *from* an object.[2] [*Cat.* 7b39–b1] When Aristotle calls the mathematical objects "the things said *from* abstraction" (my emphasis), he seems to hint at the relative character of abstraction.

We have hints also in the *Categories* that Aristotle considers abstraction to be a relation. When Aristotle speaks of 'slave' as the proper correlative for 'master', he speaks of "stripping away" ("περιαιρουμένων") [7a32 & 35; 7b2] *from* the human being all the attributes not pertinent to being a slave: being biped, being receptive of knowledge, being a man. [7a36–7] 'Περιαιρέω' has the sense of 'strip off', as a soldier strips off her helmet, or as the sand mold in which metal has been cast is taken away from the metal, so as to leave only what is of importance, the gold casting.[3] So again we have in 'the stripping off *of* x *from* y', a relational operation.

This operation of stripping away makes what is left, the correlatives, like 'master' and 'slave', quasi-subjects, also known later as 'hypostases'.[4] We can have statements true of the slave that are not true of the human being who is the slave: a slave must have a master, while it is not necessary that that human being have a master. The relative independence of these quasi-subjects from the substances in which they exist will also make the special sciences, which cut off parts of being to talk of them as if they were independent subjects, possible.[5]

Perhaps Aristotle has used 'περιαρέω' in contrast to 'αφαιρέω' to indicate here there is an active process of stripping away, as the attributes of the individual substance, the human being, are known and lie ready to hand to be stripped away

[2] Or, as the quote on perception has it, 'receiving x without y'.

[3] So LSJ, s.v. περιαιρέω.

[4] Plotinus, *Enneads* VI.1.7.27–8: "A hypostasis is not that which is said of the subjects but of that which is said relative to something". See n. 5.

[5] Perhaps this is what Ammonius means when he says, *in Cat*. 6, 11–7, that τὸ πρὸς τι is said in two ways: absolutely or relatively (in virtue of a position (σχέσιν). Cf. 21, 3; Sextus Empiricus, *Adversus Mathematicos* 8.162.

(Lewis 1991: 279). Or, perhaps, as Aristotle may not use the same terminology in all of his works in the same sense, he is using 'περιαρέω' in the sense of 'αφαιρέω'. This would weaken my claim that 'αφαιρέω' does not mean 'subtract'. Still, my point would remain that, although we may "subtract" the attributes of the human being that we know about, we cannot subtract the ones that we do not know about. So 'stripping away' like 'subtract' would have acquired an extended, rather metaphorical sense beyond the usual stripping away of a helmet or sand or the subtraction of one quantity from another.

Accordingly, I shall suppose as a working hypothesis that abstraction is a relation. We shall find this hypothesis borne out, as what Aristotle says about the structure of perception and knowledge transfers readily to abstraction.

3.1 Relation and *Relatum*

Many have despaired making much of Aristotle's theory of relations. Klaus Oehler claims that Aristotle has the hopeless task of trying to fit the relational structure between things into the predicational structure of a thing belonging to a class (Oehler 1982: 203). But I shall try.

Aristotle names the category of relatives not with the abstract term ("relation") but with the concrete one ("*relatum*"). So too he does in the other categories with the "*quantum*", the "*quale*", the "when", the "where". [1b26–7] The expression that he is using, 'τό πρός τι', is a substantive, literally, 'the [or: what is] relative to something'. Such a type of expression for him as for his teacher has ambiguity: it may refer to an object that is being related or to the relation itself. Thus Plato calls the Form of Equality, 'the Equal'; the Form of Goodness 'the Good'. [*Phd*. 75c9; *Resp*. 509a3] Yet at the same time Plato will talk about the things that are equal as "the equals". [75a1] There are texts where Aristotle *might* be using 'τό πρός τι' to signify the relation and not the thing being related. [11a21?] Yet, as his examples indicate, he mostly uses 'τό πρός τι' to signify a thing being related.

For *relata* Aristotle complicates the situation as he discusses examples like 'master' and 'slave', 'wing' and 'bird', where the nouns being used to signify *relata* are concrete, as well as examples like 'perception' and 'knowledge', and 'standing' and 'sitting', where the nouns being used to signify *relata* are themselves abstract. [6b2–3; 6b11–2; 6b29–30; 6b38–9] So then some of the *relata*, although described by the concrete term '*relata*', will be items that we might well call "relations", as they themselves are named by abstract terms like 'perception'. We could think of an ideal language where we separate out these types of *relata*, so as to have different names for them and for the relation connecting them—at the least by using 'relations', 'abstract *relata*' and 'concrete *relata*' to label them.[6] However, Aristotle is starting with his *endoxa* of ordinary language use where these cases are mixed.

[6] That is, even if the *relatum* and the relation connecting it to its correlative end up being the same thing, at least this will be given by argument and not by an accidental quirk of the notation.

Ordinary usage encourages Aristotle to use the same term sometimes to name one of the *relata* as well as the relation itself. Speaking strictly, as was done later in the Aristotelian tradition, the relation itself can be signified by an abstract term ('paternity'), while the *relatum* can be signified by a concrete term ('father'). However, such uses of abstract terms occur rarely in Aristotle, although they do appear in the Greek commentaries of Alexander et al.

Particularly in his example where he uses 'slave' instead of 'slavery', Aristotle may be distancing himself from Plato (Scheibe 1967: 28–49). Plato held that the things in this world are homonyms with respect to the Forms. [*Prm*. 133d2] Forms have relations to each other, and their instances have relations to each other in separate realms. [*Resp*. 438b] Thus a slave is a slave of a master, but slavery is slavery for mastery, and mastery is mastery of slavery. [Cf. *Symp*. 199d–e.] Plato uses abstract nouns like 'mastery' as well as 'master itself' and 'what a master is' to signify the Forms and their relations. [*Prm*. 133d7–134a1; 134a3–b1] Human beings in our world may participate in these relations of slavery and mastery, but imperfectly and homonymously, just as an image of a man may share the name of 'man' with Socrates. [Cf. *Cat*. 1a2–3] In reaction, Aristotle may well have insisted upon a material instance of 'slave', as opposed to the ideal 'slavery', in his example to emphasize that his *relata* concern slavery perceptible in this world.

However, in other examples of *relata* and relations, as with knowledge the Form and knowledge the individual, sc., an instance of the Form, Plato mixes his terms more. He uses ἐπιστήμη for both the Form in the 'knowledge itself' and 'what is knowledge' constructions and for an instance of that Form in our world. [134a3–b1] Aristotle may have inherited from Plato as from ordinary usage this tendency to use 'knowledge' for both the relation of knowing and an instance of knowing (to be discussed in the next chapter).

An item in the category of *relatum* has an existence dependent upon the existence of its correlative *relatum*. Without something to have wings, a wing does not have the relation of being a wing, and, *vice versa*, without a wing, there is not something with the relation of having a wing. For instance, what it is to be a slave is just to be in the relation of slavery, the condition of being a slave of someone. [*Pol*. 1254a8–13] The relation proper belongs to the nature or essence of the *relatum*.

Relations agree with Aristotle's doctrine, that no accident (taken as the accidental thing and not as the accident only) is identical to its essence in its definition or account. [*Metaph.* VII.6][7] After all, the swan or the thing having whiteness as an accident may be white, but the swan or the white thing is not whiteness. Just as 'whiteness' or 'being white' differs from 'the white (thing)', so too for relations: 'paternity' or 'being a father' differs from 'father' and from the male animal who happens to have begotten an offspring (Porphyry, *In Cat.* 124, 6–14; Mignucci 1986: 102–3).[8]

Unlike other accidents, *relata* have a special status in that in their very conception and definition they point to something beyond themselves: a parent is a begetter

[7] This is a complex issue. See Bäck 2000: 185–97.

[8] At least, the relation constitutes the essence of one of the *relata*. So it would seem in 'the father is the father of a child'. Yet we shall see that once both *relata* are named strictly, the relation is the essence of both *relata*, which are its paronyms.

of its child; a child is something begotten by its parent. [Cf. *Metaph*. 1021a23–4] More importantly, even the relation itself involves reference to another: paternity is the begetting of a child by a father. Unlike *relata*, items in other categories have no reference to others in the very definition of the attribute itself, although the things having those attributes do so refer. The abstract term ('whiteness') does not refer to another, even though the concrete term ('white'), taken concretely, does: 'the white', taken to mean '(a thing) having whiteness', presupposes a thing having that attribute. [*Metaph.* 1031b22–8] Items in the other accidental categories make necessary reference to other things only after they have come to exist in substances, and it is this inherence, this "being in", that gives them this attributive character. The thing that has a quality, quantity etc. does make reference to another. However the quality, quantity etc. itself need not make reference to another. In general the paronyms of items in accidental categories (the just; four) other than relation (may?) make reference to another, while those items themselves (justice; fourness) do not. Substances differ from all accidents because both the thing and its essence make no reference to another. An animal can be perceived and thought of independently of its foot, and a foot can be perceived and thought of independently of the animal having it (Philoponus, *in Cat.* 114, 19–21). If we consider the essences of animals in terms of what they are, and not in terms of the things having these essences, again we can conceive them without referring to another. In contrast to substances and also to other accidents, the very definition of a *relation* like parenting or slavery makes reference to something else. This distinctive feature of relations makes it possible for them to connect other things without themselves needing to be connected.[9]

Aristotle keeps this same account of *relata* in other texts. In the *Metaphysics* he divides *relata* into three types: the containing and the contained, like the double and the half; the active and the passive, like father and son; the measure and the measurable, like perception and the perceptible. [1020b25–30][10] He claims that the first two types differ from the third because the essence of one of the former "includes in its nature a reference to something else, not because something else is related to it", while the last type is relative "because something else is related to it." [1021a26–30] Thus in the last type, sight is the sight of something like color and not the sight of what is the object of sight. [1021a33–b1] Aristotle objects to such repetitions of 'sight' as babbling. [*Soph. El*. 173a32–40] However this difference seems to concern ordinary language use rather than the definition of relation. For if we say instead 'sight is the sight of the visible' or perception is the perception of the perceptible', as Aristotle himself will have it in *Categories* 7, this difference disappears.[11] In any case, all three types satisfy the general definition of the *relatum*, as needing reference to something else in its very definition.

[9] And avoid a Bradleyan regress. Cf. Bäck 2003.

[10] As Ross (1936: 535) notes, this is the most extensive classification. Parts of it appear also at *Metaphysics* 1056b34–1057a1 and *Physics* 200b28–31. Also cf. *Topics* 125a33–b4.

[11] At *Sophistical Refutations* 165b13–8 Aristotle says that in dialectical contests babbling, either the repetition of terms or solecism, speaking barbarously, will make you lose. Of course the introduction of technical terms would count as solecism but also counts as the respectable philosophy of Aristotle himself.

Because of the need to specify the other *relatum* in the definition of the relation itself, a *relatum* has a unique kind of "conversion": e.g., a parent is a parent of a child; a child is a child of a parent.[12] For "…all *relata* convert." [*Top*. 149b12] In stating such conversions Aristotle allows the preposition or case of the *relatum* contained in the predicate to change, grammatically if not logically: a rudder is a rudder *of* a boat; something ruddered is ruddered *by* a rudder.[13] On account of this I signify the connection of the predicated *relatum* to the rest of the statement by a generalized prepositional connective 'π'. Relational conversion thus has the form:

$$\mathrm{S\,is\,S}\,\pi\,\mathrm{P;\,P\,is\,P}\,\pi\,\mathrm{S}.$$

Aristotle requires this sort of "conversion" to hold uniquely for all *relata.* [*Categories* 7a22–5; cf. Porphyry, *in Cat.* 115, 17–23; Simplicius, *In Cat.* 179, 27–180, 17; 181, 2–18][14] Items in the other categories do not satisfy the requirement. E.g., a foot, as a primary substance, is a foot of an animal, but an animal is not an animal of/by/for a foot. Particularly the primary substances have no such relational dependence. [*Cat.* 6a36–7; 8a31–3][15]

Some of Aristotle's examples of *relata* have trouble converting thus. Aristotle says that 'large' (μέγα) is a *relatum*, as a mountain is said to be large relative to another. [6b8] Earlier he uses the comparative 'larger'. [5b38–9] The problem is that 'large' and 'tall' do not on the face of it satisfy the criterion for *relata* of having a proper conversion. Mt. Everest may be large as a mountain, but how do we put this into the conversion schema? To be sure we can say that a mountain is small "relative to" Mt. Everest. Does this suffice to make largeness and smallness relations? If we name the *relata* strictly, then we can get the conversion to work: the large is large relative to the small; the small is small relative to the large. So Aristotle seems to say. [5b14–29; 5a22–3] This move though looks somewhat suspect as it has to use an extensive paraphrase of the original statements. Moreover, Aristotle says about

[12] Cf. Avicenna, *Al-Maqūlāt* 146, 7–15.

[13] 'By a rudder' is in the construction of a dative of means. Bodéüs (2001: 122) says that the difference of using genitive and dative cases in the conversion of *relata* is held to be "negligible" by Aristotle. Still, cf. *Topics* 125a5–1; Menn 1995: 311–37. Evangeliou (1988: 81) notes that Porphyry distinguishes two types of relatives: in thought; in expression (1) in the same grammatical case (2) in a different grammatical case.

[14] The usual interpretation is that this conversion amounts to the first definition proposed for the *relatum*, that a *relatum* is what is of another. [8a24–31], but is a consequence of the second, final definition given by Aristotle at 8a31–2. Cf. Ammonius, *in Cat*. 77, 28–9; Sorabji 2002: ix.

We can think of counterexamples to this claim particularly in accidental categories like action and passion. First, consider, e.g., 'the one hit is hit by the one hitting'; 'the moved is moved by the mover': Aristotle does not put actions and motion into the category of relation proper. Yet perhaps he thinks them types of relations. He himself mentions position as a relation. [6b11–2] In some later accounts of the *sufficientia* these categories are subsumed under relation, perhaps for this reason. Second, Aristotle will have to mash ordinary language a lot: 'the ruddered is ruddered due to a rudder' etc.

[15] 'Being said of' should not be construed as a relation. Cf. Philoponus, *in Cat.* 130, 18–9: "'Being said of' is a consequence of being, and not conversely".

such cases also "even if they were taken as *quanta*…" [5b30; 6a9–10] Also at 5b1–4 he seems to make 'large' (πολύ) a *quantum*, since the surface is large.[16] Indeed Aristotle could have taken largeness itself also as a quality, if we think of it as being on one extreme from the mean of ideal proportion, as in Greek sculpture and architecture.[17]

Aristotle's hesitation over cases like largeness comes, I think, from 'many', 'large' etc. not satisfying the conversion characteristic of *relata*. The mountain may be large relative to the hill, but how do we convert? With great difficulty if at all. It is far easier to convert the comparative: e.g., 'the taller (mountain) is taller than the shorter (mountain)'; 'the shorter (mountain) is shorter than the taller (mountain)'. Despite all this, *Categories* 5b14–29 concludes that clearly large etc. are *relata* and not *quanta* as they are large relative to one thing and small relative to another. To take Aristotle's example, we say that the people in a village are many relative to the usual population of the village, but few relative to the usual population of Athens. [5a22–3] In effect taking 'large' etc. as *relata* amounts to taking the adjective as equivalent to its comparative. We see him doing perhaps when he first gives 'larger' as an example and then switches to 'large'. [6a38; 6b8–9] Here Aristotle may again be following Plato's terminology for *relata* and relations. For it is asserted in the *Parmenides* that greatness is greater than smallness and of nothing else. [*Prm*. 150c4–6]

In sum, although Aristotle does not discuss the subtleties of such cases much in the *Categories*, he does insist there on the *relatum* itself pointing to something beyond itself: a parent is an individual substance in the relation of parenting a child. The correlatives of parent and child have a necessary connection. In thinking of and defining the relation of a *relatum*, reference must be made to its correlative regardless of which one is being defined: parenting is the begetting of a child by the parent; filiation is begetting of a child by a parent.[18] Aristotle distinguishes a *relatum*

[16] (Ps.) Alexander (*in Metaph*. 802, 20 [on 1088a15]) says that *relata* [i.e., the great and the small] are affects (πάθη) of the *quanta*. Thus Avicenna (*Al-Maqūlāt* 132, 8–13; 136, 14ff.) takes long and tall to be *quanta*, unless "relation to a third thing is added" and then they are *relata*. Cf. Simplicius, *in Cat*. 168, 16ff; Plotinus, *Enneads* VI.1.6.

[17] Cross (2005: 54) cites *Physics* V.1 [should be: V.2, 225b11–30] here. Cf. Henninger 1989: 8–10 for the claim that every relation between two objects must be based on a change intrinsic in at least one of them. As Cross (2005: 61) says, "What makes it true that Theaetetus is taller than Socrates are just the non-relational facts that Theaetetus has the height that he has, and Socrates the height that he has. I take it that this relationship is logically necessary…" In modern terms, the relation supervenes by necessity on these attributes.

[18] Aristotle does not use this example in *Cat*. 7 but does so at *Metaph*. 1021a23–4. Plotinus emphasized this example; cf. *Enneads* 6.1.8.14–15. Ammonius, *in Cat*. 76, 12–3, also uses this example which is like the master and slave except that one of the substances in the relation must exist as prior in time. Cf. Simplicius, *in Phys*. 836, 16–7.

Aristotle and the tradition focus on two-place relations almost exclusively. Cf. Ammonius, *In Cat.* 66, 16. Also they assume that 'son' has a two-place relation with the father, and not a double relation to both mother and father—perhaps on account of Aristotle's theory of reproduction where the father contributes the entire form of the offspring. But too the correlative of the father is usually thought to be 'son' and not 'child'. I shall just use the example of parent and child in place of father and son.

from an item in another category by the *relatum's* needing reference to another thing in its definition: "for *relata* being is the same as holding somehow in relation to something." [8a31–2; cf. *Top*. 142a26–33; 146b2–4; 125a33–b14][19]

Aristotle does admit though that (in ordinary usage) both *relata* need not be simultaneously existent *in re*. [7b15ff.] The general presumption in science, however, is that both *relata* exist *in re* together now.[20] Ammonius states what I shall suggest below is Aristotle's general policy, that *relata* must be simultaneous in act but need not be so in potency. [*in Cat*. 76, 23–30] I shall argue that this modality condition, of actuality, forms part of Aristotle's determinacy condition for *relata*. Still, the simultaneity of *relata*, even when stated strictly, does not rule out one from being causally prior to another, as with the father and the son. [*in Cat*. 76, 12–3][21]

Aristotle's views become much more coherent if we suppose that he has a two-stage analysis of *relata*: (1) an initial stage on the endoxic level of ordinary language, and (2) a technical stage on the level of scientific inquiry. On the first stage *relata* need not be simultaneous; on the second stage they must. Perhaps Aristotle has these two stages of analysis also in first giving an endoxic definition of the *relatum* and then discarding it in favor of a more adequate one. The first definition ("what is said to be what it is relative to another") is based on what is being said, what is evident to us, while the second ("their being is the same as being related somehow to something") is based on real being, what is evident in itself. [6a36–7; 8a31–2][22] Perhaps the case of the large fits the first definition but not the second one.

We can see these two stages also in the account of what things can be in a relation and what names can signify the *relata*. Aristotle may be admitting that items in other accidental categories satisfy the endoxic definition of a *relatum*, that it involves reference to another thing. For a white (thing) and a sitting (thing), and even some secondary substances, like foot and wood, must make reference to other things, notably to the primary substances: the whiteness *of* the swan; sitting *on* the

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[19] Porphyry (*in Cat.* 124, 4–8) uses the relation-*relatum* distinction here so as to explain how the *definiendum* is not taken in its own definition: the *relatum* is defined relative to the relation. Cf. Simplicius, *in Cat.* 202, 12–9.

[20] Also, as Aristotle remarks at *Categories* 8b15–21, if an individual is known to be a *relatum*, so must its individual *correlatum* be known. Cf. Ammonius, *in Cat.* 79, 17–23.

[21] Although clearly the issue of causal priority remains a problem if *relata* are simultaneous in act. Cf. (ps.) Simplicius, *in de An.* 110, 1–7: "For, as has been said in the *Categories*, color as perceptible is simultaneous with the perceiving, while as color it is prior by nature. But this is worthy of objection: even for *relata* the cause is prior to the caused, as this is also said in those [pp. of the *Cat*.]. Now the knowable is prior as a leader (is prior) to the one being led and as definition [limit] (is prior) to the one being defined [limited]. On account of the same cause on account of which the actuality is before the potency, also the knowable is before the knowing: for it is prior as by nature." Sorabji (1995: 1–10) suggests that the author might be a Priscian of Lydia, a colleague of Simplicius.

[22] So too Luna (1987: 137–8) says about reconciling the two definitions of the *relatum*: the first based on being said, what is evident to us; the second on being, evident in itself. She claims that Simplicius thought both definitions adequate, while others disagreed. Cf. Simplicius, *in Cat*. 201, 31ff.; Ammonius, *in Cat*. 77, 4–16; Philoponus, *in Cat*. 124, 17ff; Olympiodorus, *in Cat*. 109, 20ff.; Elias, *in Cat*. 214, 21ff.

floor; the foot *of* the dog; the wood *of* the tree. However, on the strict level, *relata* differ from items in other categories in having reference to another thing in the definitions of their very relations.[23] So not merely the *relatum* but also the relation has a reference to another. Aristotle perhaps thinks that this move makes an improvement on Plato's characterization, that *relata* are "of something" or "somehow qualified relative to a correlative". [*Soph. El.* 255c14–5; *Resp*. 438b4–c4; cf. Simplicius, *in Cat*. 217, 8–32] For, although Plato does admit *relata* like 'greater', 'double' and 'knowledge' he tends to call them *qualia* (ποιά) and say just that *relata* are "of something alone".

Which things then are *relata* referring to correlatives in their definitions? On the first endoxic stage of analysis (1), the *relata* themselves need not belong to the category of relation. For instance, a [particular] wing is the wing of something winged: one *relatum*, the wing is a substance, while the other, the winged, is presumably a paronym of the relation, being winged. [7a1–2; cf. 1a12–5][24] Similarly, being ruddered is a relation having the rudder and the ruddered as its *relata*. [7a10–5] Like the wing, the rudder is a substance: Aristotle says that part of substances are substances. However the winged and the ruddered[25] are not substances but *relata* having their being as being *in* the individual substances, this bird and that boat. [8a13–28; 8b20–1] We might be inclined to take expressions like 'the winged' and 'the ruddered' as incidental (or accidental) names of individual substances: substances having wings or rudders. They are, but, given that Aristotle recognizes individuals in categories other than substance, he is taking such names also to name, not incidentally (*per accidens*) but essentially (*per se*) accidents, real incidental things, that happen to be *in* individual substances—here perhaps in the category of *relatum* (or having or quality).

Even in the first stage Aristotle does not require all relations to have at least one *relatum* in another category. Sometimes both *relata* are paronyms derived clearly from relations, and are neither substances nor from substances, as in the case of the master and slave and that of the double and the half.[26] These are derived logically from the relation itself, like slavery and double-ness, although common speech may give them different etymologies. However the *relata* of perception and knowledge are not derived from the relation. For Aristotle admits that the objects of perception and knowledge can exist beforehand, independently of the correlative perception and knowledge. These objects include items in the category of substance like a

[23] Cf. Plotinus, *Enneads* VI.1.7.35; Philoponus, *in Cat.* 109, 12–5.

[24] Or, perhaps, these are paronymous terms, derived from the substances: 'winged' from 'wing' just as 'human' is from 'man'. Below I suggest that this option is unlikely.

[25] I.e., taken not as the substances that are winged and ruddered, but the merely winged or ruddered thing; sense (2a), discussed below on p. 57.

[26] In examples like this, accidental features of the (Greek) natural language obscure the structure of the relation and its two paronyms. In English as well as in Greek, 'master' and 'slave', and 'half' and 'double' are said from the relation of slavery and being double, but only the former etymologically. Yet Aristotle does insist that the correlatives be stated precisely. [6b36–8] When he does so himself by making up terms like 'ruddered', he makes the structure of paronymy apparent.

body, a hand and a head. [8a5; 8b14–5][27] Like the wing and the rudder, then, the objects of knowledge and perception serving as *relata* are not themselves *relata* or relations (except insofar as they are taken in such relationships).

Nevertheless, despite what Aristotle says in these passages, elsewhere he goes on to make a finer distinction (Everson 1997: 120). On this second stage of his analysis (2), although the particular wing is indeed an individual substance, when it is taken in the relation of being the particular wing of that bird, it is being considered *qua* winged, namely, in the relation of being a wing of, and not a wing or *qua* bird (or *qua* substance or *qua* the substance wing). Thus at 7a1–2 Aristotle says that the wing is said to be the wing of a bird not *qua* bird but *qua* winged. The being of that wing as the wing of a bird depends on the being of that bird. In other words, even if the particular wing is a substance existing in its own right (*per se*), its being a wing *of* that bird depends upon the existence of the bird. At the least then Aristotle should talk about the particular wing *qua* winged, namely, only as under the relation of being winged. As we shall see, he does use this '*qua*' talk in this way often to specify the thing being discussed, as when he speaks about "the builder *qua* builder". So too Plato talks about "a brother just insofar as he is a brother of something".

Aristotle admits that secondary substances, like hands or heads, *might* be thought to be *relata*. [8a24–8] He hints that, if they were named strictly, say, by using the '*qua*' talk, this difficulty might be solved. [8a31–3] He says too that a hand or head is not a *relatum* strictly, because it can be known to be a hand or head without knowing its correlative. [8b15–9] Nonetheless, at least in the *Metaphysics*, Aristotle remarks that a finger severed from the body is a finger only homonymously, and not a real finger. For the amputated finger does not function as a finger. [1035b24–5] Likewise an eye removed from the body is an eye in name only, as it no longer has the actual function of an eye. [*An*. 412b19–22] However this point challenges Aristotle's claim that the parts of substances are substances more than this account of relations, and so I put it aside until Chap. 10.

Aristotle proposes a *proprium* or perhaps a criterion for identifying relatives: if someone knows one correlative determinately, she will know the other one determinately. [8b14–5] What does Aristotle mean by "determinately" (ὡρισμένως)? He is making this remark in the context of arguing that substances, like wings or heads, are not in the category of relation. For they can be known independently of the definite individual of which they are the parts. So I can know that this is a head without knowing that this is the head of Coriscus (Sedley 2000; Sorabji 1988: 197–8, 2005: 80).[28]

On the other hand, I cannot know "determinately" that this is a double without knowing of what it is the double. Hence the double is a *relatum* while the head is not. I can say, indeterminately, that this double is the double of some half. Determinate knowledge requires that I know the particular number that is the half. [8b2–7] Likewise in the *Metaphysics* Aristotle distinguishes between determinate

[27] Aristotle does say [8a13ff.] that the particular head and the particular hand are not *relata*, in the sense of 'the particular hand of a person'. Whether the hand in general, the species, is a secondary substance has more difficulty as I discuss below and in Chap. 10.

[28] He cites and translates Olympiodorus, *in Cat*. 112, 9–113, 15 (Sorabji 2005: 83–4).

and indeterminate numerical relations. Being double 1 is a determinate numerical relation, while being many times 1 is an indeterminate one. In the first case, I can identify the particular number, 2, that is the correlative of 1; in the second case I cannot. [1020b32–1021a2]

Likewise I can say, indeterminately, that something is more beautiful without knowing that of which it is more beautiful.[29] That is, I could take "the less beautiful" as the correlative of the more beautiful. Aristotle rejects such *relata* because they need not be known but only supposed, as there is no guarantee of their existence. Thus, if I have never seen a rose in a particular garden, and then see one, I may say that this is the most beautiful rose in that garden. Yet I may never have seen any other rose in that garden (as indeed in Rikyū's tea garden there was but one flower). Then, even if we perceive the first rose, we do not know it "determinately" as 'most beautiful', as we do not know its correlatives.[30] Again, if you know that I am a Spartan and that every Spartan has a helot, you can speak of "my helot" but you will not know him determinately—the person who is that helot.[31]

Aristotle's point, that *relata* must be named "determinately", has importance also because it is easy to take Aristotle's doctrine on *relata* to construct a verbal paradise for sophists. For I can always manufacture *relata* merely verbally from the relation. Aristotle insists rather that we state *relata* strictly by naming them from the relation, but also know them "determinately", i.e., know the essential *subjects* for which they are *relata*: the head is always the head of the headed (Bodéüs 2001: 131). [*Top*. 149b9–12; *Metaph*. 1021b8] Again Aristotle may be reacting to Plato, who tended to give such correlatives for *relata*; the greater for the lesser; the much greater to the much less etc. [*Resp*. 438b–c]

Still these determinate subjects for *relata* need not be substances. For in the case of the double and half, the subjects, numbers, are *quanta*.[32] Even when they are not substances, these subjects for *relata*, later known as hypostases, have a substantial or quasi-substantial being in their own right. Aristotle acquires subjects for most of the sciences from accidents in this way (as I shall discuss further in the next chapter). In this way, the awkward "*qua*" phrasing has a point. For it gives the *relata* determinately: no longer 'the headed' but 'Coriscus *qua* headed'. Here we have a phrase determining the logical subject, here the individual substance, and the respect in which it is the *relatum*. Again, with '4 is the double of 2', the logical subjects are the *quanta* 4 and 2, each taken *qua* being in the relations of being double. The '*qua'* phrase makes the connection of the respect to that subject transparent, so as to insist

[29] Cf. Simplicius, *in Cat*. 200, 35–6 and what Aristotle says about "indefinite" names and verbs. [*Int*. 16a32; 16b14]

[30] Simplicius (*in Cat*. 200, 20–3) says that if you know the beautiful determinately and the worse indeterminately nothing prevents what you suppose to be beautiful to be worse than everything—*presumably if only one thing existed [?]*.

[31] Likewise Morales (1994: 260) claims that 'knowing determinately' is too strong, for we can know the half thus; cf. Ackrill 1963: 102. Rather, Morales (1994: 263) claims that we must know that the correlative exists and has the relation holding.

[32] Bodéüs (2001: 128–9) notes that there are also relatives in other categories like quality and quantity.

upon the ontological dependence of these respects. In this way, so I shall suggest, Aristotle thinks that he can avoid having a prolix ontology and have only the base substances with their attributes existing in them—while allowing for a quasi-independence for *relata*, and, indeed, for all universals.

So to know a *relatum* determinately requires knowing its correlative, stated strictly, on the same level of generality, plus its logical subject, its hypostasis. It also will require knowing it in the same mode of modality and time (more on this below). It does not suffice to say that Xanthippe the mistress has some slave or other for knowing that determinately. Rather, we must know which individual human being (or perhaps: non-citizen) is a slave—and that there actually is one at the present time.

On the other hand, if the *relata* were not required to be named strictly in the case of perception or knowledge, we could then know a *relatum* without knowing its correlative. If I may, strictly speaking, have a perception of Coriscus, then the perception would be a relation between my visual image and Coriscus the man. Yet I may not perceive that Coriscus is the one who is approaching whom I am perceiving even though in fact the one that I am perceiving is Coriscus. My having the state of perception or knowledge would not then guarantee that I grasp the correlative thing being perceived "determinately" at the same time—*if* that correlative were the substance Coriscus—which strictly it is not.

Hence we get the fallacy of accident: I know Coriscus; Coriscus is the one approaching; therefore I know the one approaching, while I do not know of the one approaching that it is Coriscus. [*Soph. El.* 179b1–4; *Top.* 149b4–18] The fallacy comes from the correlatives not being named strictly. Rather, my perception is a perception of Coriscus only *qua* visual image.[33] The proper subject for visual perception is the visible. If we follow up on Aristotle's hints and take Coriscus only *qua* visible, insofar as he is seen as a colored shape, we can solve the sophism. I do perceive and know Coriscus only insofar as he is visible from my present perspective, that is, *qua* perceptible and not *qua* substance. My perception of Coriscus has only an accidental connection to Coriscus *qua* perceptible, namely to the colored shape that Coriscus happens to present at times from a given perspective. My present perception and the present colored shape of Coriscus are correlatives in the strict sense, and I perceive one in perceiving the other. I do not necessarily perceive that the *relatum* is an accident of Coriscus, even if I perceived that *relatum* "determinately." For a visual image is colored and has a shape, where colors and shapes are qualities. So the perceptible has a *quale*, and not the substance, as its proper subject. Thus, if we took, wrongly, Coriscus and not that visual image as the second *relatum*, I need not perceive one correlative in perceiving the other. But this violates Aristotle's condition for knowing *relata* determinately. Moreover the colored shape *qua* perceived, which is the proper correlative, might apply equally well to Coriscus, a statue and a topiary. That is, that colored shape could be an accident for any one of these substances as far as my visual experience is concerned: I might see the same colored shape when seeing any of them from that distance. This explains why

[33] "The red thing causes me to perceive it as such by acting upon me as a red thing, and not as anything else that might be truly said of it" (Broadie 1993: 138).

my knowing the proper correlative of my perception (my mental state of perceiving), the visual colored shape while being perceived, does not entail my knowing the substance Coriscus. We shall see Aristotle continuing this line of thought in his doctrines of *per accidens* perception and the fallacy of accident.[34]

Note that, once named strictly, the object of perception, what is being perceived, is always perceived reliably: for what I perceive is the visible image of something that might happen to be Coriscus or a slave or a bush. I do not know Coriscus or the slave *per se* from the perception, but only *per accidens*.[35] (Descartes has a similar view in *Meditation* Two.)

In sum, *relata* must all be in the category of *relatum*, strictly speaking. Correlative *relata* do have to exist and to be known together, if they be named strictly speaking and not accidentally. We must know those *relata* "determinately", so as to know their correlatives, stated strictly, on the same level of generality, plus their logical subjects, their hypostases, in the same mode of modality and time.[36] *Relata* are these subjects in certain respects, relational ones, and can themselves serve as independent subjects.[37] Likewise, as the ultimate subjects end up being individual substances, *relata* are individual substances in certain respects, more or less remotely: less remotely, like Socrates *qua* slave; more remotely, as three birds are half of six birds, as the logical subjects are the *quanta* 3 and 6. Perhaps Aristotle himself has hinted at all this by saying "determinately". I shall be pursuing these hints below.

3.2 *Relata* as Paronyms

If this is Aristotle's account, then the *relata*, when named strictly, are always paronyms derived from the relation. [Philoponus, *in Cat.* 108, 31–109, 12] The *relata* that are named as coming from the categories other than relation would be *relata* only *per accidens*. Then the correlatives of perception each would be named strictly, '*qua* being in the perception relation'. [Cf. *Top*. 149b12–22] Indeed, Aristotle uses the 'qua' locution frequently in his other writings to indicate just this. Just as Socrates builds *qua* builder and not *qua* Socrates, and the doctor builds *qua* builder not *qua*

[34] *Sophistical Refutations* 179a26–31: "There is a single solution for all fallacies by accident. For since it is *indefinite* [my emphasis] when something must be said to belong with the object when it belongs with the accident, and in some cases it seems so and people say so, while in other cases they say that it is not necessary, so it must be said similarly for them all, when there has been a conclusion, that it is not necessary."

[35] Aristotle (*Metaph*. 1021b8–9) says that man or the white is a *relatum per accidens* through being a half. Cf. *Metaph.* V.7 on being *per accidens*.

[36] Simplicius, *in Cat*. 200, 34–6, says that the determinate thing is the *individual* part. This does hold for most examples but not for all. Relations have species and genera too.

[37] Cf. Porphyry, *in Cat*. 125, 19–25. Here I perhaps differ from Mignucci (1986), who takes the *relata* as relational properties. I agree only if those properties are taken substantively so as to be paronyms and subjects, which in turn can be in more basic (hypostatic) subjects just as things like the just and an action of hitting can be in subjects.

doctor [*Phys*. 191b4–10],[38] so too Socrates perceives not *qua* Socrates but *qua* perceiver. So too the rudder is not the rudder of a boat but of something ruddered, namely, of the individual boat *qua* its having a rudder. The rudder itself in the relation of being a rudder *of* something would be the individual substance only "*qua* rudder-ing". Likewise the wing that is the wing *of* the bird, although it is a substance, would be the wing of the bird *qua* winged that is, being in the relation of being winged only, and not *qua* beautiful or *qua* tasty or *qua* substance. Aristotle does not emphasize these distinctions in the *Categories* but does so in his science and metaphysics.[39] Still we have seen that he does point to them even there. For he does not necessarily endorse the view that the perceptible exists before its being perceived, i.e., that the perceptible is the substance existing beforehand. Rather, he says, "it would seem" so. [8a12] He suggests that the problem of whether or not substances, especially secondary substances, are *relata* can be solved if we name the *relata* suitably and "determinately". [8a29; 8b4] Again, he ends with a promissory note indicating that he has given but a preliminary discussion. [8b21–4]

Although Aristotle does not give us the general schema, we can perhaps extract this one for how to name *relata* strictly. Because of the iteration of terms in most of his examples, like 'perception is perception of something [the perceptible]', the structure is obscured. So let us take a clearer case: Philip is a parent of Alexander. Just as Aristotle wants the *relatum* in 'a wing is a wing of a bird' to be 'bird *qua* winged' or 'the winged' [7a1–2], so too here the *relata* are not strictly Philip and Alexander. Rather, they are "Philip *qua* parent (or: *qua* father)" and "Alexander *qua* parented (or: insofar as he has a parent; or: *qua* son)". See how hard it is in ordinary language to express these proper subjects—or how variable it is and obscured it becomes if we get more colloquial, and use 'father' and 'son'!

The schema though looks clear. The qua phrase performs an abstraction upon the original item, so as to focus on, or attend selectively to, it in the respect that it has this relation. All other attributes are stripped off. A general, less barbarous ways of stating the schema would be to say that the expressions signifying the substances involved are to be considered "only insofar as having that relation". Indeed, the Greek commentators understand Aristotle's position thus. The "head" in the relation of being the head of something is "a head in virtue of being a part", not "a head in virtue of being a head".[40]

The *relata* do not have to come directly from the category of substance. As we just saw, items in other categories have relations too and so can serve as their

[38] Note the conversion: the builder is a builder of a building; a building is a building by a builder (just as plausible as the conversion for 'the wing is a wing of the winged').

[39] The ancient commentators explain similarly that the categories not discussed much in the *Categories* are discussed extensively by Aristotle, but in his scientific writings. E.g., Simplicius, in *Cat*. 295, 10–6.

[40] Simplicius, *in Cat*. 199, 2–3 (So too, he says at 199, 24–6); Ammonius, *in Cat*. 78, 8–9. This solution follows *Categories* 10a27–32. Simplicius, *in Cat.* 202, 26–7, and Ammonius, *in Cat.* 76.11–21, distinguish the *relata per se* from them as tied together by a σχέσις. So too Philoponus (*in Catn* 130, 24–9) distinguishes the *relata* in themselves (the σχέσις itself) from them *in re*, sc., the individuals in the relation.

subjects (Simplicius, *in Phys*. 835, 11–3). Thus numbers, being *quanta*, are double and half of each other; one color can be brighter than another. Often, as I shall stress again in the next chapter, it is not the items in the categories, like twoness and redness, but their paronyms, like two and the red, that have the relations. Indeed we shall find Aristotle holding that perception, knowledge, and abstraction are not substances but states of mind belonging ultimately to certain substances but often immediately to other subjects which are themselves accidents of those substances.

We should recognize how much Aristotle will have to transform, if not distort, ordinary language in order to have his theory hold.[41] Look at his conversions. In some cases the statements sound fine: the half is half of the double; the double is the double of the half. But in other cases the conversions sound weird. Take his own case: the wing is the wing of the winged; "the winged is winged with a wing" (Ackrill's translation). [7a4–5] To be sure that sounds better than the rejected '*the bird is the bird of (with?) the wing' but not by much.

In sum, despite the variants of expressions signifying relations in ordinary language, strictly speaking, the *relata*—for Aristotle, the objects and not the words—are paronyms from their relation. At any rate, expressions signifying them can be derived from the expression signifying the relation. For 'enslaved' ('the slave') and 'enslaver' (the 'master') come from 'enslavement' ('slavery'), just as 'brave' means 'having bravery'. In ordinary language these paronymous derivations are not obvious: 'winged' means 'having a wing' and 'ruddered' 'having a rudder', but deriving 'rudder' and 'wing' from the relation becomes even more awkward.

Although Aristotle himself inclines towards this finer analysis, where he is willing to make up names for the sake of an ideal, protocol language, he will still talk in terms of the endoxic ordinary language. His puzzling over whether a head or hand is a *relatum* is a case of this. [8a13ff.] For he is beginning with cases in ordinary language and then moving towards the ideal language. Such is his endoxic method. However, as he himself notes, he does not finish up the discussion of some problems about relations in the *Categories*. So, although he does give hints there, certainly he does not state his full doctrine, that the *relata* are named paronymously from the relation by taking the expression signifying the individual substances involved abstractly, namely, insofar as they are in that relation.

Does Aristotle ever allow for either *relatum* to be a substance? Most putative candidates seem to come from the category of action, which some commentators at least take as a kind of relation.[42] How about 'Sue hit Jim'? Or, 'man begets man'? On the other hand, Aristotle might well say that the substance is involved only *qua* being a relative of a certain sort: 'Sue *qua* hitter hits Jim *qua* hit'. 'A man *qua* begetter

[41] Cf. his own remarks at *Metaphysics* 1021a26–1021b3.

[42] *Metaph*. 1021a14–6; 1021a18 on 'the cutter' and 'the cut'; Alexander, *in Met*. 405, 20–2; Simplicius, *in Cat*. 162, 2–3. In the doctrine of the *sufficientia*, the Aristotelian "transcendental deduction of the categories", action and passion are taken to devolve from relation. If substances can be subjects for action and passion, perhaps this is the very reason why action and passion do not belong in the category of relation proper. On the other hand, Aristotle says that the proper subjects for change are not the substances themselves but their *relata*, as I shall note.

begets another man *qua* begotten.[43] After all, Aristotle does say that the builder, or Socrates, heals *qua* doctor. Then the proper *relata* would be the paronyms of the relation. If this analysis be accepted, once again, it would seem to follow that all *relata* must be such correlative paronyms, and cannot be from other categories. As just discussed, I could not perceive Coriscus *per se*, Coriscus the substance, but only Coriscus *qua* perceptible thing. We shall see this conclusion borne out in Aristotle's discussions of perception and knowledge and of the fallacy of accident.

Aristotle's analysis becomes further obscured by his terminology. I have already noted that, in the tradition of his teacher, expression of the form 'the Φ' can be taken to name either the Form, Φ-ness, or the thing that is Φ or has Φ-ness. Plato himself insists upon sharply distinguishing the Form from those things participating in it. [*Tht.* 182a–b] In other words, he stresses the importance of paronymy (Ward 2008: 27–36, 201–2). Aristotle has the further complication that, even when taken as a concrete term naming "the thing" that is Φ, 'the Φ' has the ambiguity of naming either concretely the substance that is Φ, or just the attribute Φ that that substance has. That is, 'the Φ' ('the red') can be taken (1) as abstract ('redness') (2) as concrete: either (2a) abstractly, as the accident ('the red thing'), or (2b) concretely, as the accident in a substratum ('the red thing').[44] 'The Φ' taken concretely can signify either (2bi) the complex of the substance with Φ, or (2bii) the accident itself but taken to be a subject thing in its own right. Aristotle denies this last option when taken (2biii) to signify something holding in reality, especially for accidental complexes like 'the white musical'. However he will allow for (2bii) complexes taken to signify accidents thought about in abstraction from the substances in which they must inhere in order to exist in reality. In this way, in the sciences we can take such an accident "as if" it were a separate thing.[45]

Aristotle himself notes such ambiguity of expressions of the form 'the Φ' in discussing whether a thing is the same as its essence in *Metaphysics* VII.6 and in discussing unnatural predication in *Posterior Analytics* I.18. In the *Metaphysics*, he asks whether a thing is the same as its essence. For in the case of what is said *per accidens*, he says, the essence has a paronymous ambiguity. On the one hand, the essence, being white or being musical, is identical to "the white" or "the musical", if the latter be taken in the sense (2a) of the accident, sc., as merely having whiteness or musicality. On the other hand, the essence is not identical to "the white" or "the musical", if they be taken in the sense (2bi) of being the white thing, the substance having the whiteness. [1031b18–28] Making predications of the mere accident (2a), and *a fortiori* of the accident as a substance in its own right (2biii), is "unnatural". [*An. Po*. 81b22–9; *An. Pr.* 43a32–3; *Soph. El.* 179a39–b2; Ammonius, *in De Int.* 53, 22–8] Concrete

[43] So too Leibniz. See Mugnai l978: 16–7.

[44] This distinction also has great importance in Aristotle's discussion of motion. The potential considered potentially can have no motion, whereas what has potentiality, something in potency, is just the sort of thing that moves. Cf. *Physics* 201a34–b5.

[45] The distinction between (2bii) and (2biii) concerns two senses of 'accidental': the former the accidental said of things existing in categories other than substance; the latter of sophistical ill-formed complexes taken to exist apart from their substances. See *Metaphysics* V.7; Bäck 2000: 62–73.

substances like man (1) are identical to their abstract essences (2), like being man, only if man is taken as the form without the matter. [*Metaph*. 1043b2–3]

Aristotle seems generally to reject (2biii). Expressions of this type signify only being *per accidens*. [*Metaph*. 1017a7–22; 1031b22–3] This is a topic fit only for sophists who treat things like "musical Coriscus" and "a musical being" as things that have come to be like substances. [1026b12–21; 1027b17] Moreover, combinations of accidents like 'white musical' are ill-formed. [*Int*. 20b31–21a16]

Despite all this, Aristotle will allow taking accidents as subjects in the mode of "as if" so as to provide objects for the sciences: the snub, the concave, the white, the slave, the double (as I shall discuss in the next chapter). This seems to amount to taking the mere accident as a subject but only in thought (2bii). We might say that such accidents get their ability to have a substratum derivatively from their substances. For, to focus on the *relatum*, the *relatum* strictly is the "substance *qua* having that relation", according to the schema that I have proposed. So the *relatum* will get its ability to serve as a subject derivatively, from its substance. The *relatum* is not really distinct from its subject but can be distinguished objectively (or formally) in thought. Aristotle has to have an account like this, as he holds that the proper subjects for change often are paronyms from items in the accidental categories and not the substances themselves. Thus strictly it is not "Coriscus" but "the doctor" who heals—i.e. Coriscus *qua* doctor—and this can serve as a subject. [*Phys*. 191b4–5; cf. *Top*. V.7] Likewise "the builder builds *qua* builder" —and not *qua* doctor and apparently not *qua* substance. [195b23–5] Likewise the proper correlative of what has a head is not an animal but the headed. So sometimes expressions of the form 'the Φ' signify (2a) the simple accident, which has enough unity to serve as a subject but not as a substance. This sort of independent subject does look a lot like the sophistical accidental subject (2biii) that Aristotle wishes to reject. He himself seems to realize this. Hence he spends a lot of effort insisting on their difference. Their main difference lies in being taken to exist *in re*. For unlike the sophists Aristotle does not allow such an accident to exist separately *in re*, but does so at least as a mode of thinking about objects "as if". (I leave it to the last chapter to consider if Aristotle has not thereby joined the sophists.)

So Aristotle is marking a paronymous ambiguity for expression like 'the white'. Expressions like 'the white' can be taken (2a) "abstractly", to signify just the white and nothing more, sc., the accident of being white, or (1) being white, sc. whiteness, or (2b) concretely, to signify the white and what is presupposed to exist, sc., the thing that is white.[46] 'The known' can be taken in the same way, to signify (1) being known, sc., knowledge, or (2a) the accident of knowing, or (2b) the thing that is known. Once *relata* are allowed to be subjects in their own right, (2b) has two different readings, based on what "the thing" signifies: either (2bi) the substance that is known etc. or the sophistical (2bii) the accident itself but taken to be a subject different from its substance. Aristotle does not allow (2biii) taking such a subject to exist *in re* as an individual substance. He does allow (2bii) taking it as a separate subject in thought.

All this doctrine applies to his discussion of relation when he names items like "the winged" as *relata.* What sort of thing is "the winged"? Something like "the bird *qua*

[46] Aristotle uses this distinction also in *Posterior Analytics* I.19 when discussing unnatural predication. See Bäck 2000: 179–90.

winged". But what is that? Such a "thing" does not seem to be the wing or the bird, the substances themselves. Perhaps this "thing" is a *relatum* derived from the relation 'being a wing of'; perhaps it is an item in the category of having. Aristotle does not make it too clear, but just uses the expression 'the winged' etc. to talk about "the bird *qua* winged".

Yet, in light of the distinctions just discussed, there are two main candidates for the signification of 'the winged' et al.: not (1) the form 'being winged' or "wingedness", as this is not for Aristotle a wing of an animal. Perhaps it is just the attribute 'winged' on the abstract reading (2a): an accident and nothing else. Yet in this context this is quite unlikely, as "the winged" is paired with "the wing" which, if not an individual substance, is a substantive thing. Likewise, Aristotle's using concrete paronyms as in 'the slave is a slave of a master' and 'a wing is a wing of a bird' suggests that expressions like 'the slave' and 'the wing' name something with the sufficient unity of a substratum to serve as a subject.

So we are left with (2) the concrete reading, 'the thing that is winged'. Perhaps this amounts then to (2a) the individual substance with the attribute, as "the bird *qua* winged" might suggest. Then, in effect, Aristotle would be taking "the winged bird" as the *relatum*. But then the relation would not be named properly. For bats and insects would be excluded. [7a2–3] Thus here this "thing", the winged (in general: 'the Φ'), is not the individual substance itself. Perhaps we should put it "determinately" on the same level of generality, and say 'the winged animal' or (if we admit statues to have wings) 'the winged perceptible substance'.

Yet Aristotle says to take that substance only "*qua* winged", to take it with attention focused on it only as winged. We are then to strip off the other attributes of the bird, and leave only its winged attributes. Now that thing, or complex of attributes, has to have enough unity in order to serve as one of the *relata*. Aristotle describes these via complex expressions: 'the bird *qua* winged; 'the boat *qua* having a rudder'. We treat the complex "bird qua winged"—which I call *a qua complex*—as if it were a thing with a unity of its own.[47] But what are such things? They seem to be (2b) the individual accidents, yet here taken as independent subjects (2bii).

Although Aristotle ends up holding these qua complexes in reality to be just their corresponding (individual) substances, this does not hold for their definitions (or *logoi*) in theory. Their definitions differ from those of their substantial subjects. For Aristotle this point turns out to have great philosophical importance and subtlety. Aristotle's objects of mathematics and, yes, his universals, end up being such things. These things can function as if they were independent subjects for the sciences while not being independent subjects.[48] Small wonder that he passes over the subject at the end of *Categories* 7:

> It is perhaps hard to make firm statements on such questions without having examined them many times. Still, to have gone through the various difficulties is not unprofitable. [*Cat.* 8b21–4]

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[47] Perhaps later called a σχέσις by Iamblichus (Cf. Simplicius, *in Cat*. 204, 7–9), and certainly later a hypostasis by Plotinus, *Enneads* VI.1.7.27–8 (See n. 4).

[48] Simplicius (*in Cat*. 202, 26–9) says that *relata* subsist solely in virtue of the σχέσις and not as subjects. He (204, 7–9) is following Iamblichus, who says that a σχέσις is something in between subjects and things having a σχέσις.

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Chapter 4
The Relation of Abstraction

Now I turn to considering the relations especially pertinent to my topic: perception, knowledge, and of course abstraction. Aristotle's discussions of these relations have certain features, both verbal and conceptual, making them especially hard to understand. I shall show that the general conclusions reached above, that strictly speaking *relata* are simultaneous and are named paronymously from the relation, hold for these cases. We shall then be in a better position to understand how Aristotle treats *relata* and other abstractions as quasi-substantial and how he understands them to exist.

4.1 The Relations of Perception and Knowledge

Aristotle says that perception is the perception of something perceptible; knowledge is the knowledge of something knowable. That these *relata* themselves are signified by abstract paronymous terms and not the concrete ones complicates the situation. Aristotle could have used concrete terms instead. For he could have said, and indeed does say elsewhere, that a perceiver is a perceiver of the thing perceived, and a knower is a knower of the thing known. [*An*. 417b23–4][1] These cases would parallel his example about 'master' and 'slave' as opposed to 'slavery' and 'mastery'.[2]

However Aristotle does not name the perceiver but the perception as the first *relatum* for the relation of perception. This seems to be the mental event, the act or state of perceiving, as I shall confirm below. [7b35–8a1; *Top*. 125a33–7; 146b5–6][3]

[1] See Alexander of Aphrodisias, *On Aristotle's Metaphysics 5*; translated & comm. Dooley SJ 1993: 165, n. 382, on Alexander, *in Metaph*. 409, 14–18.

[2] Indeed, Avicenna, following Al-Fārābī (*Kitāb al-Ḥurūf* §35, 80, 7–81, 6; §42, 87, 1) does exactly that: *Al-Maqūlāt*, Part One, Volume Two of *Aš-Šhifā*, ed. Anawati et al. 1959: 144, 5–145, 4.

[3] At *Topics* 125b15–27 Aristotle calls perception and memory states and not capacities.

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Just as an image of a bird in a mirror is the image of the bird, so too the perception is the perception of the bird. If the bird goes away, there is no longer present an image or perception of that bird. In this way we should understand 'perception' in 'the perception is the perception of a bird' to concern a mental state. Likewise, the first *relatum* of the knowledge relation would be a mental act or a state of knowledge. [7b28–30] Thus, despite using an abstract noun, 'perception' or 'knowledge', what is being signified is its paronym, a concrete thing (in the sense of (2b)[4]). This concrete thing is not itself the substance itself but that state in its substance.[5] Likewise what is being perceived strictly is not the bird, but the bird *qua* being perceived, i.e., the individual substance *qua* being in that relation.

Aristotle classifies perception and knowledge as relations having two correlatives. [*Cat.* 6b2; cf. *Metaph.* 1074b35–6] On the one hand, Aristotle says, there is the perception or knowledge, while on the other there is the object perceived or thought. "Knowledge is the knowledge of something." [6b5] What is confusing is that he uses the same term, 'perception' or 'knowledge', for both for the relation and for one of its *relata*. Yet the two need to be distinguished. At any rate, Aristotle himself does insist upon this distinction explicitly in the case of quality: the quality, say, whiteness, is one thing, while the *quale*, the thing qualified, the white or what has whiteness, is another. [10a27–b11] So too being related, the relation, is one thing; the *relatum*, what has the relation, is another. Aristotle has made this very distinction in general already in introducing paronymy as holding between two objects (not: expressions!), like bravery and the thing that is brave, where one is "said from" another. [1a14–5] It is one thing to be bravery; it is another to have bravery, to be a brave person.

As I have already suggested, it is reasonable to suppose Aristotle to be applying this doctrine of paronymy to all relevant cases. However, in the *Categories*, generally Aristotle just uses the abstract form 'knowledge'. It too can be taken to signify abstractly just the knowing, the relation holding between the mental state and the object, or to signify the *relatum* of knowing concretely, a state being what is known, sc., as being the knowledge about something, where the knowledge is *in* a particular mind. Indeed, Aristotle could have signified the *relata* more precisely and less colloquially by use of *qua* phrases, as he did with "bird *qua* winged". But he doesn't. Despite that, I shall be taking Aristotle generally to be distinguishing the abstract relation from the concrete things being related, with them being paronyms said from another. Aristotle then recognizes a relation, perception or knowledge, between two

[4] See the "*Relata* as Paronyms" section for an explanation of this numbering.

[5] Morales (1994: 256) says that Aristotle uses "concrete" terms for *relata*: thus not 'slavery' but 'slave', except for 'equality' etc.1021b6-8. (Cf. Ackrill 1963: 98.) But as 'knowledge' figures prominently in his discussion he must not mean 'concrete noun' grammatically, but, as he suggests murkily "concrete" in the sense of signifying an underlying thing (Morales 1994: 261). This seems to mean that the father presupposes a substance who is that father; the equal presupposes things that are equal etc. In my scheme, Morales is saying that *relata* must be said paronymously from the relation.

relata, knowledge, in the sense of 'a state (ἕξις) of perception or knowledge in an individual substance', and the object being perceived or known.[6]

That Aristotle takes this approach for the relation is obscured also by his terminology for "relations" themselves, particularly when discussing knowledge and perception. In Aristotle's terminology, knowledge and its object, what is being known, are the *relata* (τά πρός τι) while the relation proper is "knowledge" taken "abstractly", in the sense of 'an *abstract* term'. Now there is no easy way for Aristotle to make an abstract name for the substantive '*relatum*' (πρός τι) as there is for the adjectival '*quale*' (ποιόν; ποιότης). The usual way would be for Aristotle to add on 'be', as he does for the abstract correlate for 'man' (ἄνθρωπος; τοˆ ἀνθρώπῳ) or for 'the musical' (τὸ μουσικὸν; μουσικῷ εἶναι). [*Metaph.* 1031a21–4; *Phys.* 224a22–3] But this would be obscured in usual sentences and in substantive phrases like 'τὰ πρός τι'.[7] Again, because he uses 'knowledge' instead of 'what is known', probably since it is more colloquial and since 'ἐπιστήμη' has the concrete sense of a particular science and its content and the more general sense of science or knowledge in general, his point about distinguishing between the relation and the *relatum* becomes particularly obscured when talking about knowledge—and likewise about perception and abstraction.

Relations differ from things like qualities since the latter have only one object said from the original paronym signified by the abstract term, while the former have two. For both qualities and relations have paronyms. Thus "brave", namely, 'what has bravery', is said from "bravery", and "the wing" and "the winged" from "being a wing". [*Cat.* 1a14–5] So "knowledge" has two paronyms although they are hard to state[8]: We might say that "what knowledge we have" and "the thing about which we have knowledge" can both be said from "knowledge". Indeed, both can be signified by 'what is known'.[9] Now Aristotle does not use this terminology but rather

[6] Especially in ordinary language many mixtures of abstract and concrete terms are possible. To take Aristotle's own example: mastery is mastery of a slave, not of slavery, and, conversely, slavery is slavery [enslavement] by a master, not by mastery. Aristotle may not end up endorsing all the vagaries of ordinary language. Still, he does start with them.

[7] Later on the usual term for 'relation' seems to have come to be the σχέσις, which generally means 'condition'—here the condition holding between the *relata*, and ultimately the state of the substance for taking on the relation. Neoplatonists like Plotinus and Simplicius tended to give more reality to the relation than to the *relatum*, and so treat the relation as a hypostasis, as opposed to the *relatum* serving as a subject. Cf. nn. 36 and 37; Simplicius, *in Cat.* 169, 1–6; 169, 22–3; 171, 19–21; *in Phys.* 835, 23–4; *Enneads* VI.1.6.1–3 & 31–2; VI.1.7.23–7; VI.1.9.28–32; Menn 1999: 224, n.14. (I have modified my account in Bäck 2003.)

[8] Simplicius (*in Cat.* 163, 31–164, 4) says that the state is relative to the one having the state or to the statable (τό ἑκτὸν).

I am using double quotes to indicate that I am not talking about the expressions but about the things, the paronyms. Also "the knower" seems to be said from "knowledge", sc., "what has the knowledge". Cf. Avicenna, *Al-Maqūlāt*, 144, 5–145, 4 & n.268. However, as Aristotle does not make knowers one of the *relata* for knowledge, I postpone such discussion until later.

[9] I am tempted to say that the first constitutes a use of the middle voice and the latter a use of the passive voice (the thing being known versus the thing being known by someone), but I don't find sufficient evidence to do this. Cf. Plato, *Euthyphro* 10a5–c12.

calls 'what we know' "knowledge" (ἐπιστήμη), and 'the thing about which there is knowle\dge' "something" and often "known" (ἐπιστητόν) [*Cat*. 7b23; *Top*. 146b5–6], sc., what is able to be known, in the sense of a first actuality—suggesting that the "knowledge" that is the first *relatum* is also a first actuality.

We can get two paronyms from the relation of knowledge. Just as the white is said from whiteness, so too for the *relata* of knowledge are said from knowledge: both the [thing] known and the knowing about it. That is, in "knowledge is the knowledge of something," we should take the first "knowledge" as what we know, the second "knowledge"; as the relation of knowledge, and the "something" as the [thing] known, the object about which there is knowledge. We can express all this using the schema of 'qua' described above and often used by Aristotle: when Socrates knows this apple, we have both Socrates and this apple, each *qua* being in the relation of knowledge.

In *On the Soul* Aristotle says that earlier theories of perception erred in not distinguishing acts of perceiving from the capacity of perceiving. [425b26–426a6][10] Like English with 'perception', Greek commonly uses the same word for both: ἀίσθεσις. Aristotle makes the same point explicitly for types of perception like vision and hearing (Caston 2002: 762).[11] As he also likens thinking to perceiving [429a17–8], we may take him also to be making this point about 'knowledge': it can be understood as a capacity or as an exercise of that capacity.

These distinctions conform to his general account of first and second actuality, where he mentions 'knowledge' explicitly. The actual capacity is a first actuality, while an actual use of that capacity is a second actuality. [412a22–7; 414a4–12] Knowledge and perception in the soul are mental events: actual individual perceivings and knowings in the sense of second actuality. Knowledge as first actuality seems to be the relation proper: it is a capacity to know something about some object, and so seems to be the two-place relation being discussed in *Categories* 7.

The situation becomes complicated because first actualities can also serve as the first *relatum* for knowledge: geological knowledge is knowledge of rocks, even when there is no thinking of rocks actually going on now. The first *relatum* can also be a universal representing what is common to the individual knowings or perceivings—indeed, the first *relatum* in these examples is generally understood thus—and these in turn can be taken as first or as second actualities.

Aristotle says that the perceptible, namely, the object that can be perceived, can exist beforehand and independently of being perceived by a perceiver. [7b36] In contrast, the other *relatum*, the state of perceiving, comes into existence only with the establishment of the relation of perception.

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[10] See too *Metaphysics* 1021a14–19; *Topics* 125b20–125b28.

[11] Caston does make some dubious claims though, that at 425b20–1, when Aristotle says that even when we are not seeing we can discriminate darkness by sight, 'sight' must refer to the capacity and not to the act. In pitch black I can have my eyes open and actually see nothing, i.e., receive no forms of the visible objects; this is an act of seeing in another way. Again, Aristotle's using the plural 'perceptions' at 425b25 does not suffice by itself for claiming that Aristotle must mean acts of perception; cf. the plural 'knowledges' at *Cat.* 8b29 (although Caston's conclusion might be correct; cf. Caston 2002: 772).

On the one hand, this suggests that Aristotle is taking the second *relatum*, in 'perception is the perception of something', to be not in the category of relation but in another category like substance. The "something", the object of perception, might be an individual bird, which only at present flies into view. Surely the bird existed beforehand. Still, the perception of the bird need not exist beforehand. [*Metaph*. 1021a26–b3]

We can make the same point about 'a perceiver is the perceiver of a perceptible'.[12] In this case, both the perceiver, the person perceiving, and the perceptible substance, the object of perception, exist before they get into their relation of perception. Thus the first occurrence of the indefinite 'a perceiver' would signify the individual substance, the animal that happens to be perceiving. The second occurrence, 'the perceiver', would signify the species, perhaps the *infima species*, of the relation of perceiver (or perhaps the first actuality, the actual capacity of the one perceiving to perceive, which is itself a relation).[13] "The perceptible" would be, say, an individual substance like a bird or a cloud. In such cases, both *relata* themselves do not belong to the category of relation. The same point holds for 'a knower is the knower of something knowable'.

On the other hand, Aristotle has been insisting that the *relata* be named properly. Strictly speaking, he says, the rudder is the rudder not of the substance that has it, namely, the boat, but of "the ruddered". Likewise, strictly the wing is the wing not of the bird but of the bird *qua* winged. "For it is not as being a bird [literally: *qua* bird] that a wing is said to be of it, but as being a winged, since many things that are not birds have wings." [7a1–3] Then the second *relatum*, when named strictly, would not be a substance. The winged, the bird or bat *qua* winged, does come into existence simultaneously with the wing. Once *relata* have been named strictly, all *relata* become correlative and contemporary.[14]

We can thus save Aristotle's position by using the two-stage analysis (discussed in Chap. 3) making a distinction in the very way that he himself tends to do, not merely in the *Categories* but also in his scientific and metaphysical writings. In ordinary speech, often the *relata* seem to signify substances and other items that are not in the category of relation. Speaking more strictly, in relational statements where substantial and other non-relational terms appear, neither *relatum* belongs to the category of relation, in virtue of what it is but only insofar as it is in that relation. E.g., the wing, insofar as it is a part of a bird, not insofar as it is an individual substance in its own right, is the first *relatum* in 'the wing is the wing of a bird'. Likewise, Socrates is a perceiver of Xanthippe and is a knower of the Form of the

[12] On why Aristotle does not use 'perceiver' as a *relatum*, see (ps.) Alexander of Aphrodisias 407, 35–408, 17, trans. Dooley 1993.

[13] Cf. (ps.) Simplicius, *in de An.* 128, 10–1.

[14] Then the distinctions between the three types at 1021a26–b3 disappear; remember that the lexicon is partly endoxic as it codifies current usage, ordinary and philosophical. I discuss this text below. The difference noted at *Topics* 125a33–b14 between those *relata* that must have a relation to their correlatives and those that need not comes from the difference of the terms being used to signify the *relata* and not from a difference in the relations being signified. After all, Aristotle there is concerned with constructing arguments against and adversary and with the selection of terms.

Good. Still, Socrates is not a perceiver or knower *qua* Socrates but only *qua* perceiver or knower. So too Xanthippe, like the Form of the Good, is the thing perceived or known not in virtue of herself but only in virtue of being perceived or known.[15] We shall see in Chap. 10 that making such distinctions also explains Aristotle's position on the parts of animals.

In this way we can save the phenomena of the text.[16] For, although Aristotle does remark that the object of perception exists before the perceiving, still he also has said that it seems that correlatives exist together by nature. [7b15] He then goes on to say that this holds in most cases, like the double and the half, but not for knowledge and the knowable. Certainly, if we name the knowable thing by a term signifying its substance, the *relata* will not be *simultaneous*. Yet if we do name it strictly, the known object, insofar as it is known, i.e., when 'knowable' is taken in the fully actual sense, is simultaneous with knowledge.[17] In Aristotle's terms, they are simultaneous in time:

> Those things are called simultaneous without qualification and most strictly which come into being at the same time; for neither is prior or posterior. These are called simultaneous in respect of time. But those things are called simultaneous by nature which reciprocate [convert] as to implication of existence, provided that neither is in any way the cause of the other's existence, e.g. the double and the half. These reciprocate, since if there is a double there is a half and if there is a half there is a double, but neither is the cause of the other's existence [*Cat*. 14b24–33].

Given that *relata* are named strictly via paronyms, all *relata* are simultaneous in the strict sense, in time. However, *relata* like the perceptible and perception, and parent and child, are not simultaneous by nature, since the former cause the latter.

Aristotle does puzzle over whether *relata* are simultaneous by nature in the cases of perception and knowledge. [7b15] We can say, in the case of parent and child, that once the *relata* are named strictly, the *relata* are indeed simultaneous in time, but not by nature, as they have causal asymmetry. Likewise, *relata* like knowledge and the knowable differ from those like the double and the half, in that only the latter are simultaneous by nature. So Aristotle ends up agreeing that not all *relata* are simultaneous by nature. For parent and child, master and slave, and knowledge and the knowable are not. Still all *relata*, when named strictly, are simultaneous in the strict sense. [So too Plato, *Tht*. 156a–b]

In effect, he is stressing that, if the correlatives are not named properly, their co-relation will not be clear or disappear. If it is said that Coriscus is the master of a slave, Coriscus can exist before and after his being a master. If we take 'Coriscus' to name one of the *relata*, then we shall get the same result as with the object of perception: one (or both) of the *relata* can exist before the relation. Yet, if we name

[15] This point becomes important below in the next two chapters when I discuss *per se* and *per accidens* perception, and extend the doctrine to *per se* and *per accidens* knowledge.

[16] —and solve the puzzles raised by Everson (1997: 116–25).

[17] Cf. (ps.) Simplicius, *in de An.* 192, 2–3, who says that the perception and the perceptible are simultaneous in act but not in potency, and that the thing that is the perceptible in potency can exist beforehand in act. Also Bodéüs (2001: 125), who cites *An*. 431a1–2. Plotinus (*Enneads* VI.1.7.39–41; 8.15) argues against the simultaneity of relatives.

Coriscus properly—say, in ordinary language, 'master Coriscus'; strictly speaking, 'the master, who happens to be Coriscus'—their co-relation will be clear.[18]

Aristotle uses these doctrines also when he argues against "Protagoras" that there must be things prior to and independent of what appears to us:

> And, in general, if only the sensible exists, there would be nothing if animate things were not; for there would be no faculty of sense. The view that neither the objects of sensation nor the sensations would exist is doubtless true (for they are affections of the perceiver), but that the *substrata* which cause the sensation should not exist even apart from sensation is impossible. For sensation is surely not the sensation of itself, but there is something beyond the sensation, which must be prior to the sensation; for that which moves is prior in nature to that which is moved, and if they are correlative terms, this is no less the case. [*Metaph.* 1010b30–1011a2]

Aristotle is holding again that the correlatives of perception and the perceptible, when named precisely and "determinately", must exist together. Still, as in the *Categories*, Aristotle admits that the thing that has the capacity to become the perceptible can exist beforehand. The priority in question here looks causal.[19] The case is similar to the relation of father to son, where we have correlatives where one has causal but not temporal priority, just as Sophroniscus exists before his son Socrates but not *qua* father.

We can see Aristotle making and using the doctrine about *relata* developed in the *Categories* also in discussing perception in *On the Soul*. In the *Categories*, as just discussed, he holds that the *relata* of perception are correlatives and exist together when they are named precisely. There the *relata* were described strictly as things 'only insofar as they are in the relation', as in "the bird *qua* winged". In *On the Soul* Aristotle seems to present another condition, about what it is for them to "be" in the relation, strictly speaking: they must be taken with the same modality, namely when both are actual in the full sense of second actuality.[20] This amounts to restating the point about the simultaneity of the *relata* in more detail.

Aristotle proceeds to make a further point about the relational complex:

> The activity of the sensible object and that of the sense is one and the same activity, and yet the distinction between their being remains. Take as illustration actual sound and actual hearing: a man may have hearing and yet not be hearing, and that which has a sound is not always sounding. But when that which can hear is actively hearing and that which can sound is sounding, then the actual hearing and the actual sound come about at the same time (these one might call respectively hearkening and sounding). [*An.* 425b26–426a1]

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[18] Then the distinction made at 1021a26–b3 disappears.

[19] Everson (1997: 122–5) takes the ὑποκείμενα, the things making the perception, at 1010b34 to be the colors etc., the things perceived by the senses, while Ross (1953: *ad locum*) takes them to be the substances. In light of the *Categories* doctrine, I favor Ross. We might also think of a quasi-modern example to convince us: suppose it is pitch dark at night and you are facing an (unpainted) marble statue. At "the rosy fingers of dawn" you see the statue as pink. Now it is hard to say (especially without modern knowledge about the finite speed of light) that the pink of the statue existed prior to your perceiving the statue as pink. Rather the individual substance, the statue, with the capacity of coming to be pink, did.

[20] (Ps.) Simplicius (*in de An.* 193, 24–7) says that the perceptible and the perception are simultaneous [in actuality], while the perceptible in potency exists before. I shall suggest this condition of modality already to explain Aristotle's views on the parts of animals. Cf. Ammonius, *in Cat*. 76, 23–30.

Once more Aristotle is affirming the simultaneity of *relata* when stated precisely. The actual production of sensory stimuli by the object of perception and the actual perception of them, in the full sense of actuality, always go together. But obviously there are many ways in which we can have one without the other: the most obvious being where there are the stimuli being produced with no animal perceiving them. There the stimuli "are" present in the sense of the second actuality, where the perceiving of them "is" present at best in the sense of first actuality, but not in the sense of second actuality. Here then Aristotle explains that, for the *relata*, even those of perception, to exist together co-relatively, they must be taken as fully actual.[21]

Perhaps 'determinately' in *Categories* 7 implies this conditions, of both *relata* being fully in act as well as the condition that correlatives must be given on the same level of specificity. Yet perhaps all that is needed is for both *relata* to be taken in the same mode: in potency (more or less remote), in first or in second actuality.[22]

The perceptible object's activity in producing stimuli like sounds and the activity of the sense perceiving these sounds are, Aristotle says, one and the same in actuality—that is, when there is actual perceiving of the object making actually making the sounds. If we stick to the actualities in the second sense and avoid potentialities in any sense, Aristotle is saying that the actualities are one and the same in the act of perception, although we can still distinguish them in account. When he says, "The activity of the sensible object and that of the sense is one and the same activity," we can understand "the activity" to be the single relation of perceiving linking those *relata*. So all there is is that relational complex, the relation with its *relata*. Yet the "being" (or *logos*) of the two *relata*, what each of them is, differs in that relation (Kosman 1992: 348; Kahn 1966: 24).

Aristotle's basic conception of perception here is thus of the relation of perceiving, and not of the *relata* in that relation. Perception is a relation with two *relata*, the mental act of perceiving and the perceptible, that is, the object insofar as it is actually making the perceptibles. There is but a single actuality here then, namely the complex of the two *relata* being related by the relation. The two *relata* still differ in their account, in their "being" or essence, in what they are. Perhaps Aristotle's way of saying this in his logical theory would be to say that both *relata* of perception are paronyms said from that relation of perception.

Moreover, the relation itself can be described in two ways (Broadie 1993: 147–8). Aristotle proceeds to tie this doctrine to another where he is claiming that the relation itself can be taken from the perspective of either *relata* so as to constitute two items differing in their accounts but not differing in reality. [*An.* 426a2–26] Depending on which *relatum* the description of the relation starts from, it can be described from the point of view of either *relatum*: the perceiving *in* the mental act and the perceiving *of* the object—and so here again are two paronyms said from it.

[21] Or, at any rate, in the same mode of actuality etc. as the interpretation about the criterion of determinacy suggests.

[22] Simplicius (*in Cat*. 79, 9) may be suggesting this. Also see Chap. 3.

We can see this point more clearly perhaps from looking at another passage first. Aristotle has a similar account in *Physics* III.3 where in effect he is analyzing the relational statement, 'a mover is a mover of the moved':

> A thing is capable of causing motion because it can do this, it is a mover because it actually does it. But it is on the movable that it is capable of acting. Hence there is a single actuality of both alike, just as one to two and two to one are the same interval, and the steep ascent and the steep descent are one—for these are one and the same, although their definitions are not one. So it is with the mover and the moved. [202a16–21]

Again, motion, the relation, is a single actuality with two *relata*. Still, the definition (or *logos*), the formula of the essence, what the relation is, differs depending on which *relatum* we start from. For, because of the conversion, we can start from either: the mover is the mover of the moved; the moved is moved by the mover.[23] Moving for the mover differs from moving for the thing being moved. For instance, think of a staircase as a sequence of steps connecting a place below with a place above. We can say, with Heracleitus, "The Way Up is the same as the Way Down." For we have in each case the same two landings and flight of stairs. On the other hand, moving up the stairs is not the same as moving down them.

Likewise for 'the teacher is the teacher of the student', or, better, to speak more precisely: 'the one doing the teaching is teaching the one being taught':

> Nor is it necessary that the teacher should learn, even if to act and to be acted on are one and the same, provided they are not the same in respect of the account which states their essence (as raiment and dress), but are the same in the sense in which the road from Thebes to Athens and the road from Athens to Thebes are the same, as has been explained above. For it is not things which are in any way the same that have all their attributes the same, but only those to be which is the same. But indeed it by no means follows from the fact that teaching is the same as learning, that to learn is the same as to teach, any more than it follows from the fact that there is one distance between two things which are at a distance from each other, that being here at a distance from there and being there at a distance from here are one and the same. To generalize, teaching is not the same as learning, or agency as patiency, in the full sense, though they belong to the same subject, the motion; for the actualization of this in that and the actualization of that through the action of this differ in definition. [202b10–22]

The examples about the ascent and descent and the road from Thebes to Athens, or from Athens to Thebes, suggest that Aristotle is thinking of starting from one *relatum* to get to the other.[24] Once again, there is a single relational complex, which can

[23] This conversion does work, rather tortuously, also for perception: perception is the perception of [something] perceived; the perceived is perceived in perception. Thus (ps.) Simplicius, in de *An.* 169, 25–6: "…the perceptible being perceptive of the perceptible, and the perceptible being perceptible to the perceptive." (Cf. We might also consider a more exact parallel using abstract terms: motion is the motion of the movable. Cf.: "That of a being in potency, when what is in actuality acts not *qua* itself but *qua* movable, is motion." [*Phys*. 20la27–9]

[24] Aristotle seems to construe these cases as relations too: the road from a to b, and the ascent/descent from a to b. For there is something like the conversion typical of *relata* here, obviously with 'the ascent is an ascent of a descent' or perhaps 'the ascent is an ascent from a to be; the descent is a descent from b to a; more tortuously with 'this starting point (Athens) is a starting point for the ending point (Thebes); this ending point is an ending point for this starting point.

be described from the standpoint of either *relata*. The accounts of the *relata*—indeed also of the relation—all differ without multiplying entities.

The relation of thinking or perceiving, the process where something thinkable or perceptible in potency comes to be thought or perceived in act, is a motion.[25] One of its *relata* is the actual thought or perception, namely, the state in the soul of some animate substance. The other *relatum* is what causes this state, usually an attribute, usually accidental, of a substance, another one or perhaps the same one. Their substances have the relation of perceiving or thinking derivatively, in virtue of these *relata* being their accidents.[26] We can think of the items involved in the perceiving or thinking as the *relata* or their subjects, ultimately their substances, and can consider them in full actuality or in some more or less actualized grade of potentiality.

Accordingly, Aristotle then sees an abundance of ambiguities in our talk of 'perception':

> If it is true that the movement, i.e. the acting, and the being acted upon is to be found in that which is acted upon, both the sound and the hearing so far as it is actual must be found in that which has the faculty of hearing; for it is in the passive factor that the actuality of the active or motive factor is realized; that is why that which causes movement may be at rest. Now the actuality of that which can sound is just sound or sounding, and the actuality of that which can hear is hearing or hearkening; 'sound' and 'hearing' are both ambiguous. The same account applies to the other senses and their objects. For as the acting-and-being-acted-upon is to be found in the passive, not in the active factor, so also the actuality of the sensible object and that of the sensitive subject are both realized in the latter. But while in some cases each has a distinct name, e.g. sounding and hearkening, in some one or other is nameless, e.g. the actuality of sight is called seeing, but the actuality of colour has no name: the actuality of the faculty of taste is called tasting, but the actuality of flavour has no name. Since the actualities of the sensible object and of the sensitive faculty are one actuality in spite of the difference between their modes of being, actual hearing and actual sounding appear and disappear from existence at one and the same moment, and so actual savour and actual tasting, &c., while as potentialities one of them may exist without the other. The earlier students of nature were mistaken in their view that without sight there was no white or black, without taste no savour. This statement of theirs is partly true, partly false: 'sense' and 'the sensible object' [i.e., 'perception' and 'the perceptible'] are ambiguous terms, i.e. may denote either potentialities or actualities: the statement is true of the latter, false of the former. This ambiguity they wholly failed to notice. [*An.* 426a2–26]

Aristotle is saying that the actual relation of perception relative to each of its *relata* is the same: the perceiving in the soul and the perceiving of the object are the same *in re*, even though their accounts differ. However, the two *relata* will be not correlated if one is taken as actual and the other as potential. So, if the object is actually making the sounds while no one is actually perceiving the sounds, the perceiving and the perceptible object will differ. [426a19] It is in this way that Aristotle says that in perception one perceptible may exist before the other—namely, when both *relata* are not being taken with the same modality, such as both being fully actual [or fully potential or…], or, worse, when a *relatum* is not properly named. Thus, without

[25] (Ps.) Alexander (*in Metaph.* 792, 1) calls knowledge in actuality a motion and knowledge in potentiality a state.

[26] On perception being a motion, see Granger 1993: 166.

sight there can be black or white (Aristotle takes colors to be real *qualia*) but not black or white as seen, but this only potentially and not actually. The two *relata* then will be correlative and exist together when named properly and taken as fully actual. Aristotle claims again that the two actualities are the same relation. They differ because, although both *relata* exist as constituents of the relational complex, each of them takes a different starting point, a different perspective on it. Thus sounding is the relation of hearing beginning from the object emitting the sounds; hearkening is the relation of hearing beginning from the mental hearing of the sounds.

So perception—and knowledge and abstraction likewise—have ambiguities (1) from their *relata* not being named strictly (2) from having their *relata* not being taken as fully actual but as being potential in some way (including first actuality). Again (3) they have ambiguities arising from the same term being used to describe the relation beginning from the side of one of its *relata* and the relation going in reverse. Thus we can take 'perceiving the apple' to concern our mental state or the presence of the apple. That is, we may focus on and start the description from either *relatum*: the activity of the mind in perceiving the apple, or the activity of the object in prompting a mental experience of perceiving.

Likewise being a relation, knowledge has this twofold nature, and so can be considered beginning from the mental state or beginning from the object. So too abstraction has the twofold nature, of being on the one hand a mental activity and on the other a real feature of the object. Yet still we have but a single "abstractional complex", which can be described from different perspectives.

The later Aristotelian account of heteronomy agrees with this. Heteronyms in general have different names and "accounts" (in the sense of *Cat*. 1a2). Yet the commentators distinguished a special sense of heteronomy according to which heteronyms have the same substratum but different "notions".[27] For instance, an ascent and descent of the same stairs would be different things but have the stairs as their *substratum*. In effect we have the same scheme: a common relational complex, with two different aspects being abstracted, according to beginning from the perspective of one of the *relata* to the other.

Aristotle does say as well that knowledge is a state of the soul in the category of quality. [8b29–32]. However, he also says that states are relations, as they are *of* something just as knowledge and perception are *of* something. [6b2; 11a22–3] In most cases, he says, the genera of knowledge are relative, while the singulars, sc., the *infimae species*, like grammar and logic, are not. [11a23–4; *Top*. 124b18–9][28] For grammar is not the grammar *of* something, just as the particular wing is not a particular wing *of* something. Rather the particular wing is *a* or *the* wing of the

[27] Simplicius (*in Cat*. 22, 22–30) says that heteronyms share neither account nor name, and that this is the strictest type of heteronomy. He then admits this special sort, which however Ammonius (*in Cat*. 16, 26–9) takes as basic while calling the wholly 'heteronymous' simply 'different'. Cf. Clement of Alexandria, *Stromateis* VIII.8.24.2-9, ed. Stählin: 95, 5–26; Ammonius, *in Cat*. 16, 24–17, 3; Alexander, *in Top*. 398, 1–4; Luna 1987: 52.

[28] For knowledge is of the universal and so for Aristotle its *relata* would not be singulars. The relation of perception can have singular and perhaps universal *relata*. See the next Chapter. On grammar being a *relatum* because its genus is, cf. *Top*. 146b7–9; *Metaph*. 1021b4–6.

bird.[29] When we speak of the knowledge *of* and the wing *of* something, we are speaking of a generic knowledge and a generic wing. [11a29–30] Accordingly, these genera tend to be relatives. Still, someone is said to be a knower, in virtue of being a knower of an *infima species*, and not in virtue of being a knower of its genus: not a knower of knowledge or science in general but a knower of a science like grammar. So too something is winged not in virtue of having a generic wing but in virtue of having a particular wing. [11a33–4] These *infimae species* (or singulars) tend to be the *relata* but not the relation, while the genera above them tend to be the relation, while also being able (sometimes) to serve as *relata*.

Nevertheless, this rule has exceptions, as Aristotle suggests. E.g., suppose that science is a certain type of knowledge. Aristotle himself recognizes other sorts of science, like *phronesis*. Then science is knowledge of theoretical objects, while geology is the science of rocks. 'Science' does not signify an *infima species*, although 'geology' does (let's suppose). Again, 'natural science' can be used to signify the relation, as in 'biology is the natural science of living things', and also to signify a *relatum*, as in 'philosophy includes the knowledge of natural science'.

Again consider a particular instance of the general claim, that "knowledge is knowledge of something" [Cat. 6b5]: 'physics is the knowledge of moving objects'. The theory of physics is what we know about the moving objects, which are the things that we know about. 'What is known' itself is ambiguous as it could signify either physics or the moving objects. Aristotle instead calls the former "knowledge" and the latter "something". Likewise then, 'knowledge' itself can be taken to signify (1) the bare relation of knowledge or (2) the knowledge (or science) of something existing in the soul.

What about the second *relatum*, like the perceptible? In general, it is an object that is being perceived, known or abstracted. Sometimes this object seems to be individual: we perceive individuals approaching. Yet at times it seems to be universal, a general type: first, because to have a general theory of perception etc. we must talk in universal terms: perception is the perception of a perceptible, sc., some individual in the class of perceptibles. Second, for Aristotle we perceive the universal as well as the individual even in sense perception, (as I shall discuss further below). I can perceive Coriscus and man in general, this red color of this apple as well as red and apple in general. Aristotle does claim this. For how could we gain knowledge of universals by abstraction if the perceptions did not already have a universal content to be abstracted?

On the whole, in the case of perception, despite the use of the abstract expressions, Aristotle seems to tend to take both of the expressions signifying the *relata* as singular or at least as less general than the relation of perception. Thus, in 'perception is the perception of a perceptible', the first 'perception' would be a particular

[29] Aristotle is rather coy in his phrasing, as to whether the second 'wing' is indefinite or definite. Given his theory, it should be taken to indicate something general. We however might think that grammar is of something: e.g., the grammar of the Greek language. If so, then just take 'the grammar of the Greek language' to signify the *infima species*.

perception in the soul of a particular animal—or a general type or species of such perceptions. The perceptible would also be a singular thing, ultimately an individual substance, capable of being perceived, or perhaps a universal feature of a singular substance.

However, a case like 'knowledge is knowledge of the knowable' might have a different structure. The first 'knowledge' likely signifies a particular case of knowledge in a particular soul. For Aristotle speaks similarly of this particular grammar as being in the soul but as said of no subject. [1a25–7] Likewise for the first instance of 'perception'. However, the object of knowledge seems to be a universal. Aristotle has the *dictum* that knowledge is of the universal. Anyway, if Socrates and Xanthippe are both Greek grammarians, they both have knowledge of the same thing, grammar, viz., the structure of the Greek language, although to be sure individual apprehensions of that structure exist in their individual minds. This *relatum* then is the abstract paronym, grammar, which is universal, and not an individual. Nor is it the concrete paronym, the individual thing that is grammatical.

To sum up: I have claimed that in such statements as 'knowledge is knowledge of something', Aristotle takes the second 'knowledge' as the general relation. He takes the 'something' to be the second *relatum* of the knowledge relation. This *relatum* need not be in the category of relation, except insofar as it is known, i.e., in this relation. Thus I may know, and perceive, substances. Still, strictly speaking, insofar as the item to be related enters into the relation, it should be named "abstractly", solely in terms of its being in that relation: '*qua* winged', 'ruddered', '*qua* slave'. Then the second *relatum* will be a paronym of the relation, as the schema described above requires

On the other hand, it is less clear to what category the first *relatum*, knowledge or perception, belongs. Aristotle does not mind the same item being in different categories (Frede 1987; Morrison 1992). [11a37–8] Knowledge and perception offer instances. Aristotle puts these in the categories of both quality and relation. [6b2; 8b29–30] However, the context of 8b29–32 suggests that, when Aristotle speaks of "knowledge" as being in the category of quality, he means here "a knowledge or science", sc., a particular sort of knowledge serving as an *infima species*, like grammar. For he also uses the plural "knowledges" (ἐπιστῆμαι). Here then it seems that knowledge as genus serves as the relation only, while the particular kinds of knowledge, the *infimae species* serving as *relata*, are qualities. Then this *relatum* is a *quale* and does not belong also to the category of relation. At any rate, in most cases the genera function as the relations themselves, while their lowest species (or individuals of those species) function as *relata*, as things connected by the relation that themselves need not be in the category of relation. For instance, 'geology is knowledge of rocks'. Still these things still must be considered abstractly, insofar as they are in the relation. In both these examples, the second occurrence of 'perception' or 'knowledge' signifies a universal relation, sc., perception or knowledge taken as a genus. For Aristotle has said that knowledge is said of grammar. [1b2–3] The relation itself then is universal, while its *relata* may be singular or universal, abstract or concrete.

4.2 Abstract Paronyms

Now I consider how Aristotle's teachings on relations in the *Categories* fit with his doctrines elsewhere. Some have claimed them not to.

I have claimed that, strictly speaking, the *relata* are paronyms derived from the relation. This claim holds not only for *relata* named by concrete expressions: slave, wing, the ruddered, the equal, but also for the cases central to my topic—perception, knowledge, abstraction—where the *relata* themselves are signified by abstract nouns. Perhaps these signify a type of things different from the concrete nouns normally naming *relata*. Certainly, as we have already experienced, much of the difficulty in understanding Aristotle's position comes from the terms that he uses. So I now turn to focus on the relationships between the relation and the paronymous *relata* expressed by abstract terms.

We might suspect that, as with items in other categories like whiteness and being in the market place, Aristotle signifies the relations themselves by abstract names or expressions and signifies things having those relations through paronymous expressions. And so he does for cases like wings and slaves. (I have suggested that Aristotle often marks the abstract character of the expression naming the relation in a construction with 'be' given in the predication or in an infinite construction, and so that is not obvious.)

However, Aristotle is not making this point when he says:

> Lying, standing, and sitting are particular positions; position is a relative. To-be-lying, to-be-standing, or to-be-sitting [these are verbal perfect infinitives] are themselves not positions, but they get their names paronymously from the aforesaid positions. [*Cat*. 6b11–4]

To be sure, Aristotle once again, as with 'perception', is using abstract nouns to name *relata*. His point is that positions are *relata*, since a position is a position of something [6b6], satisfies the definition for *relata*, and converts in the way distinctive to *relata* (Simplicius, *in Cat*. 165, 3; 165, 5). However, in this case, the infinitives also signify items in the categories, as they are the realizations or states of having these relations; perhaps these are positions and not relations (Simplicius, *in Cat*., 165, 12–3; 165, 19–20; Ammonius, *in Cat*. 69, 17–21). Then this passage would be explaining why position and relation are distinct categories, although positions are *relata*.

In any event, Aristotle, no doubt partly for the sake of his attempt to account for all reputable, endoxic ways of talking about the world, recognizes cases where the *relata* themselves are signified by abstract nouns. Thus position is the position of something; grammar is the knowledge of, say, the structure of a language. So too perception is perception of a perceptible, and knowledge the knowledge of an object of knowledge (the knowable): cases central to my topic.

These cases (along with those of disposition, state, position and sight, thought, measure [*Cat*. 6b2–3; *Metaph*. 1021a29–b3]) use abstract nouns. They have two features making them unusual: a statement of their relation tends to mix these abstract nouns with concrete nouns: e.g., perception is perception of *something* perceptible, not of perceptibility. As observed in Chap. 3, unlike Plato, Aristotle

does not do this in other cases where he could have. E.g., he does not use the example 'mastery is mastery of a slave'.

Second, the conversion that Aristotle finds typical of *relata* becomes much more difficult to do with statements containing abstract nouns. Perception may be perception of something perceptible, but how to convert? 'Something perceptible is something perceptible through perception' sounds contrived and at best surely is not as smooth a conversion as in the case of 'the slave is a slave of the master'. Aristotle had a much more plausible, concrete option: the perceiver is the perceiver of the perceptible; the perceptible is perceptible to a perceiver. The latter cases would parallel the examples of master and slave, rudder and the ruddered etc. much more closely.

It is hard to tell what Aristotle wants these abstract terms to signify. Nearly all the examples that he gives for *relata* use concrete terms: slave, wing, father. Even when he speaks of the "state, condition, perception, knowledge, position" at 6b1–2, he may merely be listing the types, the species and genera, to which these *relata* belong. Still, he does go on to treat 'knowledge' and 'perception' as genuine *relata*. He does say often that they are states, presumably of the soul. [6b2–3; 8b27–9; 11a22–3]

Along the same lines, at 11a20ff., he suggests that knowledge and perception are *relata*—and universal—while saying that their species, like grammar, are qualities. Here again we have abstract terms signifying relations.

> Thus the particular cases are not relatives. But it is with the particular cases that we are said to be qualified, for it is these which we possess (it is because we have some particular knowledge that we are called knowledgeable). Hence these—the particular cases, in virtue of which we are on occasion said to be qualified—would indeed be qualities; and these are not relatives. [*Cat*. 11a31–6]

That is, the qualities belong to the category, and, as we have these qualities, like 'perception', they can be called by their paronyms, their *qualia*, like 'perceptible'. The same thing can be both a *quale* (ποιόν) and a *relatum*: "Moreover, if the same thing really is a qualification and a relative there is nothing absurd in its being counted in both the genera." [11a37–8] Here 'knowledge' signifies a *relatum*, despite being an abstract term.

On the other hand, his list of the categories in Chap. 5 contains, most probably, all concrete expressions. The ancient commentators tend to explain this by saying that Aristotle is starting with what is most familiar to us, the concrete, and moving towards the abstract (Ammonius, *in Cat*. 80, 25–81, 1; Chase 2003: n. 647). Thus, strictly, all the items in the category of "*relata*" will be "relations", with the category being that of "relation", although when we speak of these items as existing we use concrete terms naming their paronyms, which are the complex of, e.g., the relation in an individual substance. For those relations to exist *in re* they must become *relata*. For in this way they come to be in a subject, namely, in a primary substance and avoid turning into Platonic Forms (Caujolle-Zaslawsky 1980: 190–1). Yet we might beware the Platonizing influence, so as not to say that these paronymous items like *relata* owe their existence to relations etc. (Bäck 2003: n. 24).

Strictly speaking, the items in accidental categories are all signified by abstract terms. In most cases, the things having these accidents are signified by concrete terms. However sometimes, as with 'knowledge', they are not but are signified by abstract terms.

Aristotle could have used abstract terms for many of his examples of *relata* but does not. He does not use 'mastery' and 'slavery', or 'enslavement'. Consider the conversion in such cases: mastery is mastery of a slave; enslavement is enslavement by a master. For the statements to be true and for the conversion to work, we need to introduce a concrete term: not: mastery is mastery of slavery.[30] Moreover, such statements look more like definitions than like facts: e.g., 'mastery is mastery of a slave'. Yet as definitions such statements look incomplete. Rather, read: 'mastery is mastery of a slave by a master'. We could also go on to speak more strictly: 'mastery is the mastery of a human being *qua* mastered' or 'mastery is mastery of the mastered'. We could also reformulate the claim so as to eliminate the abstract terms, and say instead: 'to be a master is to be a master of a slave'.[31]

In contrast, in discussing perception and knowledge: Aristotle does use abstract nouns, although he could have used their concrete correlates.[32] E.g., why not: 'a knower is the knower of something known; something known is known by a knower'? Instead, using 'knowledge' and 'perception', Aristotle has the same situation as he would have had with 'mastery': at least one of the *relata* must be concrete: perception is not the perception of perception, but of a *perceptum*, something perceived. Moreover, if we take this statement as a definition, we ought to add on, at least implicitly, 'in a representation' and perhaps also 'by a perceiver'.

Thus understanding what Aristotle means in speaking of knowledge and relation (and abstraction!) as *relata* has many difficulties. Let me present a general interpretation and then proceed to show how it explains some particular passages.

In the previous section, I have claimed that for Aristotle the first *relatum* of the knowledge relation is a mental act or a state of knowledge. [*Cat*. 7b28–30] This state can be singular or universal, i.e., have one or many instances. Then, despite

[30] Actually, Aristotle could have said this, along the lines of what Plato suggests at *Parmenides* 134a–e, that the Form of knowledge has nothing to do with the individuals of our acquaintance but with Forms. Yet Aristotle seems not to take this line, as he takes the *relata* for knowledge to be individual things.

[31] The same would have to hold for true statements about qualities etc.: 'redness is a color' means that to be red is to be a color. Just as Aristotle does not want the essence of a dog, being a dog or what it is to be a dog, to exist apart from the dog, the same might be said for the essence of the red thing.

[32] Simplicius (*in Phys*. 401, 32–3) gives the correlates for vision and knowledge as their paronyms. Alexander of Aphrodisias, *On Aristotle's Metaphysics 5*; translated & comm. Dooley SJ 1994: 165 n. 382, on 409, 14–18: "If Aristotle's position must be justified, it is because Alexander's interpretation of *Metaphysics* 1021a32—that sc. thought is not referred to the thinker in whom it exists to the thing cognised—seems to conflict with the text from the *Topics* he has quoted, according to which relatives are referred to that in which they exist. But that text provides for relatives such as knowledge that are not necessarily referred to things in which they exist (although such reference is possible), but that can also exist in other things. When therefore (Alexander argues) Aristotle refers thought not to the knower but to the object, he is invoking this principle."

using an abstract noun or expression, what is being signified is the paronym, a concrete thing (in the sense of 2b) existing *in re*, be it singular or universal. In contrast, the second 'knowledge' in 'knowledge is the knowledge of something' signifies the relation, 'is the knowledge of', "being knowledge".

Moreover, we need to distinguish the two uses of abstract names discussed above (1 & 2). On the one hand, an abstract name like 'knowledge' can name the relation itself; on the other, it can name the state (in the soul) of being in that relation. Such states might be said, strictly speaking, not to exist without that of which they are the states, and so satisfy Aristotle's definition of the *relatum*.

Now the relation itself can be the subject of statements. Thus, in "defining" (at least in the sense of 'explicating') 'knowledge' or 'enslavement', we might say that knowledge is the knowledge of some object in a representation (to a knower), and that enslavement is the enslavement of one human being by another. In such statements, the first occurrence of the abstract term does not name a *relatum* but the relation itself, here being said to be "just that which (ὅπερ) the definition is". In such cases where the relation itself is the subject, both *relata* appear in the definition, where the relation is repeated.

In particular, a major clue for whether a relational statement is a statement about the relation of two *relata* or a definition of the relation lies in how it is completed. If its (fully explicit) completion requires both *relata*, it is definitional or explicative, as in 'knowledge is the knowledge of (1) *some object* in a representation [or: state of knowledge]' and 'enslavement is the enslavement of (1) *one human being* by (2) *another*'. If it requires only one *relatum*, it is a statement about the relation of two *relata*, as in 'the slave is a slave of the master, or 'knowledge is the knowledge of something (knowable)'.

Aristotle's example, 'knowledge is the knowledge of something', has the unfortunate feature of being able to be read as a definition or explication (a not fully explicit one) or as a statement of a relation between two *relata* much more easily than his statements about wings and slaves. Given the context in the *Categories* we should usually take the latter reading, a statement about the relation between the *relata*.

Aristotle has said about *qualia* that strictly they do not belong to the categories; rather the qualities do. Likewise, I have suggested, the *relata* do not belong to the category of relation. It is not the case that individual substances *are* qualities and relations. Rather, they *have* relations and qualities (Code 1986: 412, 430). (This is now misleading, if all *relata* are strictly speaking in that category.) When something has whiteness, it is white; when something has slavery, it is a slave, although the substance is not the proximate subject. After all, Aristotle has said that for such accidents to be, or exist, they must be, or exist, in an individual substance as subject. That subject is what has those accidents like whiteness and slavery. The derivative paronyms of these relations are what exist, as they signify the complex of the accident with the individual substance: namely, the accident's being in the subject. These derivative paronyms, as they have their being in a subject, exist. These are things like the white and the slave. An accident itself, like a relation or a quality, "exists" only insofar as it is in a subject, as a constituent of the complex, the thing having it. Thus Aristotle avoids Platonism. Hence he uses concrete terms in

Categories 4, when discussing what is said to exist,[33] while at the same time naming the accidents belonging to the categories by abstract terms. However in discussing relations he has the obscurity of using the concrete τά πρός τι to signify both the *relata* and the relation.

In discussing relations, Aristotle would tend to speak of these paronymous *relata* more than of the relations themselves, first, because it is difficult to speak of the relations in ordinary language, then and now. Indeed, Aristotle himself states the first reason when explaining why some *qualia* are not said paronymously from their qualities: because there is no name lying at hand to use. [10a324–4; cf. 6b13] To be sure, Aristotle does not mind inventing names, becoming a name-maker. [7b10–2] Still the lack of available names seems to constrain what he will say. Second, in the case of relations we have two paronyms and not one. So to avoid ambiguity especially when speaking as succinctly as Aristotle does, it is easier to speak of the derivative *relata* than of the original relations.

On this interpretation, Aristotle does have *relata* derived from the relation being signified by abstract nouns or expressions. These still signify things that exist, namely complexes of a thing having a relation, just as concrete nouns do. After all a perception or (a state of) knowledge exists only in a subject; what exists is the complex of the things having the perception or state of knowledge. (Still, Aristotle allows, we may talk *as if* the state or perception has an independent existence.

Let me show now how this interpretation handles some difficult passages.

In the *Metaphysics* Aristotle distinguishes types of *relata*, and suggests that [3] a case like knowledge and the knowable may differ from [1] that of the double and the half or of [2] the father and the son:

> Relative terms which imply [1] number or [2] capacity, therefore, are all relative because their very essence includes in its nature a reference to something else, not because something else is related to it; but [3] that which is measurable or knowable or thinkable is called relative because something else is related to it. For the thinkable implies that there is thought of it, but the thought is not relative to that of which it is the thought; for we should then have said the same thing twice. Similarly sight is the sight of something, not of that of which it is the sight (though of course it is true to say this); in fact it is relative to colour or to something else of the sort. But according to the other way of speaking the same thing would be said twice,—'it is the sight of that which is the object of sight'. [1021a26–b3]

This translation is quite misleading or at the least so free that it obscures the connection of the *Metaphysics* passage to *Categories* 7.[34] Literally the passage begins:

> Thus all *relata* said in virtue of number and potency are *relata* through just what they themselves are being said of another, but not through the other [being said] relative to that [the former]. But the measurable and the knowable and the thinkable are said [to be] *relata* through another being said relative to it.[35] [1021a26–30]

[33] Cf. *Metaph*. 1028a11–3. On the nature of the categories, see Bäck 2000: 136–9.

[34] So Christopher Kirwan (1993: 164) sees little connection.

[35] The variant text at 1021a28 amounts to the same. Cf. Kirwan's translation for 1021a28–9: "…from being called just what they are of something else, not from the other thing, being relative to them."

That is, the first two sorts of *relata* have "being said of another" but not "[being said] relative to another" as what they are, presumably, their essences, while the third sort has as what it is "[being said] relative to another" but not "being said of another". Kirwan thinks that Aristotle has gotten himself into a hopeless muddle, one inconsistent with the doctrine in the *Categories* (Kirwan 1993: 164–6).[36]

Aristotle might here just be making a further distinction about different ways in which one *relatum* in related to the other, as reflected in how those ways are stated. Kirwan thinks that Aristotle has dismissed such talk of the "purely grammatical". However, Aristotle does focus his attention greatly on the conversion peculiar to *relata*. He does remark on how the relational statements will have to be inflected:

> Sometimes, however, there will be a verbal difference, of ending. Thus knowledge is called knowledge of what is knowable, and what is knowable knowable by knowledge; perception perception of the perceptible, and the perceptible perceptible by perception. [*Cat*. 6b33–6; so too *Top*. 124b35–125a13]

These remarks are not "purely grammatical". For Aristotle is constructing a protocol language (Bäck 2000: 59–96). Moreover, such differences in inflection may signify varying features of the relation, such as the causal ones. We have seen Aristotle making such a distinction in contraposing the simultaneous in time from the simultaneous by nature. He does so also in the *Metaphysics* passage with the second sort distinguished. [1021a14–26][37]

Now in the *Categories* Aristotle defines *relata* first thus: "We call relatives all such things as are said to be just what they are, of or than [literally: "of" in the extended Greek sense] other things, or in some other way in relation to something else." [6a36–7; 6b6–7] But this definition is provisional. Again the translation may mislead: literally 6a36 reads, "Such are said to be *relata*…"—not that Aristotle himself is necessarily endorsing this. He does say that this definition implies the conversion special to *relata*. [6b28] He then says that this definition does not define *relata* strictly but is a consequence of the correct definition of *relata*. [8a33–4] The correct definition for *relata* is: those are *relata* "for which being is the same as being somehow related to something…" [8a32]

Thus the simplest way to take the distinction in *Metaphysics* V.15 is to say that Aristotle there is making again the distinction between *relata* that hold "of" or "than" another and those that hold "in some other way ("ὁπωσοῦν ἄλλως") in

[36] He has missed the point that the items being related are not properly the substances but *relata* of those substances. A *relatum* like the thinkable *is* and not merely *can* be thought, although its substance need only able to be thought. Also see (ps.) Alexander, *in Metaph*. 407, 10–1; 409, 32.

[37] The remarks of Dooley (*On Aristotle's Metaphysics 5* [= 406, 35–407, 4], nn. 368; 382) then are off-target, when he asserts that the third sort differs from the first two by one of the *relata* being able to exist without the other: first, because this remark would hold also for the second sort, as with the father and the son, and, second, because, as discussed, this result holds only from the substances that are *relata*, and not for the *relata* when named strictly. On his reference to *Top*. 125a33–b14 see n. 14. Kiefer (2007: 28–9) claims that the second sort "*does not imply* the presence of its opposing counterpart, unlike the other two kinds" and such *relata* are not simultaneous.

relation to something else."[38] For the examples given of the first two types there can be construed as connecting the *relata* in statements using the (extended Greek) genitive (at least as plausibly as examples in *Cat*. 7). This distinction need not be merely grammatical but may also signify differences in the structures of different sorts of relations. Indeed this is how Aristotle seems to be using "ὁπωσοῦν ἄλλως" again in discussing how to name *relata* strictly speaking. [6b13]

We can see this interpretation supported by the rest of the *Metaphysics* passage where Aristotle warns about the same thing being said twice. Aristotle says that for sight, as for cases like knowledge, perception, and thought, "sight is the sight of something, not of that of which it is the sight…" [1021a33–b1] He admits that both statements are true; the point is to say that sight is the sight of that of which it is the sight does not reveal the structure of the relation. As Aristotle indeed says, in 'sight is the sight of something of which it is the sight' is that the relation itself is mentioned twice.[39] This becomes clearer if we use 'sight' for the first occurrence of sight the *relatum*, and 'the seeing relation' for the second occurrence of sight the relation, in accordance with my general analysis of relational statements given in Chap. 3. The sentence containing the repetition then reads: sight has the seeing relation to an object to which that sight has the seeing relation. Here not only the relation itself but also the first *relatum* are stated twice, and, although we can talk like this, it does not provide a good analysis of what is going on, but rather Tartufferie. Once again we have continuity with the doctrine of *Categories* 7. For here Aristotle ends up justifying the form of the relational statement that he uses there: "knowledge is the knowledge of something"—not: 'knowledge is the knowledge of that to which it has the relation of knowledge'. [6b5; 1021a33; 1053a31–5]

Given that Aristotle speaks of thought "signifying" thus [1021a31], it is likely that he is thinking in *Metaphysics* Δ.15 of definitions and not of a statement of the relation between the *relata*. After all, *Metaphysics* Δ is a lexicon. Moreover, these statements about thought and sight [1021a31–b1] meet my criterion for a definitional statement for *relata*, as both *relata* appear in the predicate. Like the thinkable, the knowable signifies that there is (or: can be—the Greek problematic 'is') knowledge of it. However, knowledge signifies not that "there is the knowable of it" but that there is knowledge of something: if we were to say that knowledge signifies that there is knowledge of that of which there is knowledge, we would have said something true, but have said the same thing twice. In contrast, *Categories* 7 tends to make statements about the *relata* and not give definitions.

The two *relata*, knowledge and the knowable, have a certain asymmetry, one that is revealed in the difference in grammatical structure in their conversion.

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[38] Compare the phrasing of 1021a28–9 with 6a35 and the use of ὅπερ and ἅπερ. This is also how ancient commentators like (ps.) Alexander (*in Metaph*. 409, 32–6) interpret it.

[39] Cf. (ps.) Alexander of Aphrodisias, *in Metaph*. 406, 35–407, 4. On what Aristotle means by 'saying the same thing twice', see *Int*. 21a16–7; 20b40 and *Metaph.* 1003b26–9.

There are problems with the text of 1021b3: one definite article added and another deleted by the editors: if not thus then: 'it is sight of that of which the sight is [it is the sight]'. Not making the two suggested corrections would yield a text following the pattern in the *Categories* exactly, as opposed to what the editors (Jaeger and somewhat Bonitz) give. See Ross 1953: 331, n. 3.

Thus, while the double is a double *of* a half, and the master a master *of* a slave, and indeed knowledge is knowledge of the knowable (or: of something), it is not right to say that the knowable is knowable *of* that of which there is knowledge, but "in some other way": 'in' or 'to' knowledge (using the dative in Greek) or 'in a state of knowledge' perhaps.

In sum, Aristotle does use abstract names and expressions at times to signify concrete things that are items in the accidental categories insofar as they exist *in re*. For them to exist *in re* is for them to exist in individual substances. But these abstract terms name concrete and not abstract paronyms. The truly "abstract" things are the items in the accidental categories: for instance, whiteness, slavery, and (the relation) knowledge. When these exist in individual substances like Socrates, the resulting complex, the paronym, is named from the item in the categories by a term, usually concrete but sometimes abstract: '(the) white', 'slave', 'knowledge'. The *relata* are especially tricky, as two paronyms are derived from the same relation, and often in ordinary language have quite different names: thus 'enslaver' or 'master' and 'enslaved' or 'slave' from 'slavery' or 'enslavement'. Moreover, sometimes from these paronyms yet further paronyms can be derived, just as Aristotle allows for (the position or state of) "having been seated" to be derived from the relation sitting—and perhaps "perceiver" (an individual substance named *per accidens*) from perception the state (not the relation).

4.3 The Reality of Abstraction

'Abstraction' seems to have the same relational structure as 'perception' and especially 'knowledge'.[40] It too concerns the formation of something grasped in a mental state from the apprehension of an object or objects. We shall see that Aristotle holds abstraction to be a mental process having perception or knowledge as its types. Thus it is likely that Aristotle takes abstraction to have their logical features too. Accordingly, in line with the *dictum* for 'knowledge' or 'perception' [6b5–6], we may say:

> Abstraction is the abstraction *of*, or *from*, something.

As before, the first 'abstraction' in this sentence would signify the result of the abstracting, something in a certain state or actuality or activity of the soul, while the second would signify the relation of abstraction itself. Abstraction as a relation then would have two *relata*, "abstraction", in the sense of what is abstracted, and the thing from which the abstracting is done, its base. Thus 'abstraction' can be taken to signify in two ways: the relation of the abstracting and the product or state, derived from the activity of abstracting from the objects, the bases.

[40] Alternatively, 'abstraction' can be taken to signify an action done upon *something*. Yet action too has relational features.

Again, we can likewise describe abstracting as a process from two perspectives: beginning from the mental experience and proceeding to the object; beginning from the object and proceeding to, indeed, bringing about, the mental experience. Thus the first *relatum* in the relation of abstraction has the same two perspectives as the first *relatum* of perception or knowledge. On the one hand, it can be considered as something mental, going on in the soul; on the other, it can be considered as being about the real object from which it has been derived. 'My perception of the apple' can be taken subjectively, to describe my experience of the apple, or objectively, to describe what can be observed about the apple from my perspective and from my organs of perception. Likewise, abstractions can be taken as mental processes or states, or as features of the objects from which the abstraction is made.

It is likely that, just as was the case for perception and knowledge, the relation of abstraction tends to be more general than its *relata*. For Aristotle uses the phrase 'the things said from abstraction' (τὰ ἐξ ἀφαιρέσεως λεγόμενα) to signify one of the *relata* in the abstraction process: the abstract things that have been produced. Such "things" will all be *relata*, related by the more general "abstraction" relation and more general than the things from which they have been abstracted.

The same distinction made above in the schema applies to the abstracted things. As we shall see, Aristotle holds that we abstract the (general) color and the species bird from our perceptions of more particular objects. These objects may exist prior to the abstraction, *in re* or at least in the mind of the person abstracting, but not insofar as they are in the abstraction relation, that is, *qua* their bases. Once again too, as with perceiving or knowing, even though the individual substance, the animal or human being, doing the abstraction is also presupposed in the relation of abstraction, she does not constitute a third *relatum* for the abstraction relation. Moreover, strictly speaking, the human being or animal abstracts not *per se* but *per accidens*: the one abstracting, or the animal, *qua* abstracting, abstracts *per se*.

In one sense, the objects of abstraction, the bases, have an existence prior to and independent of the abstraction. Colors and birds exist prior to being perceived or known, but do so *qua* qualities or *qua* substances, and not *qua* perceptible or *qua* knowable. Likewise for the animals doing the abstracting. The same ambiguities of mode, of potentiality and actuality, apply in Greek to 'abstraction' too. Without actual knowers and actual knowledge, there are abstractions only potentially; with them there are abstractions in first if not in second actuality. Given that Aristotle holds all universals are abstractions, this result will hold for universals too!

Construing abstraction as selective attention agrees with this relational account. For 'selective attention' can likewise be taken in two ways: the effort and process of the one doing the attending and the result of attending selectively to the objects, the conception or mental state produced, the objects being attended to. Once again, the one attending to those objects is not, *per se*, one of the *relata* of selective attention.

Moreover, as with the *relata* of perception and knowledge, the *relata* of the abstraction relation need not themselves be items in the category of relation—at any rate, when not named precisely, *qua* being in that relation. Concavity, Aristotle says, is an abstraction from the shape of a snub nose, as snubness is concavity in a nose.

[*An.* 429b19; 431b12–7; *Metaph.* 1030b31–2] What is said from abstraction, the concavity, is itself a quality. [*Cat.* 10a11–3] The shape of a snub nose, *qua* shape, again is a quality, although the individual nose is a substance, noses in general *relata* or substances, and the shape of a snub nose *qua* continuous is a quantity. [4b23–4]

We might here make again the further refinement and require that, strictly speaking, the *relata* be *c*onsidered only in virtue of the abstraction being performed. A base like the snubness of a nose, when being abstracted in order to get concavity, must be considered solely in virtue of its "form" (here in the sense of 'its figure'), not in terms of its function. A severed nose may still be a concave object, although, if we follow Aristotle's remark about the finger, is now an actual (fully actualized) nose in name only, as it no longer functions as a nose. An abstract thing like a particular concavity (for instance, the concavity of this nose) is to be considered solely in virtue of the spatial arrangement of its parts, not in virtue of its color or its being located on a face or its having been developed via animal growth or its glowing in the dark—or its functioning as a nose. Likewise, concavity in general is considered in virtue of the figure alone, not in virtue of its material constituents, even if essential to it. For a plausible case might be made that Aristotle should hold certain material to be necessary for concavity: just as a saw must be made of the right sort of material, so too, it would seem, concavity must be exemplified in the right sort of materials, namely solidified stuff that can hold a shape. [*Phys*. 200a11–3] Nevertheless, when the geometer considers concavity, she does not consider, or attend to, such material features.

So then abstraction is a relation constituted by a mental process of thinking of an aspect of some object. What complicates the situation is that what is taken to that object, the base, itself may well be an object of a previous abstraction. For instance, snubness signifies a certain shape of a nose. To get at snubness we must have already abstracted away from many other features of this and that nose. Still, in the present abstraction relation, the snubness is taken as the object upon which the abstracting is to be performed.

Things then come from their bases by extracting, via selective attention, certain of their features. Relative to the particular abstraction being performed, the bases serve as the objects, subjects having these features in their *substrata*.

Now Aristotle does not require such objects themselves to be substances: snubness, for instance, is a quality, and concavity is abstracted from it. Indeed, I have claimed Aristotle to hold that in general *relata*, when named strictly, are not the substances without qualification but only in the respect of being in the relation. Still these non-substantial bases for abstraction have a unity and an identity sufficient for their serving as objects in the relation. These objects are taken *as if* they were substances in their own right—as quasi-substances or as hypostases, to use the later Greek term: obviously so for master, slave, father, son, and the ruddered; less obviously for rudder and wing, except when named strictly, *qua* this or *qua* that. We have here objects serving as independent subjects without being substances.

This sort of abstract thinking happens commonly in the sciences. What we think about in science are real objects. As Aristotle sketches in his psychology, the

universals thought about in the sciences are themselves the products of previous abstractions via sense perception and previous abstract thinking of the primary substances and their attributes in the world. In science, we think about them precisely by attending selectively to certain aspects of the objects under discussion: *qua* this and *qua* that. Yet those objects taken to be real, which will serve as the second *relata* in the abstraction relation, themselves are abstractions on another level. One science may consider snubness; another science concavity, where both snubness and concavity describe attributes of particular noses existing in reality acquired via abstraction.

Aristotle may be making also a much stronger point about the reality of mathematical objects, namely that items like concavity do not exist *in re* at all. Rather, only their paronyms, the concave etc., exist *in re*. For the snub nose is not concavity but concave. This will allow the concave to exist *in re* and to be a *quale*, albeit not to exist in its own right but dependently, as being in a substance. That is, for concavity ("the concave" taken abstractly (1)) to exist it must be taken as the concave thing (in the sense of (2b)). Concavity does not exist in its own right, *per se*, but only because it is in an individual substance.[41] But the concavity in the individual substance is just the concave; the concavity does not exist *in re* in the primary, fully actual sense. Thus the quality does not exist *in re*, even though the correlated *quale* does, in its combination with an individual substance, where it is a paronym of its correlative quality. This position gives Aristotle a strong rejection of Platonism. In the last chapter I claim that this ends up being Aristotle's general solution to the existence of universals *in re.*

Aristotle thus recognizes series of abstractions producing a series of more and more "abstract" —simpler and simpler—objects with fewer and fewer features. Aristotle thinks that the more abstract, the simpler the objects, and the simpler the objects, the more precise the science. [1078a9–11] This series is not an infinite regress but has an ultimate limit resulting in abstract things that cannot serve in turn as bases. As we shall see in Chap. 6, these are "the things said from abstraction."

Aristotle presents this hierarchy of abstractions in his classification of the sciences. He speaks of preferring sciences that abstract away from spatial movement to those that do not, and of preferring those that do not deal with movement to those that deal with uniform primary movement, and preferring the latter to those dealing with primary movement, and preferring the latter to those that deal with movement of any sort. [1078a11–4] That is, the science that deals with the simplest objects, the most restrictive aspects of the object, is the best, the most primary, the logically prior science. Aristotle sees the scientist making abstractions upon objects that are themselves the results of prior abstractions and in so doing having a hierarchy of types of knowledge.

[41] "There is, for Aristotle, no such thing as a number, for example, except insofar as is a particular number. And there is no such thing as a particular number except insofar as that particular number is an odd number or, if it is not an odd number, an even number. Each particular member of the kind, number, must be determined as to being odd or, if not odd, even, if it is to be a member of that kind" (Tierney 2004: 15).

Still he holds that all this multiplicity of abstract objects and types of knowledge does not create a multiplicity of real objects or substances. Instead they are different aspects of the same primary substances and their attributes. The relation of abstraction itself is a mental process. What it creates are abstract thoughts, which, like sense perceptions themselves, have existence in the mind as mental states. These mental states signify real features of real objects.

Thus, just as with 'perception is a perception of a physical object' the first 'perception' signifies a mental event or experience, so too it would seem that for Aristotle, in 'abstraction is abstraction from something', the first 'abstraction' signifies a mental state. Likewise, in 'concavity is an abstraction from snubness', 'concavity' would signify a mental state or activity of the soul on some object. If the point can be generalized sufficiently, it has large implications. For, if Aristotle holds that all universal terms signify abstract objects, namely, the products of states produced by processes of abstract thought—as we shall see him to intimate—then we shall have attained great insight into his views of universals. For they would be abstractions produced in the mind while being about and from real things.

This point would also hold for all substances. For secondary substances themselves are universals, and so too would be abstract objects. Yet even the primary substances are not themselves perceived directly in the perceptions of sense. At any rate, Aristotle does seem to take them thus, as we have no sense perception of substances in respect of being substances but only in respect of certain of their attributes, mostly qualities. As we shall see, he holds that we grasp substances, both individual and universal, by successive processes of perceiving and knowing and by *noûs*—all of which involve abstraction as well as synthesis. Our knowledge then not only of universals but of all substances as such will depend upon abstraction. The priority of individual substances does not come from our order of knowing but from their causal priority and intelligibility in themselves.

What are we to do with the species and genera of substances? For they too are abstract things: the species dog is abstracted from individual dogs. The conversion special to relations does not work for these species and genera: an animal is not an animal from a dog, and so their being substances and not *relata* appears safe. Still it is not clear yet just how these species and genera are to appear in statements of the form 'x is abstracted from y'. We can say safely that they appear *qua* abstracted: the species dog *qua* abstracted is abstracted from individual dogs. But what this means and what is the relationship between "the dog" and "the dog qua abstracted" remains to be determined.

4.4 Quasi-Substances

For Aristotle the objects of science and philosophy are real but do not have a real existence apart from the primary substances from which they are abstracted, nor from our experience of them. To be sure, Aristotle wants special sciences like geometry, astronomy, and optics each to have its special domain of real objects, even

though all of them might talk of spheres, concavity etc. He says, "They cut off a part of being and investigate the attributes of this part—this is what the mathematical sciences for instance do." [*Metaph.* 1003a24–5] This talk of "cutting off" suggests a process of abstraction.

Aristotle recognizes that endorsing such domains of special objects suggests that more objects and types exist than the individuals ones grasped in sense perception. He calls mathematical objects "the things said from abstraction". [*An. Po.* 81b3] He takes them to be abstract objects that can be used in science but still do not exist separately and in addition to the objects *in re* from which they have been abstracted. [*Metaph.* XIII.3] However, he does not want these objects all to exist *in re* separately, so as to avoid a Platonism:

> For besides the sensible things there will be, on similar principles, the things with which astronomy and those with which geometry deals; but how is it possible that a heaven and its parts—or indeed anything which has movement—should exist apart from the sensible heaven? Similarly also the objects of optics and harmonics will exist apart; for there will be voice and sight besides the sensible or individual voices and sights. Therefore it is plain that the other senses as well, and the other objects of sense, will exist apart; for why should one set of them do so and another not? And if this is so, animals also will exist apart, since the senses will. [*Metaph.* 1077a1–9; cf. 997b12–34]

Aristotle affirms that each particular science has its own particular domain of objects. Geometry has shapes and figures; arithmetic numbers; physics moving things; astronomy celestial, everlasting moving things. As for optics and harmonics, "neither considers its objects *qua* light-ray (ὄψις) or *qua* voice, but *qua* lines and numbers; but the latter are attributes proper (οἰκεῖα...πάθη) to the former." [1078a14–6] These objects, he admits, exist over and above the perceptible, singular things. But, he asks, how to maintain this position while still affirming the primacy of individual substances and the existence of all else *in* and *of* them?

Aristotle solves this *aporia* by saying that the scientist can study what is not separate *as if* it were separate by performing an act of abstraction:

> …thus since it is true to say without qualification that not only things which are separable but also things which are inseparable exist—for instance, that moving things exist, —it is true also to say, without qualification, that the objects of mathematics exist, and with the character ascribed to them by mathematicians. And it is true to say of the other sciences too, without qualification, that they deal with such and such a subject—not with what is accidental to it (e.g. not with the white, if the white thing is healthy, and the science has the healthy as its subject), but with that which is the subject of each science—with the healthy if it treats things *qua* healthy, with man if *qua* man. So too is it with geometry; if its subjects happen to be sensible, though it does not treat them *qua* sensible, the mathematical sciences will not for that reason be sciences of sensibles—nor, on the other hand, of other things separate from sensibles. [*Metaph.* 1077b31–1078a5]

Perceptible objects, the primary substances, happen to have mathematical attributes as their accidents. Aristotle is saying that these attributes are the objects of mathematics, considered as separate, even though in fact they are inseparable and cannot exist apart from the primary substances *in* which they are. Just as we can consider a substance like a dog or a man *per se*, apart from its accidents, we can

consider an accident like the white or triangle *per se*, apart from what is accidental to it, sc., the primary substances.[42]

Each of these accidents can serve as a subject at least to the extent that it has its own essence, *propria* and accidents—even though its existence depends on the existence of the primary substance or substances *in* which it is. [Cf. 102816–29] Indeed, if we run through the list of sciences recognized by Aristotle, we shall find most of them deal with the accidents of substances.[43]

> Many properties [literally: many things—πολλά] attach to things [πράγμασιν] in virtue of their own nature [*per se*] as possessed of some such property; e.g. there are attributes [affects—πάθη] peculiar [ἴδια—sc., that are *propria* for] to the animal *qua* female or *qua* male, yet there is no female nor male separate from animals. And so also there are attributes which belong to things merely as lengths or as planes. [1078a5–9]

Aristotle then reaffirms that the "attributes"—i.e., affects, so accidental ones—of substances can be taken as subjects for sciences and have their own *propria*. After all, a science looks for *propria* of its subjects. [*An. Po*. 75a18–31;76a4–7][44] Thus (ps.) Alexander says that male and female are affects or accidents (*per se*, of the second sort) of animal. Still they can be taken as subjects in their own right, having their own essential attributes belonging *qua* male or *qua* female, like being able to beget and being able to receive sperm. [(Ps.) Alexander, *in Metaph*. 737, 3–17] In this way we cut off a part of being and produce distinctive subjects for the special sciences. The objects produced thus amount to quasi-substances, or, as Aristotle himself might have said (but doesn't), substances *per accidens* (Tierney 2004: 19; Harari 2004: 104–6).

Note Aristotle's copious use of '*qua*' talk in describing these subjects. We have seen him using it also in discussing *relata*. Considering substances *qua* this or *qua* that was Aristotle's way also for specifying *relata* strictly speaking: the bird *qua* winged; Coriscus *qua* headed; the boat *qua* having a rudder. These qua phrases restrict the attention on the attributes of the individual substances ((Ps.) Simplicius, *in de An.*, 253, 39–40; 254, 2). Still, as they are still the attributes of the individual substances, Aristotle thinks that he has not introduced any new, transcendental separate objects like Plato's Forms.

Yet, somewhat like Plato, Aristotle has a hierarchical ladder of sciences leading to those having the least to do with the matter and individuality of perceptible things:

> And in proportion as we are dealing with things which are prior in formula and simpler, our knowledge will have more accuracy, i.e. simplicity. Thus a science which abstracts from[45] the magnitude of things is more precise than one which takes it into account; and a science is most precise if it abstracts from movement, but if it takes account of movement, it is most

[42] Aristotle certainly admits accidents to have essences and definitions. Cf. *Metaphysics* VII.4–6 and the use of essence (τὸ τί ἦν εἶναι) at *Topics* I.5 applying to all the categories; so Ammonius, *in Cat*. 20, 27; Frede 1987: 33–5; Luna 1987: 117.

[43] 'Being *qua* being' is the obvious exception; perhaps also embryology and astronomy as well as psychology, as the soul is the essence of animate substances. Cf. *Metaphysics* 1037a5–8.

[44] Cf. Ross 1949: 577.

[45] 'Abstracts from' does not appear in the Greek!—only "without magnitude".

> precise if it deals with the primary movement, for this is the simplest; and of this again uniform movement is the simplest form. The same account may be given of harmonics and optics; for neither considers its objects *qua* light-ray or *qua* voice, but *qua* lines and numbers; but the latter are attributes proper to the former. And mechanics too proceeds in the same way. Thus if we suppose things separated from their attributes and make any inquiry concerning them as such, we shall not for this reason be in error, any more than when one draws a line on the ground and calls it a foot long when it is not; for the error is not included in the propositions. [1078a9–21]

So Aristotle finds the most abstract science the most precise and knowable in itself. [Cf. *An. Po*. 87a31–5] A science of substance, abstracting from motion, has more precision than a science of mobile substance. These sciences have their own proper objects and fields of study. Still they do not presuppose that these objects exist independently in reality.

Perhaps alluding to Plato's discussion about the equal sticks in the *Phaedo*, Aristotle gives the example of a line drawn on the ground. The line is not precisely a foot long. Yet, if in a mathematical discussion we use it as an example of a foot-long line we can say that it is a foot long. Aristotle gives few details. Still he seems to be thinking of specifying the line *qua* mathematical, as abstracted from its matter and the irregularities of the sand in which it is drawn. Perhaps he thinks that we can do this by abstracting away from those particular features where the particular things differ. For instance, the actual lines drawn are more or less straight have more or less width etc. So eliminate all those features whereby they differ and a perfectly straight line *might* be obtained.

The key point here is that Aristotle is saying that

> [1] This line is a foot long can be false, while
> [2] This line *qua* geometrical is a foot long is true.

Thus somehow, in a way still to be determined, the objects of mathematics, abstracted from individual substances not only have a substratum and an identity of their own, but also can have properties incompatible with their bases.

Now we can make a plausible case that *relata* in general have the same features. For instance

> [3] Coriscus *qua* object of perception has an existence simultaneous with the [actual] perception of Coriscus
> [4] Coriscus does not have an existence simultaneous with the [actual] perception of Coriscus

and even:

> [5] Coriscus *qua* object of perception is perceived

can be true at a time when

> [6] Coriscus is perceived

is false, as Aristotle has said that correlatives stated strictly and in the same mode (preferably of second actuality) exist together. Now in [3] and [5] we have correlatives while in [4] and [6] we do not. After all, Coriscus exists before someone actually perceived him; I can "know that someone is approaching "and not know that it

is Coriscus. That is, the correlative, 'Coriscus *qua* object of perception', amounts to a visual perception that need not have come from Coriscus: I could have gotten the same visual experience from seeing Xanthippe at a distance. (I discuss *per accidens* perception and the fallacy of accident more in the next chapter.)

Thus the objects being generated by the abstraction relation not only have a quasi-independence but also may have attributes different from the things from which they are abstracted. In formal terms, this means that the *secundum quid ad simpliciter* inference does not hold.

Aristotle goes on to give other such instances:

> Each question will be best investigated in this way—by supposing separate what is not separate, as the arithmetician and the geometer do. For a man *qua* man is one indivisible thing; and the arithmetician supposes one indivisible thing, and then considers whether any attribute belongs to a man *qua* indivisible. But the geometer treats him neither *qua* man nor *qua* indivisible, but as a solid. For evidently the attributes which would have belonged to him even if he had not been indivisible, can belong to him apart from these attributes. Thus, then, geometers speak correctly—they talk about existing things, and their subjects do exist; for being has two forms—it exists not only in fulfillment but also as matter. [1078a21–31]

So likewise we have:

> [7] A man is not indivisible and
> [8] A man *qua* man is indivisible.

After all, Aristotle says that a mathematician supposes something that in fact is false, that what is not separate is separate. Once more the *secundum quid ad simpliciter* inference does not hold.

The same situation arises for *relata* once named strictly. What holds of Coriscus *qua* slave, of the rudder *qua* part of a boat, of the head *qua* fully actualized part of a body, need not hold for Coriscus, the rudder, the head. For this to be possible, Aristotle, suggests, *relata* have to have *substrata* different from the substrata of their substances. [*Metaph*. 1089b15–33] In effect he is saying: "if *relata were* separate from the substances in which they exist, then…" We shall need to look to see what theory Aristotle offers in justification of such counterfactual claims and whether like the sophists he has thereby made accidents into substances. In effect, we shall need to investigate his theory of abstraction.

Relata then look like good candidates for ersatz substances. When named strictly, they constitute an aspect of the substances in which they exist while providing new subjects in their own right. A *relatum* like the slave—that is, the paronym (2a) from the relation of slavery—can have Cambridge changes just like a substance: without moving or changing himself, he can change his relations from being on the right to being on the left of his mistress, just like Coriscus, the substance that is the slave.[46]

[46] As discussed in Chap. 10, Sorabji seems wrong to claim that these Cambridge changes are distinctive to *relata*. Rather they would hold for the concrete paronym of an item of any category when the motion or change is *per accidens*.

Indeed Aristotle holds that substances and *relata* agree in neither admitting motion:

> In respect of substance there is no motion, because substance has no contrary among things that are. Nor is there motion in respect of relation; for it may happen that when one correlative changes, the other, although this does not itself change, may be true or not true, so that in these cases the motion is accidental. [*Phys*. 225b10–3][47]

For Aristotle, motion consists in going from one existent contrary to another. Substances and *relata* agree in that they come to be not from those (as sitting from standing, or red from white) but from "not being", what are not they at all, the negation of their existing (*Phys*. 224b1–4; 225a32–b5; Simplicius, *in Phys*. 834, 25–835, 1). The contraries that substances take on while persisting come from other categories. In contrast, if a dog takes on not-dog, it has died and is no longer. Substances thus undergo changes, some essential like perishing, but most accidental. Substances do change in the way distinctive to motion but only *per accidens*. Substances like Coriscus move but not insofar as being substances but insofar as being in a place or having a quality or having a quantity. [*Phys*. 225b8–9][48] Likewise *relata* do not move except *per accidens*, and change in the ways that substances do: coming into existence and going out of it. For instance, someone can come to have the relation of slavery and also can lose it; thus the slave comes to exist and ceases to exist *qua* slave. The slave though is sitting or walking only *per accidens*. Aristotle calls such statements ones of being *per accidens*, if 'the slave' is taken in the sense of the mere accident (2a) and not in that of the substance with the accident (2bi). [*Metaph*. 1017a7–13] Those in the former sense give rise to unnatural predications. Yet they serve also as the proper objects for science, when we take them not as being in fact separate substances but as separate subjects in the mode of "as if".

As discussed further in Chap. 10, such a change (Geach's Cambridge change) holds for the substance in the relation, but not for the *relata* named strictly. Xanthippe changes her relation from being on the right to being on the left of Coriscus as he approaches, while she herself changes not at all. This lack of change on the part of the subject is a criterion that the accident in question is a *relatum*.[49] The *relatum* named strictly (2a), "the (original) one on the right", in contrast undergoes no process of change, but ceases to exist altogether. In fact, Aristotle may well be saying that, strictly, it cannot have any changes at all, if we insist that it can never be a

[47] There are some problems with the text: if we excise Ross' addition, we get for 225b11–3: "For, when one of them changes, it is possible that it is true that the other changes [in] nothing, so that their motion be *per accidens*."

[48] Still, Aristotle does say that "the musical walks because that to which the musical is accidental walks" [224a22–3]—and that thing certainly seems to be an individual substance. Simplicius (*in Phys*. 802, 18–21) takes this to mean that the individual substances walk, but goes on to observe, 802, 27–803, 2, that Aristotle is not speaking of motion but of change in general. We may say also that Aristotle just has not yet given his finer analysis, that an individual substance walks *qua* being in a place but not *per se* (some individual substances, the immaterial ones, can't walk).

[49] Perhaps this is what Sorabji and Fleet mean, although they do not say so strictly speaking.

subject but only an attribute of a subject. At the same time, if we consider the *relatum* loosely, as the paronym, the complex of the substance having the relation (2bi), or if *relata* can serve as subjects, as Aristotle allows in the mode of 'as if', *relata* like slaves can move *per accidens*, and have their relations change without themselves changing at all, as with like being on the right.

Yet then these things, these quasi-substantial *relata*, that move *per se* are not the substances. Thus Aristotle speaks of "the musical", "the doctor", "the whitening" moving or changing. [223b22; 223b33; 224b18] These "things" can serve as subjects. "I mean by subject what is indicated by an affirmation." [225a5–6] What exactly are these "things"—the complex of accident with substance (2bi) or that of accident with a quasi-substance, (2a) in the mode of "as if"? Apparently they are not the substances without qualification. For then Aristotle should allow substances to move *per se*, and for a builder to build *qua* human being as well as *qua* builder. Rather, they are the substances insofar as they have qualities, relations etc. like house-building, slavery… Indeed I suggested this very schema for naming *relata* strictly: the bird *qua* winged; Socrates *qua* headed. These items amount to the accident (2a) taken quasi-substantially.[50] For these are his objects of science.

Yet, at the same time, Aristotle holds that a *relatum* is least like a substance. [1088a29–35; quoted in Chap. 10] How can what is "least like a substance" be a quasi-substance?

Above all the substance provides a substratum for change. It alone can develop gradually and persist through changing its contrary properties. [*Cat*. 4a10–1] A substance can change its relations without changing at all. *Relata* do resemble substances in not moving *per se* and in having changes only like coming to be and passing away. They differ from substances though in not having a process of this generation or destruction (also in some other features, like some of them admitting or more and less). A *relatum* like a slave does not gradually develop into a slave, in the way that a baby or fetal head develops gradually into a fully actualized human being or head. Thus, as I shall suggest, parts of animals like heads then are not *relata* (except *qua* fully actualized) because they come to be in a gradual process. Moreover, *relata* can have persistence through change only when treated as if they had a substratum, which they gain derivatively from their substances, as they are just these substances insofar as they have those relations.

Relata then turn out for Aristotle to be the ideal quasi-substances, serving as abstract objects and universals of the sciences. On the one hand, as they have such a dependent existence and cannot, strictly speaking, persist through change, recognizing *relata* does not multiply entities so as to create an intelligible or a quasi-intelligible or abstract world over and above the perceptible world. On the other hand, *relata*, in the mode of "as if", used in theory construction, can serve as subjects in their own right and even have properties different from the substances in which they exist. If universals have this relational structure, Aristotle ends up avoiding Platonism while still having universals as subjects for the sciences.

[50] Thus Simplicius, *in Phys*. 811, 13, 812, 2.

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Part II
SCIENCE: The Psychological Process of Abstraction

> But yet one must start from that which is barely intelligible but intelligible to oneself, and try to understand what is intelligible in itself, passing, as has been said, by way of those very things which one understands. *Metaph.* [1029b10]

As with perception and knowledge, Aristotle's theory of abstraction becomes complex due to its relational nature. There is the relation of abstracting, itself a mental activity or state of a living, rational being. There are the *relata* of abstraction, ultimately the fully actual, individual primary substances: the animal doing the abstracting and the object in the world being abstracted from. Strictly and proximately, only the *relata* of these substances enter into the abstraction relation: a particular thought by that thinking thing on the one hand, and an aspect, usually accidental, abstracted from the object being thought about on the other.

The abstraction relation may be considered as moving from one of these *relata* to the other. Accordingly, we may focus on the structure of the objects upon which abstraction can be performed and then on the process whereby the objects become abstracted, how these real objects are transformed into mental abstract ones. We may focus on the products of the abstraction process and how they relate to, or signify, real objects and their aspects. The first process is psychological; the second ontological.

Although Aristotle does not emphasize the connection in his theory of relation itself, we may also consider how the abstracter, the animal doing the abstraction, is related to the abstraction being produced.[1] Here we may start from how objects appear to us, the literally "phenomenal", mental experience of perceptions, that is, from the objects as they appear to us. Here we may work upwards from that material via abstraction to the first principles. On the other hand, in an established science we may work downwards, from the first principles via scientific demonstration to what we experience. In this way too abstraction has a dual aspect. As Aristotle says, we may proceed from what is most familiar and known to us to what is most known in itself, or from the first principles to what is most known and familiar to us: from our

[1] For "the abstracter is an abstracter of abstractions" fits Aristotle's criterion of the conversion distinctive to relations, as discussed in Chap. 3.

everyday experience of sense perceptions and reputable customs (*endoxa*) or from the simple, abstract principles that begin the explanation of this experience.

Aristotle himself makes such distinctions. He parcels his discussion of abstraction out to various disciplines. He discusses somewhat the general structure of abstraction, the abstraction relation itself, in discussing the category of relation and the division of the sciences. His views on the *relata* of abstraction appear in different places besides the general discussion in the *Categories*. Next, on the one hand, he has a theory of the psychological process whereby we come to have knowledge of abstractions (*abstracta*) from sense perception of objects existing *in re*, his individual substances. There he considers also the structure of perceptions and thoughts. On the other hand, in his metaphysics and philosophy of science, he considers ontological issues concerning the *abstracta*: the basis whereby the psychological process is possible, and the nature of the abstract objects produced: do they exist like individual substances, like Plato's Forms, or like quasi-substantial hypostases? Thus, some of his discussions of abstraction appear in the context of his examining thinking or perceiving or knowing, while others arise in the context in discussing the objects of particular sciences like arithmetic and geometry. Again Aristotle discusses the formal features of the language of abstraction in his logical writings. Also in his *Topics* and at the end of his *Analytics* he discusses ways of moving from what is evident to us to the first principles.

The bifurcation of abstraction theory into the psychological and the ontological is especially unwieldy at times, due to the overlapping doctrines. Still, it is useful to begin with the division of labor found in Aristotle's texts, and to consider abstraction, first, from the viewpoint of the thinking process and, second, from the viewpoint of the things that cause the perceptions and then come to be thought about. In an Aristotelian spirit then, I shall start from the things most evident to us, the psychological process of perceiving and thinking, and then proceed to the things more evident in themselves, the ultimate principles of ontology.

Aristotle holds that our knowledge of universals, in which his science consists, derives from abstraction from individual perceptions. Perception itself can be considered to be an instance of abstraction. Abstraction is Aristotle's basic relation, connecting mind and world, of which perception and knowledge are instances. Items of perception and knowledge are all "things said from abstraction", even though typically Aristotle reserves that phrase for the final objects of a reiterated abstraction process.

To say that the objects of science arise for us through a psychological process of abstraction does not turn Aristotle's science into a solipsistic description of human mental life. Like perceptions, the abstractions of science look outward. Even though the perceiving or cognizing itself may be a mental event, what is cognized need not be so. I perceive Coriscus and not my idea of Coriscus; I know that a human being is an animal, not that my idea of a human being is an animal.

Before proceeding to consider the abstraction of universals via induction, I shall give a general sketch of Aristotle's views on perception and thinking. I wish to establish these main points: (1) For Aristotle, perceiving and thinking are processes

of the same type, namely, processes of abstraction. (2) A process of this type consists in taking "forms" from their matter. (3) The process, often described by the 'qua' locution, consists in isolating certain aspects of the objects under consideration, i.e., selective attention. (4) Mental processes differ in their subject matters but have the same formal structure, applied recursively.[2]

[2] Similar to Piaget's reflective abstraction (Piaget, J. (1972). *The principles of genetic epistemology*. London: Routledge & Kegan Paul; Piaget, J. (1977). *The development of thought: Equilibration of cognitive structures* (A. Rosin, Trans.). New York: Viking Press.).

Chapter 5
Perceiving

Aristotle has the basic intuition that what exist are singular things, with their full array of universal and particular attributes. What makes these singular things just what they are is their being individual substances, which Aristotle takes to be primary for them. Everything else is in or is said of these individual substances. These substances then have the accidents and universals as their aspects. Via abstraction we can isolate and consider separately these aspects—and perhaps even the primary substances and their essences themselves. Taking things to be *abstracta* does not relegate them to being merely mental fictions. In order for such abstractions to be possible, the *abstracta* must have a real basis in that on which the abstraction is performed.

Aristotle insists that science deals with the universal. These universals come about by abstraction. We have knowledge of individuals only as instances of these types: *qua* this or *qua* that. We get at the universals and their principles by working our way up to them from sense perception. Sense perceptions may be most evident and immediate to us, yet are far removed from the most evident and immediate first principles of science. The universals in the categories serve as the ultimate principles and (formal) causes for what exists. Perhaps this makes Aristotle into a sort of Platonist—but not into a Platonist proper, for all these universals do not exist separately from the individuals exemplifying them from which they are abstracted.

For Aristotle, even the primary substances are not the most evident to us. Rather, what is most evident to us are the ephemeral individual accidents. This becomes clear in his theory of perception. For Aristotle holds that we have no direct acquaintance with primary substances, much less with their species and genera and the universal accidents, all of which serve as the subjects for the sciences strictly speaking ((Ps.) Simplicius, *in de An.* 225, 20–1; 232, 22; 283, 9–10).[1]

Aristotle has a sort of dramatic reversal: the things most evident to us end up being the least evident in themselves; the things most evident in themselves end up being the least evident to us. So what ends up being denigrated are not the universals

[1] So too Block 1961a: 2, 1988: 235–49.

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but our ordinary experiences. Here Aristotle agrees with Plato: the experience of the many stays in the Cave with its flickering images—that is, for us moderns, it lies in the rec room in the basement with a plasma screen and a home theater system where we watch recordings of reality TV. Without much analysis and abstraction, everyday sensory experience does not reveal the universal first principles and causes.

We shall see Aristotle justifying all these claims in his theory of perception.

Let me first make some remarks about terminology. I prefer generally to translate 'αἴσθησις' and its cognates as 'perception' etc. instead of 'sensation'. I make this distinction perhaps anachronistically, following the distinction of Thomas Reid, endorsed by David Hamlyn (1968: xvii, 88, 1961: 125–8; Reid, *Essays* II.5) and Nicholas Humphreys.[2] For them 'perceiving' means receiving the output of the interplay between an organ like the eye and the stimulating object, while 'sensing' requires receiving the output plus a conscious experience of that process.

However I do not find it that pernicious to attribute this same distinction to Aristotle. To be sure, Aristotle does say in *De Anima* III.2 that we perceive that we see by seeing. So an animal is able to recognize that the prey has disappeared, that the light has gone out, that its eyes are covered. Yet all this need not presuppose a conscious experience of the process (Block 1988: 243). Perhaps some animals, like primates, do have such experiential *qualia*, but perhaps others, like grubs and amoebae, do not. One advantage in thinking of Aristotle's theory on these lines lies in not having to ascribe higher cognitive states to all perceiving animals.[3] Another lies in making more of a continuum between the physical processes of the sense organ and the mental states of the senses. Aristotle is no mind-body dualist in the Cartesian sense. So I propose to understand Aristotle's talk of "sense" in terms of the later conception of 'perception'.[4]

5.1 Sense Perception

Aristotle characterizes perception ('λόγος) in general thus[5]:

> Generally, about all perception, we can say that a sense is what has the power of receiving into itself the sensible forms of things without the matter, in the way in which a piece of wax takes on the impress of a signet-ring without the iron or gold; what produces the

[2] On the meaning of αἴσθησις Hamlyn (1961: 28) says that Aristotle was "on the verge" of making this distinction, which has been embraced today by those like Humphrey (1999). So too Kahn 1992: 364.

[3] Also we moderns at least can then talk of plants having a sort of perception too, as they do respond to external stimuli with, say, increased cellular activity at the root cells that have come into contact with a higher concentration of water molecules.

[4] Still, for stylistic reasons, I shall use 'sense organ' instead of 'organ of perception' etc.

[5] See Sorabji 1974: 162 for a general survey of interpretations of Aristotle's theory of perception. Some, like Slakey, take perception as physiological [what Everson (1997) calls the literalist view]; others, like Solmsen, take it as purely not physical [Everson's spiritualist view]. Sorabji (1974: 167–8, 175) himself tends to side with the latter, as he takes perception itself to have a matter and a form, where the former is physical and the latter is not.

> impression is a signet of bronze or gold, but not *qua* bronze or gold: in a similar way the sense is affected by what is coloured or flavoured or sounding not insofar as each is what it is, but insofar as it is of such and such a sort and according to its form [λόγος]. [*An*. 424a18–24]

Aristotle is saying that perception is what is able to receive the perceptible forms, sc., the "forms" of the objects being perceived, without their matter. He says that this is an ability of the sense organ. [424a24–5] This ability of seeing or tasting or hearing is not really distinct from, but is really the same as, the sense organ, like the eye, or tongue or ears. [425b22–4; 435a21] Still the ability and its sense organ are distinct in account, in that the ability is a certain aspect of the sense organ.

> A primary sense-organ is that in which such a power is seated. The sense and its organ are the same in fact, but their essence is not the same. What perceives is, of course, a spatial magnitude, but we must not admit that either the having the power to perceive or the sense itself is a magnitude; what they are is a certain form [λόγος] or power in a magnitude. [424a24–8]

The sense organ is a substance, a part of an animal, having magnitude, occupying space. Still the perceiving power or ability belongs to the sense organ *qua* perceiving, not as a spatial object. The eye can then be said to perceive, in respect of having a visual ability.[6] That is, the sense organ is an object composed of a certain sort of matter, as the eyeball is of watery matter. It then is affected, as watery objects are, by reflecting the scenes before it. These images are colors in patches. A sense organ is affected then only by some of the attributes of the object or substance being perceived: the colors and shape of the ax, and not its hardness or weight, affect the eyeball when it sees (Everson 1997: 100–2). Still an ax can certainly affect an eyeball by striking it. In seeing the eye is affected not *qua* eyeball. Nor does it see *qua* having an image. For otherwise a mirror or crystal would see, a plant would hear, and any heated material would feel. [424b3–16] Rather, it sees in virtue of having the ability to have the image signify or re-present the attributes of the object being perceived.[7]

I am accepting Everson's and Sorabji's view that the sense organ literally represents (re-presents) the attribute of the object perceived: the eye jelly becoming red etc. (Everson 1997: 10; Sorabji 1974).[8] (I mean that it has a "representation" of that attribute of the same type, although perhaps merely similar and inexact or distorted.[9]) Still I also accept parts of the "spiritualist" reading, where the perceiving itself cannot be reduced to the physical properties of the sense organ—rather like the AI claim that the software cannot be reduced to the distribution of electrical charges by which it is encoded. On my view the sense *organ*, the substance, the part of the animal taken literally *as an instrument* of perception, has both physical and mental attributes. For it to be an organ or instrument, it must function. The eyeball

[6] Cf. (ps.) Simplicius, *in de An.* 190, 14–5; Plotinus, *Enneads* IV.4.23.26–7. In the case of sight or touch, the organ is a part of the body relative to some determinate function.

[7] Cf. Ross 1956: 267 on 424b17–8 (which has many possible translations!).

[8] See Caston 2005: 245–7 for a discussion of the dispute between Sorabji and Burnyeat.

[9] So too Caston 2005: 299.

might physically reflect the color of the object being perceived. [*Sens*. 438a5–10] That does not suffice for it to give rise to a mental experience. For that, it also has to function.[10] For if perception consisted just in the eye-jelly's turning red, then there should be a perception of red when the animal is unconscious or even when the eye is no longer part of the animal.[11] Likewise my eyes might be bloodshot and still see white.[12] Surely the eyeball has to be a functioning part of the animal with the ability to see actually operating. Again Aristotle himself notes that there is no visual perception of an object placed upon the eyeball. Yet its image still appears in the eyeball. As Hamlyn (1959: 2) notes, it is not strictly the sense organ that reproduces the "forms" of the object perceived, but rather the sense organ *qua* sense or *qua* a particular perceptive ability. At the same time, sometimes the color seen comes from a physical process in the sense organ or in the object perceived: Granger (1993: 167) gives Aristotle's example of how a mirror may change the color of an object reflected in it.

Accordingly Aristotle argues in *Parts of Animals* I.1 that explanation by the material cause does not suffice. He compares perceiving to the harmonies and tones being produced by the strings being strummed. [424a31–2][13] These harmonies too have a material basis but signify more than that. Just as tone is produced by striking the lyre properly, so too our hearing sound in general is produced by sound striking the ear properly. [424a31–2] "Properly" striking the strings means having the right proportions [λόγοι]—today we might say, having certain frequencies within certain intensities.

Likewise the aspect of the object being selectively attended to in the perceiving moves attention away from the material features of the sense organ to its formal ones.[14] The 'qua' locutions at 424a17–24 indicate this. Thus perception, being a power of a sense organ, is really the same as the sense organ, but what it is, its

[10] Reeve (2000: 149 ff.) juxtaposes these two accounts. He agrees with Burnyeat that the eye jelly becomes proto-colored and then the person sees color (Reeve 2000: 153). Still he then sides with Sorabji that these two differ and says that the "eye jelly is the hypothetically necessary matter of an organ whose form is seeing, and its taking on a proto-color constitutes, but is not identical to, seeing" (Reeve 2000: 156).

[11] This is the main flaw in Burnyeat's example that Aristotle views the perception of red to occur in the eyeball in the same way water in a glass takes on the color of a nearby red object. See Burnyeat 1992b: 425–7. (This is an English translation of a paper first published in French in *Revue philsophique de la France de I 'Étranger*, Vol. 118 [1993] and, with corrections, in *Études sur le de Anima d'Aristote*, ed. G. Dherbey (Paris, 1995), and earliest in *Revista latinamerica de philosofia*, Vol. 20 1994.)

[12] "…the eye's becoming aware of red does not require its going red…" (Nussbaum and Putnam 1992: 36).

[13] Apparently these harmonies reflect the ratios of the lengths of the strings being plucked. [*Sens*. 439b25–449a6]

[14] Thus Aristotle explains that plants do not perceive because their organs receive the forms of external objects with their matter, and not apart from it.

essence or account, differs and so the two become formally distinct (to coin a phrase): they differ *qua* this and *qua* that.

In the relation of the sense to its sense organ we have abstraction. Not all of the features of the sense organ have relevance to its perceptual ability: the color of the eye or skin, for instance, has no relevance to the visual or tactile perceptions. Several levels of abstraction or selective attention are operating here. First, the sense organ is affected by only some of the attributes of the object being perceived: the ear responds not to the color but the sound. Second, the perception proper to that sense organ registers only some of the ways in which the sense organ is affected. An explosive sound may cause the eyeball to bleed without causing any visual perception. Again, the perceiving occurs only in a partial range even of the relevant ways in which the sense organ is affected. For there to be hearing, the sound must not affect the ear too much or too little: a loud noise may cause the ear to bleed, but neither the noise nor the bleeding is heard. So we abstract away from all the ways in which the sense organ is affected and attend to only a few of them. (To be sure, Aristotle does not make all of this too explicit or systematic. Still his scattered remarks indicate that he is thinking along these lines.)

Aristotle takes the soul to be an ability similarly: a certain aspect formally but not really distinct from the animal, the individual substance, having it. He describes the soul to be the actualization or entelechy of a body able to have life. [412a19–21[15]] It is an actual power that such a body has, even while it is not using it. [413a1] Aristotle compares the soul to knowledge. Knowledge is actual in one sense when we have the actual ability even when we are not using it. In another sense knowledge is actual when we have it and use it. Soul is actual in the first sense. [412a22–7] Similarly, an animal has perception as a natural power even when it is not actually using it. Aristotle says that, if the eye were an animal, sight would be its soul and that both are abilities. [412b18–22; 412b27–413a2] Sight, soul, knowledge, and thus perception then are powers, actual in one sense when they are had, actual in another when they are both had and exercised. The ability actual in the first sense is a general one. My ability to see is an ability to see many things; my knowledge of geometry is an ability to make many proofs. Abilities actual in the second sense are particular uses of my abilities: my seeing the apple over there; my proving this theorem now. (Particular uses may be singular or of a specific type.[16])

For Aristotle perceiving consists in a process whereby the perceiver receives the "forms" without the matter in which they are *in re*. By "forms" (εἰδῶν), Aristotle evidently means all the attributes of the object being perceived, not merely the

[15] Cf. Simplicius, *in Phys* 414, 21–28 [also 493, 21], on whether *energeia* and *entelechia* are the same: not if 'entelechy' means 'completion'. He cites Alexander, 412, 29–33: "…it is said to be an entelechy in virtue of this so far as the actuality in virtue of it is a completion of what is in potency, just as in the case of states the actuality in virtue of it is the completion of the state."

[16] Also cf. *Physics*. I.1 (discussed below) where Aristotle says that a child first perceives a general image before a singular one.

essential ones.[17] For, e.g., visual perceptions give us perceptions of their correlatives, the visible things. Aristotle says that the visible things proper and special to vision are colors. [*An.* 418a8–14 & 24–5] He recognizes also visible things that are seen, strictly speaking, but are perceived by other senses as well: e.g., both sight and touch are of shapes (Everson 1997: 150). So perception has two types of objects perceptible *per se*, one special and one common.

All these proper, special perceptibles are in accidental categories.[18] Colors (and shapes) are in the accidental category of quality. [*Cat.* 9b9–11; 10a11–2] Likewise for sounds, smells, tastes, and touchings. Again, most if not all of the proper, common perceptibles are accidents. (See below.)

In conformity with perception being in the category of relation, Aristotle takes the perception and the thing perceived to be correlatives. [*Cat.* 6b35–6][19] Thus 'the thing perceived' indicates not 'the individual substance that is being perceived' but simply the paronym of perception, sc., the perceptible, taken as a subject in its own, albeit derivative, right (Bolton 1996: 306; Bäck 2000: 185–95).[20] Likewise, Aristotle holds that the proper correlative of the slave is not the substance man [*lege*: human being!] but the master etc. (Porphyry, *in Cat.* 115, 17–23; Simplicius, *in Cat.* 179, 27–180, 17; 181, 2–18). [*Cat.* 7a27–31] As discussed in the previous two chapters, the important point is that, in his logical theory, Aristotle has made the objects of perception, strictly speaking, not to be substances but *relata*, items in the category of relation. To be sure, these *relata*, to exist *in re*, must be in individual substances. But, strictly speaking, what is perceived (sc., *per se* and not *per accidens*) are the *relata*, and not the individual substances (Block 1960: 94). These *relata* have a connection to individual substances. The slave might happen to be a slave of Sappho, because the slave's mistress is Sappho. Yet it is essential to the slave (*qua* slave) to belong to a mistress, and accidental for him to belong to Sappho. Aristotle will follow this doctrine of correlatives in his account of *per se* versus *per accidens* perception.

Thus vision has as its correlative the visible, namely colors, hearing the audible, namely sounds etc. As with other relations, the things being related are not the individual substances in themselves but *qua* being in that relation. The *relata* are accidental attributes in individual substances taken as subjects in their own right (2a).[21]

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[17] Themistius, *in De An.* 57, 4: "the forms of the perceptibles and the accounts (λόγοι) without the matter". So too Everson 1997: 101. Summers (1987: 27) concurs that the particulars called up by imagination "…were, of course, the "forms" of particulars at the first level of abstraction from external sense. They were not, however, sufficiently abstracted to be the "universals" subject to the activity of intellect."

[18] Bolton (2005: 221) claims that we do perceive objects [substances?] too—but all he seems to mean by this is that animals can experience them "without intellection" [without rational activity?].

[19] Cf. Everson 1997: 117–23 on perception as a relation. He concurs that the correlative of 'perception' is 'the perceptible', and not the objects proper to each sense.

[20] Cf. (ps.) Simplicius, *in de An.* 262, 1–2: "For if it is not at some distance or if some other passion does not prevent, it is always true of the proper perceptibles."

[21] On this notation see the "*Relata* as Paronyms" section. So too Graeser 1978: 73. He rightly wonders why then are not perceptual judgments like 'the white is Socrates' objectionable for Aristotle, as they seem to be unnatural predications (Graeser 1978: 74–6).

In this way, Aristotle allows that we can perceive colors and sounds without perceiving the individual substances of which these are accidents. In perception then the object affects the sense not insofar as being what it is, namely, an individual substance, but "insofar as it is of such and such a sort and according to its form" [λόγος] (Hamlyn 1968: 113).[22] Graeser puts the point nicely:

> …we should realize that his framework of *sensibilia* works with what may be called an inverse ontology. With the framework of perceptual language genuine substances are treated as attributes and non-substances are treated as genuine subjects. (Graeser 1978: 74)[23]

One might argue that having a color (or a shape) is necessary for a physical object and hence that color (like shape) is essential, as a *proprium*, to the individual perceptible substance. Even more so, is it not essential to certain substances to occupy space? Still Aristotle puts body in the category of quantity. Some common perceptibles might be necessary and essential to the substances, and still be accidents: *propria* themselves seem to be in accidental categories (Bäck 2000: 150–8). In any case the particular color and shape, say of this table, are certainly accidental to it. The "forms" constituting perceptions, as perception is of the individual, would then all be individual accidents of individual substances. In fact, as we shall see, substances are not proper perceptibles at all.[24] So the proper perceptibles and even the common ones (at least when taken as individuals) are accidental to the substances. Thus Aristotle says that sight is the sight of color or some such thing—not of the substance. [*Metaph*. 1021a33–b1] He gives colors, tastes, and body as instances of perceptibles. [*Cat*. 8a5–6][25]

Furthermore, as Aristotle holds us to abstract the universals from the perceptions, the universals must already be there implicitly or inchoately in the perceptions, in order for the abstraction to succeed.[26] Kahn (1992: 368) however calls this "the empiricist myth of abstraction".[27] I shall have to show that Aristotle or I am following no myth.

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[22] The translation of "form" seems to be following, e.g., (ps.) Simplicius, *in De An*. 167, 6–9: "For, even when the body is heated, the admission of the form is not in virtue of being heated but in virtue of operating cognitively in virtue of the form of the hot, since the organ as heated is perceptible but does not come to be perceptive." For instance suppose hot honey is put on the tongue. The tongue itself senses the heat and the sweet but not in virtue of the same sense organ. The point here would be that the tongue insofar as it is the part of the body that is being heated and having something sweet adhere to it, is not the sense organ but just a body that is able to be perceived in these two different ways, of feeling and tasting.

[23] Cf. Pichter 1992: 380; Block 1960: 93: "But one question that persistently plagued modern philosophy was never explicitly discussed by Aristotle, namely how and in what manner we perceive or come to be aware of the concrete, physical objects to which sense-qualities belong."

[24] (Ps.) Simplicius, *in De An.* 227, 36–7: "…but at the same time that he is calling forms not the accidents (for the perceptive soul is receptive of these) but those essences that are *per se* or completely of themselves insofar as being defined *per se* they are essential."

[25] 'Body' might be taken to signify the substance but more likely signifies the common perceptible, itself accidental (Lewis 1991: 286–7).

[26] Cf. (ps.) Simplicius, *in De An.*, 183, 34–5.

[27] Kahn claims to be following Geach.

Aristotle speaks of the form as a ratio and proportion (λόγος). Aristotle *might* have used 'λόγος' instead of 'form' (εἶδος) or definition (ὅρισμος) at 424a24 also in the sense used in *Categories* 1a2, where, according to Simplicius anyway, Aristotle means 'definition' but not in the strict sense, because relations by homonymy or synonymy can apply to individual as well as to universal things. As individuals do not strictly speaking have definitions, Aristotle instead would be using 'λόγος' in the looser sense of 'an account'. As with the translation of 'form', 'λόγος' taken as 'definitional account' would be indicating that we are considering the affection of the sense organ not in virtue of its material constituents but rather in virtue of the account, or structure or information, contained in that affection.

What 'λόγος' means here has further problems. Besides the revised Oxford's translation of 'form', we have the older Oxford's '*ratio*', Hamlyn's 'principle' (which he means to cover the sense of proportion or mean), Ross's 'relation between the sense and its perceptible object' etc. (Hamlyn 1968: 114; Ross 1956: 264–5). If Aristotle wants to say 'form', why does he not just use the word? We might follow the lead of the other translators and understand 'λόγος' here not as indicating merely the 'form' or 'account' but also a 'proportion'. For Aristotle has described perception as an intermediate state between contraries. [424a4–7] At the least we have the intermediate state mentioned above: the perceptual stimulus must not be too strong or too weak: we hear only certain sounds etc. By "its proportion" (λόγος) Aristotle seems also to mean the correspondence between the perception and the thing perceived (Ross 1956: 265; Tracy 1969; Sorabji 1974: 173, 1992; Modrak 2001: 223–4; Silverman 1989: 279; Everson 1997: 96–7. Burnyeat 1991, 2002: 29; Caston 2005: 305). That is, the structure and proportion of the thing perceived is preserved in the perception of it. For instance, the image of a house formed in the eye would have the same ratios or proportions as the house.

Again, 'λόγος' at 424a24 *might* also be leaving it open that the perception has a congruence and isomorphism, but not an identity, in structure with the thing perceived.[28] Thus, the image of the house in the eye preserves the proportions of the house but does not have the same size. The proportions preserved may also be distorted by perspective or by distance. We "see" "the Sun", not literally, but rather as a bright, dime-sized disk. Still, what is perceived of the Sun does have some correspondence to what the Sun is really like. Aristotle does not insist upon an exact mirroring of the perceptible in the perception. Indeed, Aristotle's example of the signet ring suggests a loose, inexact correspondence between the object perceived and the perception. For the impression left by the signet ring does correspond to the structure of the ring, but differs in that the original structure of the ring was metal and convex, while the impression is empty space and concave

[28] Cf. Ward 1988: 220–1 on 424a20–21.

(Plato *Tht*. 193b10–c6; Sorabji 1972: 6; Scheiter 2012: 268).[29] Still, the concave impression of the ring allows us to get at what the ring itself looks like. Furthermore, Aristotle does say that the accuracy of the features and the sense impression retained in memory differ with the age and emotional state and mental ability of the perceiver. [*Mem*. 450a30–b11] Different people receiving the same perceptual stimulus would not form the same sense perceptions; even the same person will have different perceptions at different times. Aristotle admits all this and says that the same object causes them to have their different perceptions. [*Sens*. 446b17–26] Likewise, in his account of thinking of smaller and greater magnitudes, Aristotle proposes that there are mental movements in proportion to the magnitudes of the real objects being thought about (Sorabji 1972: 7). [452b9–22] But this means that, when we perceive something to be 20 ft long, we do not have an image in the eye jelly that is 20 ft long. At most, we have a congruent image.

Aristotle seems to take perception as an ability as well as a representation: perception is an ability of an animal or soul to be affected by an object in a certain way so as to represent it; a perception is a perception representative of an object. Perception taken as the representation holds as a relation between its *relata*, the object being perceived and the perceptual state. At the same time, Aristotle takes perception to be an ability. Aristotle takes abilities as states and hence qualities, even though abilities and states themselves have a relational structure: an ability is an ability of something etc. Again, abilities can be taken as first or as second actualities.

Thus, on the one hand, Aristotle is calling "the sense" or 'perception' (αἴσθησις) an ability or power (δύναμις 424a25) of receiving the perceptible forms without their matter. Now perception seems to be a natural ability. Aristotle classifies natural abilities, like having a healthy constitution or hardness, as qualities. [*Cat.* 9a14–6] On the other hand, he calls states and dispositions like perception relations. [6b2–3]

How can all these claims have a consistent account? We have already seen that in the *Categories* Aristotle puts perception, like knowledge, in the category of relation. Already there we needed to distinguish between perception the *relatum* and perception the relation.[30] Still he classifies particular perceptions and particular types of knowledge there as qualities. Likewise an ability in general can be in the category of relation, while particular abilities, or instances or uses of an ability, can be in the category of quality.

[29] Caston (1998: 268) likewise says that perceiving "is just to receive a certain transformation of the form, where the key aspects of that form are preserved." Cf. Caston 1998: 249; 263. However he says to ignore the difference of the impression of the ring (Caston 2005: 301, n. 110).

[30] Hamlyn (1968: xvii, 88) finds that Aristotle uses "αἴθησις" ambiguously between the sensation and the sense, just as 'perception is the perception of something' would exemplify.

So when the relation is made fully determinate, it becomes a *quale*, a state. Knowledge (or perception) is relative, but, when we specify of what the knowledge is, it becomes qualitative: knowledge of the Greek language is grammar, which Aristotle says is a quality; again, knowledge (or at any rate: perception) of Coriscus is a quality.[31]

Perhaps we can relate these doctrines to the theory in the *Categories* more precisely. The two *relata*, r_i, have the following structure:

$$r_1 \text{ has R to } r_2$$

The *relata* can be singular or universal, abstract or concrete. As *relata* are accidents, each one will have its own subject, ultimately a substance S_i. So 'r_1' is 'S_1 *qua* having R to r_2' and 'r_2' is 'S_2 *qua* having R to r' where 'R' is the converse relation of 'R'. Aristotle has said in *Categories* 8 that, when such relational complexes are universal and general, they are indeed *relata*, but, when they are made singular or the most specific species, they (may?) become *qualia*. Here he is adding or at least making explicit the further condition that these complexes must be actual and not potential. For instance, when Xanthippe has knowledge of Coriscus, 'knowledge' is the relation, 'Xanthippe *qua* knowing Coriscus' is one *relatum*; 'Coriscus *qua* known by Xanthippe' is the other. The first complex, when fully actual, is Xanthippe the knower. The second complex, when fully actual, is a state in the soul of Xanthippe and hence a *quale*. Likewise, in 'perception is perception of the perceptible', the first *relatum* is an actual, perceiving state in the soul of some animal; the second is the substance insofar as it is actually being perceived. Given what Aristotle has said in the *Categories*, here the actuality must be second actuality. So possibly this holds for cases of knowledge too. However Aristotle seems to think that (sometimes?) first actuality suffices for knowing: we have actual moral and intellectual virtues even when we are not actually using them. [*Eth. Nic.* 1106a10–24] Aristotle gives few details here; it is likely that there are many exceptions and complications ((Ps.) Simplicius, *in de An.* 191, 9–23).

This account solves Richard Sorabji's puzzle:

> Aristotle tells us that sensible qualities are related to the senses as *kath' hauta*. In other words, one is defined by reference to the other. If one looks at his definitions of colour, light, sound, odour, flavour, hot, cold, fluid, dry, one will find that they very seldom mention the senses… Much less do the so-called common objects, properties perceptible by more than one sense, get defined by reference to the senses

The perceptible qualities are relational and hence defined relative to the perception only *qua* in that relation. Once made determinate, the things taken in those relations are themselves not *relata* but *qualia*. As Simplicius observes, the visible is a *relatum*, while color is not a *relatum* but is *per se*—presumably a quality. Rather

[31] Cf. *Phys*. 201b2–5; (ps.) Simplicius (*in Phys*. 425, 31–4) says that the visible is a *relatum*, while color is not but is *per se*. Rather color is a *proprium* of color. Color is not visible in virtue of the fact that it is color.

being visible is a *proprium* of color. Color is not visible in virtue of the fact that it is color. [*in Phys*. 425, 31–4] Thus color, sound etc. are not *relata* except insofar as they are perceived.[32]

5.2 Common Perceptibles

Aristotle's claim that different senses have common yet still *per se* perceptible objects has many obscurities. [418a8–11] He certainly means that a real attribute of an object can cause different perceptions of different types. E.g., I can see and feel the shape of the table, and it is the shape of the table that causes my perception of seeing it and my perception of touching it—the very same, common "it". As Modrak says,

> When perception takes place simultaneously through several senses with respect to the same sensible characteristic, for instance, magnitude, the common sensible is perceived in itself, namely, as a sensible characteristic that is perceptible through different sense modalities. The perception of a common sensible is, nonetheless, dependent on the perception of the proper objects of the senses through which the common object is perceived. (Modrak 2001: 225)

The claim of Modrak's last sentence, that perceiving a common perceptible depends on the perceptibles proper to each sense, presents more difficulty. According to the strict meaning of 'proper' [418a11–2], she would be claiming that the perception of a common perceptible, like shape or magnitude, depends on the perception of a proper perceptible like color. But what sort of dependence does it have? Is Aristotle claiming then that perception of, say, a shape depends on the perception of colors? Of course, in one sense, it is obvious that there can be no seeing of a shape, or of anything else, without seeing its color (at least black and white). So the common perceptibles are perceived through the special sense organs (Sorabji 1971: 81). [*Sens*. 437a5–9] But (1) how does the perception of the shape depend on the perception of some proper perceptible or other? Is the visual perception of a shape constructed completely out of the perceptions of colors? (2) Is this seeing of a shape a process contained in the seeing at a particular instant, a given "now", or is it a construction using materials beyond a single, initial seeing? (3) Must the perception of a common perceptible agree with what is perceived by the proper senses? Must, say, the shape perceived by seeing be the same as the shape perceived by touching?

On the last question, Aristotle seems clearly to deny the necessity of the identity. For he speaks of seeing two fingers as one while feeling them as two. [*Somno* 460b20–2; *Metaph.* 1011a33–4; 1062b33–1063a10] In that case what we feel the shape to be need not be the same as what we see the shape to be. Still, the same

[32] Broadie (1993: 152) notes a possible exception: "…a strong-smelling substance can make the air around it smell the same, and he says that the substance has this effect *by virtue of its smell* even though smell perception does not result. Unfortunately Aristotle deals with this very cursorily."

common perceptible, the shape of the object being perceived, can cause us to have the seeing of a shape and the touching of a shape. Further, we can have the experience of seeing and touching the same shape, although this experience goes beyond the sense of seeing and the sense of touching and involves the common sense (Charlton 1980, 1981). [426b28–9][33] Thus, although the perception of a common perceptible must agree, perhaps, with what is perceived by one proper sense, it need not agree with them all: my perception of there being one magnitude does not agree with the tactile perception, although it does agree with the visual perception.[34]

On the second question, Aristotle seems to hold that a "perception" of a common perceptible involves not only the sense organ but also memory and imagination, as I shall discuss further below.[35] This point becomes clearer in the case of a common perceptible like motion than it is for one like shape. For, to perceive something as moving, different perceptions at different times have to be retained and combined.[36] As Aristotle says that we perceive all the common perceptibles, including shape [figure], by motion, this point would then hold for the perception of shapes etc. too. [425a16–7][37]

As for the first question, perceiving motion clearly depends on more than perceiving patches of color at a single time. Perhaps motion depends upon perceiving the proper perceptibles in the sense indicated above: not without which. Nevertheless Aristotle does not say that we perceive the common perceptibles *solely* through perceiving the proper perceptibles. And, again, the images of colored patches would have to be recalled, combined, abstracted, and run though or gone over to perceive motion, magnitude, figures etc. Surely memory and imagination also are involved in "seeing" a raindrop move.

Now Aristotle holds that we have *per se* perception of the common perceptibles. [418a8–11; 425a27–8] Yet he holds also that the special senses perceive the common perceptibles *per accidens*. [425a14–6] What perceives them *per se* is a new, common sense. [425a27–8] Still Aristotle claims we do not have a special sense organ for perceiving the common perceptibles.[38]

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[33] The problem of constructing a common perceptible from particular sense perceptions is today called the binding problem. Cf. Horgan 1999: 23; Hubel 1988: 220.

[34] Moreover if the objects of mathematics are common perceptibles, their perception need not agree with any of the proper perceptions: Aristotle says that a mathematical line is not a perceived line.

[35] Cf. Hamlyn 1968: 199: "What he is seeking is something like the fiction of a unity of consciousness per Kant's synthetic unity of apperception, as has been frequently enough suggested."—but has only the unity of sense perception (Hamlyn 1968: 208).

[36] *Contra* Modrak (1987: 64). The perception of shape involves for Aristotle mentally "moving" about the colored regions so as to trace it and so perhaps involves time too. Cf. Hamlyn 1968: 118.

[37] *Contra* Everson (1997: 150), who says, "The common sensibles are not such as to affect those [sense] organs…" I can agree to this only in virtue of the proper senses. He himself admits that "what are directly perceived are change and continuity in the proper sensibles." But these are types of motion, a common perceptible.

[38] However, Bynum (1987: 97) claims that for Aristotle, the sense organ for touch or taste is "the region of the heart that he says contains the *sensus communis*." On the heart cf. Hamlyn 1968: 117; Everson 1997: 156, n. 29.

All this can be made consistent, as others have done already.[39] The common perceptibles are perceived via the sense organs of the special senses. The eye jelly, for instance, forms (or transmits) an image not only of colors but of shapes; the skin is impressed by shapes as well as by roughness. Still the special senses of sight and touch are abilities for perceiving colors and textures, but not shapes. So, apart from their special abilities, these sense organs have another, common ability, to perceive items such as shapes and magnitudes.[40] This common ability Aristotle names the common sense. [*Sensu* 449a10–20; *Somno* 455a12–25]

We see here once again a case of abstraction: *qua* this and *qua* that. The same sense organ in one respect has the ability to see colors and in another respect has the ability to see shapes (Johansen 2012). The first ability is proper or special to that sense organ; the second ability is shared by more than one sense organ. One of the five "proper" senses gets its content from the sense organ insofar as it is affected by the perceptibles proper to that sense. For instance, perceptions of colors, the perceptibles proper to vision, come from the eyeball, its sense organ, *qua* affected by color. Likewise visual perceptions of shapes, one of the common perceptibles, come from the eyeball, the sense organ of the visual common perceptions, *qua* affected by shapes and other common perceptibles (Kahn 1979: 9; Everson 1997: 155–6).

Consequently, the perception of a common perceptible like shape is accidental to vision, the sense proper and special to the eyeball. Accordingly, when speaking of the proper senses, Aristotle says that strictly only the proper perceptibles are perceptible *per se* to the proper senses. [418a24–5]

The simplest way to relate the proper perceptibles to the *per se* perceptibles is the one perhaps suggested by Themistius. [*in De An.* 58, 17] The proper perceptibles are *per se* perceptibles, while not all *per se* perceptibles are proper perceptibles. For common perceptibles, like shape for sight, are *per se* perceptibles too. So he says that color is the proper perceptible of sight. [*in De An.* 58, 22] The surface is visible *per se* because it contains in it color and it cannot be or be thought without color. However, he claims, the surface is not visible *per se* in either of the first two modes of *per se* (distinguished in *An. Po.* I.4). "So then since the cause of the surface's being visible is in the surface itself, because of this the surface might be said to be visible *per se*—but strictly it is visible *per accidens*." [58, 28–59, 1; cf. 82, 20–1][41]

[39] E.g., Hamlyn 1968: 117. Kahn (1966: 67) and Kosman (1975) somewhat have the view of the common sense as "a single, unified sense faculty, of which the individual senses are so many diverse modes or aspects." Still some despair: Sorabji 1972: 75.

[40] Aristotle does not seem committed to claiming that the common perceptibles are all perceived by all the senses. He says for instance that they are perceived mostly by sight. Cf. Hamlyn 1968: 204: "Rather the koine aisthesis is a potentiality possessed by each of the individual sense-organs, or at least by that of sight and touch."

[41] Likewise in the *Categories* Aristotle speaks of *propria*, both special and common ones. E.g., 4a10; it is in this way that we should understand at 418a24–5: of the two sorts of *per se* perceptibles, the special ones are the special *propria*, while the common ones are *propria* not in the strict sense—not deny, with Everson (1997: 153) that common perceptibles are not the proper objects of the special senses, although perceived *per se* by them. See too Graeser 1978: 69–70, 79, 85–9.

Neither the common perceptibles nor *a fortiori* those perceptible *per accidens*, like seeing that the white thing is the son of Diares, are perceptible *per se* to a proper sense. [418a16–24] Yet these two cases differ, as the former are still perceptible *per se* by some sense, namely the common sense, while the latter is perceptible *per se* by no sense. Moreover, the common perceptibles do have an essential connection with some proper perceptible or another. Hamlyn says:

> Every coloured object, for instance, has some size. Hence when we perceive a coloured object we do not perceive something having size merely incidentally, as would be the case if some coloured objects had a size and some did not. It follows, in Aristotle's opinion that the so-called common sensibles must be essentially connected with some sense, but not with any special sense. (Hamlyn 1961: 24)

Still, at the same time, vision and perception of its proper perceptibles, colors, is necessary for a *visual* common perception—but not for a common perception without qualification. [Cf. *Sens*. 437a4–9] As Hamlyn goes on, "The common sensibles are, therefore, essential to the common sense, but incidental to the special senses…" He gives the wrong reason though: because Aristotle does not think that it is necessary that whatever is touched has a size etc. (Hamlyn 1961: 24–5, 1968: 197). Rather, I hold, Aristotle accepts that necessary connection, but holds that it does not hold *qua* tangible, sc., *qua* being a proper perceptible of touch.

Aristotle does give examples where we perceive a different number of things by vision than we do by touch. He then is distinguishing a number seen from a number touched; likewise for a shape seen and a shape touched, etc. We see shapes and numbers of things in the same visual experience as we see colors. Still the colors are the proper objects of sight in the strict sense of 'proper': a *proprium* necessarily coextensive with its subject. As vision differs from touch, the common perceptibles cannot be "proper". For I can feel and not see a shape. However, if shape were a proper perceptible of vision, I would have to see the shape too whenever I feel it.

Interpreters argue whether Aristotle takes the common sense conjunctively or disjunctively: so as to require that a common perceptible be perceived by seeing and hearing and…and touching, or by seeing or hearing or…or touching.[42] Aristotle does say that there is such a sense common to all the particular senses. [*Sensu* 449a16–9; *Somno* 455a15–20] Surely Brunschwig has reason to dismiss the conjunctive reading if taken to require that all the senses[43] must actually perceive the common perceptible: I can see the motion of bird in flight without being able to touch—or taste—it (Brunschwig 1996: 213).[44] Still, we might say that the conjunctive condition holds in principle, sc., in potentiality (but only for the perceptual modalities that apply?), whereas in actuality only the disjunctive condition is necessary (Hamlyn 1968: 196).

[42] E.g., Graeser (1978: 81) has the conjunctive reading; Brunschwig (1996: 217) the disjunctive.

[43] Or, perhaps: all those able to do so: for locomotion or shape might be not able to be tasted etc.

[44] Cf. Brunschwig 1991: 455–74.

If we take this disjunctive reading, we need to emend Themistius' account: the common perceptibles remain neither "proper" nor "*per se*" in the first sense of '*per se*' but now are *per se* in the second sense of '*per se*'. In the latter sense, a number is odd *per se*, disjunctively, because it is essential to a number that it be even or odd. So too a common perceptible is *per se* disjunctively because it will be seen or felt or tasted or heard or smelt. This modification has the attraction of explaining how a common perceptible can be said to be and not to be *per se* in different senses.

Saying that the perception of a common perceptible like a number or a shape is accidental to vision does not make this perception a case of *per accidens* perception like the sort of seeing that the yellow bile is bitter. A common perceptible is not perceived *per accidens* in this way ((Ps.) Simplicius, *in De An.* 185, 22–5; 128, 13–7). Rather, the common sense perceives the shape *per se*. [425a20–7; 418a8–14] It can do so through (some of) the sense organs of the five senses.[45] On the other hand, each of these sense organs has its own, proper ability to sense: seeing, touching, hearing… Relative to that ability, the common perceptible is perceived accidentally, "*per accidens*". Thus the eye—i.e., the eyeball *qua* seeing—sees a shape *per accidens*. Yet each sense organ of the proper senses also has this common ability to perceive (some) common perceptibles like shapes and numbers *per se*. [424a22–4; *Somno* 455a14–7]

Aristotle has two main senses of '*per accidens*', one where being *per accidens* is contrasted with being *per se*, and the other where being predicated *per accidens* is contrasted with being predicated *per se* (Brunschwig 1996: 216). To be sure, the two are related, but they differ. Thus Aristotle takes accidental predications, like 'a man is walking', as instances of being *per se*. [*Metaph*. 1017a22–30] Being *per accidens* occurs when something that is not a subject is taken as one, like 'the musical' in sense (2bii). Perhaps Aristotle means to indicate by 'οἷον' at 425a25 that this is the sense in which the common perceptibles are not perceived "*per accidens*". For the example of perceiving the son of Cleon as white, strictly speaking, predicates one accident of another, 'white' of 'son', and so is a case of being *per accidens*, as well as of accidental predication.[46] Now Aristotle tends to view being *per accidens* as fit only for sophists and occasioning the fallacy of accident (Bäck 2000: 256–60). [*Metaph*. VI.4][47] So perhaps this remark is meant to show that common perceptibles are not perceived "*per accidens*" in this way (which I shall call 'incidentally'). This would leave it open for them to be perceived "*per accidens*" in the other, more respectable way ('accidentally'). After all, Aristotelian science consists in

[45] At *Sens*. 437a8–9 Aristotle suggests that not all the special senses provide perceptions of the common perceptibles; rather sight does so preeminently. See Everson 1997: 152–3, 155. Charles (2000: 127–8) agrees that the common perceptibles are perceived via the sense organs of the proper senses.

[46] In *On Dreams* 458a15–6 Aristotle says that we seem to see that the approaching figure is white and is a man. However the context has it that this is what we *seem* to do. It's just that sense perception is necessary for us to form that belief.

[47] See below on the fallacy of accident.

demonstrating that accidents belong to their subjects.[48] Moreover, this interpretation would help understand the text. For surely Aristotle holds that we do have visual, tactile etc. experiences of common perceptibles, not *per se* but still "*per accidens*". This '*per accidens*' would follow the usage of 'accidental predication' and would still allow for them to *be per se*.

Aristotle goes so far as to say that, if the common sense had its own special sense organ, it would perceive only *per accidens*—in the very way, Aristotle says, that there is visual perception *per accidens* of the bile that it is bitter. We can see what he might mean by this.[49] The common sense is an ability common to various sense organs of the proper senses for perceiving common perceptibles. If it had its own sense organ, then we have the problem of relating the perceptions of the common perceptibles given by the sense organs of the proper senses to the perceptions given by its own sense organ. This relation would be accidental, in the sense both of *per accidens* perception and of the sophistical being *per accidens*. E.g., as we still have the shape seen with colors and the shape touched with textures, if we had as well a perception of the shape itself via the sense organ of the common sense, the judgement that the shape seen is the same as the shape itself would be like seeing that the yellow thing is bitter. A similar account would hold for a judgement that the shape seen is the same as the shape touched. Indeed, these examples parallel exactly the examples that Aristotle gives of being *per accidens*. [*Metaph*. 1017a8–10]

In the example of our perceiving two fingers by touch and one finger by sight, Aristotle has distinguished a visual perception of a common perceptible, the number two, from the tactile perception of the number one. If there were a single, special sense organ for the common sense, giving yet further perceptions of the common perceptibles, how would perceiving this difference in the perception of number be possible? Again, if the common sense had both the visual and tactile perceptions both via this single sense organ, then it would perceive the same thing as two and not-two at the same time. To avoid the inconsistency, perhaps the common sense cannot perceive the seen two fingers and the touched one finger in virtue of the same sense organ, but instead in virtue of this sense organ and in virtue of that one: in virtue of sight and touch. Moreover, if it had its own sense organ, would the common sense perceive *per se* anything at all? How else to perceive the number of the fingers but by seeing or touching (or perhaps hearing) them?

We can use this same interpretation to solve the puzzle that Aristotle in the *De Anima* says that we "perceive" that we see by sight, while in the *Parva Naturalia* he says that it is not by sight that we "see" that we see (Modrak 1987: 87; Everson 1997: 143, n. 7). [425b12–20; *Somno* 455a15–7] Perceiving that we see does take place through the eyeball, the organ proper to the special sense of sight, and is given in a visual experience. Yet the capacity of the eyeball in question, whereby we perceive that we are seeing, differs from the perception of sight, and is the common sense.

[48] Hence we get the doctrine of *per se* accidents. [*Metaph*. 997a7; 1025a30–5; 1029b16–23; Simplicius, *in Phys*. 803, 9–16] Cf. D. Frede 1992: 151.

[49] Although there are many interpretations of the passage. Cf. Hamlyn 1968: 118–20.

Still we may of course see that we are seeing or that we are not seeing.[50] But here the seeing is *per accidens*, as we are again talking of a visual common perception. Further, we may *perceive* that we are not seeing by another sense as well. For instance, I may see a stick bent in water and then by feeling the stick perceive that I am not seeing a stick bent in water. Aristotle may be pointing to some such distinction by saying that we "perceive" that we see by sight, while we do not "see" that we see by sight.[51]

Also in the *Parva Naturalia* Aristotle suggests at times that the common sense has ties to the region around the heart, perhaps as its sense organ. [*Juv*. 467b28; 469a12; *Somno* 455a32–b13; *Gen. An*. 781a14–23; *Part. An*. 656a27; *Motu* 703b23–4; *An.* 408b8–10][52] Some claim that Aristotle has thereby changed his position about the common sense.[53] Perhaps, but there is a way out. The common sense combines various operations.[54] It is the ability to have perceptions of the common perceptibles *qua* visible, audible, etc. Here it is a single, common ability of the various sense organs, which have their proper senses too. It is also the ability to coordinate and discriminate these perceptions, e.g., to judge that the shape being seen is the same as the shape being touched, and that the shape touched of the stick in water trumps the seen shape of that stick. An ability of this latter sort could be tied to its own special sense organ, while the former cannot be. Thus in the following passage Aristotle is discussing the latter, coordinating and discriminating abilities:

> Now, since every sense has something special and also something common; special, as, e.g., seeing is to the sense of sight, hearing to the auditory sense, and so on with the other senses severally; while all are accompanied by a common power, in virtue whereof a person perceives that he sees or hears (for, assuredly, it is not by sight that one sees that he sees; and it is not by taste, or sight, or both together that one discerns, and that sweet things are different from white things, but by a part common to all the organs of sense;

[50] "But if Aristotle's description of perceptual consciousness as perception that we perceive still seems strange, consider the following [from Moore 1903: 449–50]: "A sensation is, in reality, a case of 'knowing' or 'being aware of' or 'experiencing' something. When we know that the sensation of blue exists, the fact we know is that there exists an awareness of blue…. To be aware of the sensation of blue … is to be aware of an awareness of blue; awareness being used, in both cases, in exactly the same sense."" (Kosman 1975: 517).

[51] Block (1964: 61), on *Somno* 455b 1–14, stresses the relative independence of the common sense from the special senses. (Ps.) Simplicius (*in de An.* 172, 20–3; 171, 1–7) offers another explanation, that rational animals can perceive that they perceive and so ties that ability to the rationality of the perceiving animal (rather like Kant).

[52] Cf. Everson 1997: 68, 140–2.

[53] "It is that the *De Anima* is an incomplete and immature working-out of Aristotle's views on sense perception, whereas Aristotle's matured and crystallized views on this subject are to be sought in the *Parva Naturalia*…" (Block 1964: 58). Cf. Block 1961b. Likewise, Modrak (1987: 66–7) claims that Aristotle has a different account of the common sense in *Somno* and *An.* with respect to what is that in virtue of which a sense is aware of its own activity: in *Somno* 455a13 it is the common sense and in *An.* II.2 the sense itself. Cf. her n. 31 where she suggests that Aristotle might be considering different cases here. So too (ps.) Simplicius (*in de An*. 191, 7–8) says that Book III is about human perception unlike the previous books of *De Anima*.

[54] Thus Gregorić (2007: 125) says that Aristotle does not have a technical or a single meaning for 'common sense'.

> for there is one sensory function, and the controlling sensory organ is one, though differing as a faculty of perception in relation to each genus, e.g., sound or colour). [*Somno* 455a13–22; cf. *Sensu* 449a8–10]

Already Plato had spoken of a need for a unifying master sense. [*Tht*. 184d] Aristotle speaks of the common sense likewise and speaks of the heart as the master sense organ for the perception of perception: if this is not active, perception is still going on in the proper sense organs, but without any perception of those potential perceptions. [*Somno* 455b10–3]

So in talking of the region around the heart Aristotle might be looking also for a material way to link up the activities of the different sense organs. After all, his choice of the heart for the organ of thought likely comes from his wanting a material system to explain why we can move and have perceptions from this body and not all bodies: the blood does move around this body (Nerves were not discovered until later.). [*Part. An*. 647a24–31] So too then he would think the heart the natural candidate for coordinating and discriminating the proper senses and their activities.[55] After all, if we lose too much blood, we lose consciousness.

Our visual experience of a common perceptible like shape is one thing, and our tactile experience of it is another. Neither vision nor touch suffices for grounding the claim that my visual shape is the same, or is not the same, as the tactile shape, as can be seen in the two fingers example. The common sense does that. The common perceptibles themselves, like the shape *simpliciter*, are perceived *per se* by the common sense and *per accidens* by the proper ones, like the seen shape. Still the seen shape, *qua* seen, is seen *per se* although still not properly. The shape (*qua* shape) is seen neither *per se* nor properly. (Alternatively, it is seen *per se* only in the second sense of '*per se*', as on the disjunctive reading.)

For instance, when presented with a red wooden cube, I can see a red square shape and feel a hard square shape. My visual and tactile experiences are not only of the red and of the hard, but also of the seen square and of the felt square. These experiences differ qualitatively. Yet I experience them together: the same square is both seen and felt, and is both red and hard. My coordinating of the different experiences is not done by either the sense of sight or by the sense of touch, Aristotle argues, but by the common sense. We can see why this coordinating is not an additional function of a sense other than the common sense. Just because the common sense is the ability to grasp such perceptibles common to various sense organs, it thereby does not need coordinating. If it did, the dangers of an infinite regress would arise for Aristotle. [425b16] Still, all this is compatible with Aristotle locating different operations of the common sense in different bodily parts.

How is it possible for the common sense to err? Aristotle admits that we may feel one finger and see two. We may err here in the same ways that we shall be seeing Aristotle admitting that we can err in sense perception proper: the common sense normally affirms the perceptual content of the special senses. [*Ins*. 461b3–7;462a4–8] Moreover, we may err also due to a deformity of the common sense itself especially

[55] My interpretation does not conflict with Everson's claim that perceptibles are *per se* because they are the *per se* causes of changes in the sense organs. See Everson 1997: 155–7.

if the common sense depends in some respects on yet another particular region of the body, like the blood around the heart and the ducts connecting it to the proper sense organs (Block 1960: 99).

So abstraction theory makes Aristotle's views on the common sense understandable. The sense organ is a part of the body. Hence, according to his theory in the *Categories*, it is also an individual substance in its own right. A sense organ then has many attributes, including many abilities. The eyeball occupies space, is moist, can receive images of external objects, can perceive the colors in those images, and can perceive the shapes, motion, number etc. of those images. Seeing abstracts away from the full range of attributes of the eyeball to just those concerned with the ability to see colors. The eyeball, insofar as it is the sense organ for vision, perceives colors *per se* and does not perceive common perceptibles like shapes *per se* but only *per accidens* (in the sense of "accidental" predication). The eyeball, insofar as it is one of the sense organs used by the common sense, does not perceive colors *per se* but does perceive common perceptibles like shapes *per se*. We then will *see* the common perceptibles *per accidens*. In speaking of the common sense, in contrast, we have restricted our attention to the attributes of the eyeball concerned with the ability to perceive common perceptibles like shape and number. The common sense will then *perceive* these common perceptibles *per se*, sc., in virtue of itself.

In sum, the common perceptibles are perceived via more than one sense organ. However they are perceived thus not due to the perceptual ability proper or special to that sense organ but due to an ability, which Aristotle calls the common sense. Thus via the eyeball we have perceptions of shapes. Even though the visual perception provides a perception of these common perceptibles, we perceive them *per se* not in virtue of vision, the special sense, but in virtue of the common sense. What complicates the account is that the visual experience of the shapes is always colored, their tactile experience always textured etc. Still the common perceptibles themselves are perceived visually only *per accidens*. To be sure, these common perceptibles *qua* visible might be said to be seen *per se*. Yet the latter once again are *relata*, with only an accidental relation to the thing, here a common perceptible like shape (which is a *quale*) from which it is abstracted. The perception of a common perceptible itself like a shape is neither tactile nor visual. Then the perception of the shape would be judged to have a necessary connection to the colors or textures with which it has happened to be associated. [Cf. 429b4–10] Nor is it both visual and tactile. Otherwise it would have contradictory attributes when the visual and the tactile experience do not agree (as in the case of the two fingers).

Like other perceptibles, the common ones (when not particular) are *relata*: a common perception is a perception of a common perceptible like shape or motion. Such a common perceptible is an aspect of the colors or the feels—themselves *qualia*. Note that shape and motion are themselves *relata* when not taken particularly: a shape is a shape of something shaped; something moved is moved in a motion. Here the subjects for these *relata* are not substances but their accidental *qualia*.

We have already seen in Aristotle's account of proper and common perception his repeated use of abstractions: to get from the external physical object to the forms impressed on the sense organ, and from those forms to the perception of the proper

and of the common perceptibles as perceived separately, in isolation. It should be becoming apparent that the structure of the abstraction relation in all these cases looks the same. We shall see this same pattern recurring in looking at the other, higher mental activities recognized by Aristotle.

5.3 The Universal Content of Sense Perceptions

In order to see how the universal may be abstracted from sense perceptions, we need to get clear on the content of perceptions. The abstraction relation can isolate and attend to only those features already contained in what it abstracts from. If Aristotle holds universals to be abstracted from sense perceptions, he has to be admitting that the universals are contained somehow already in these sense perceptions. We shall see that he does. The problem arises then, why does Aristotle need abstraction at all? For, if sense perception intuits the universals directly, we have no need for abstraction. Instead we would have a Platonism, perhaps along the lines of the early Moore or Russell, where we directly intuit the yellowness in the rose and the goodness in Muhammad. When we see that Edinburgh is to the north of London, we would be becoming directly acquainted not only with a particular relation but also with the universal relations of being to the north of and direction. Nevertheless, in contrast, Aristotle says that perception is of individuals external to the soul, while thinking is of universals already somehow in the soul. [*An*. 417b21–3] At the same time he holds that the categories of being contain universals, which then have a real basis. He seems to be claiming that the universals are there in the sense perceptions, but muddily, inchoately like the statue in the uncarved block or like a jewel in an unfaceted stone.[56] We need abstraction in order to be able to pluck them out and polish them up.

For Aristotle, as well as for Plato before him, sense perception itself is a twofold process. Plato speaks of the object's being colored as coming into being at the same time as the seeing of the colored object. [*Tht*. 156d–e] True to his construal of perception as a relation, Aristotle speaks likewise of the simultaneous actualization of the potentiality of the object for being seen and of the potentiality of the observer for seeing. [*An.* 425b26–426a19]

As discussed in Chap. 4, Aristotle does say, at *Categories* 7b22–8a12, that the knowable and the perceptible (thing) seem to be prior to their correlative knowledge and perception. For surely the thing can exist without being perceived or known. Yet note that he keeps on saying "seems". [7b15; 22; 24; 36; 8a11] For, following the finer distinction discussed above, the correlatives, strictly speaking, co-exist simultaneously, whereas the "things" or substances in which these correlatives exist need not co-exist simultaneously. Thus, just as Sappho, the individual substance, can exist prior to her owing any slaves, but her existing as a mistress co-exists simultaneously

[56] Consider 'facet' as 'face-t', a certain respect or façade of the object. Cf. πρόσωπον.

with another individual substance's being a slave, so too for the knowable and the perceptible: The body, as or *qua* the (thing) perceived, co-exists simultaneously with its being perceived. Yet the body as an individual substance certainly may well exist prior to this. Note that Aristotle speaks about the perceptible as "body" when raising this puzzle. [7b39] 'Body' can signify a substance and not the correlative of the perception, strictly speaking. As discussed in Chap. 3, the solution to this puzzle lies in making the finer distinction between body without qualification, in the category of substance or quantity, and body *qua* perceptible, serving as the correlative. To unravel the puzzle that he has raised in the *Categories* fully, Aristotle would have to have had there the long discussions of potentiality and actuality that he has elsewhere (as in the *De Anima* text just cited!). For words like 'perceptible' carry many modal ambiguities.[57]

So we may say, in an Aristotelian spirit, that, in one sense, Aristotle agrees with Plato that the perception and the perceptible, sc., the individual substance with respect to its accidental property of being perceived, have a simultaneous *actualization*. Yet, in another sense, the "thing" that is the perceptible, sc., the individual substance, does not become actual simultaneously with the perception. Likewise a proper "object" of vision, "the white", as I have said above, is not (2bi) the individual piece of marble that happens to be white, but just (2a) the accident, white, all by itself. This distinction, of different ways of reading paronymous terms like 'white', has great importance for understanding Aristotle's views on abstraction. In most cases, what is being specified by the abstraction is what is signified by (2a) the paronymous term taken by itself: the accident white, and not (2bi) the complex of the individual substance with that accidental white's being in it. The signet ring metaphor itself suggests that perceptions are of accidents only:

> In Aristotle's analogy, when the wax takes the imprint of gold…its shape is altered; it takes on the shape of the gold. It is clearly affected by the gold. But not, Aristotle says, *qua* gold. What is he ruling out? What would it have been like if the wax had received the imprint of the gold *qua* gold? It is hard to escape the conclusion that the wax would have received not just the extrinsic, accidental features of the gold (its shape) but its intrinsic, essential ones as well (being gold). The wax would (at least in part) have come to be of gold… (Cohen 1992: 65–6)[58]

If the perception were literally to take on the substance of the gold ring, it would be a gold ring. Surely Aristotle has to mean something else.

Aristotle repudiates in large part the theory of vision of Empedocles and Plato, where the one perceiving plays an active role in causing and constructing the objects of sight from the interplay of the rays issuing from our eyes and their varied reflections from the objects seen (*Sens*. 437b23–438a3; Plato, *Tim*. 45b–46a; Phlb. 39a–c; *Tht*, 191d–e; 193b–c).[59] Aristotle has a more passive theory. The presentation of a

[57] In one sense, '(a) body' signifies a substance; in another a *quantum*. Here it signifies a common perceptible as discussed above. In any case, it is still not the correlative of the visibly perceptible etc.

[58] Cf. Caston 2005: 309.

[59] Cf. Slakey 1961: 84; Nuyens 1948.

visible object to the seeing eye causes it to realize its potential, so as to "become that object", at least in the sense of providing a visual experience of it. Aristotle's perceiver need not cause the perception by training the active power of the intellect onto an object in order to illuminate its universal Forms so as to cause us to have mimetic images of them. Rather, the object being perceived causes the perceiver to perceive by impressing its features upon her.

Nevertheless, even on this more passive model of sense perception, that act of seeing results from attending selectively to the object. For the object being perceived is an individual substance with all of its attributes. The eyes when seeing then perceive that object *qua* visible but not *qua* audible etc.; the ears when hearing perceive it *qua* audible but not *qua* visible etc. What does this amount to? Sense organs like eyeballs can be affected by the object only in certain respects. Here the sense organs are passive in receiving certain attributes, yet active in that their natures dictate which attributes can be received.[60] Moreover, the different senses, the different powers or capacities of the sense organs, select only certain of the features of those attributes that are present in the sense organ. (Sounds can cause eyeballs to vibrate, but not *qua* seeing.) Here too the sense is not completely passive.

For instance, the apple affects the eyeball *qua* seeing with respect to color and shape and not with respect to its fragrance or feel (which could affect it by causing it to tear etc.). Moreover, the sense of vision attends to the color of the image in the eyeball and not to its shape nor to whether or not the intense red pains the eye. Again, the tongue can receive certain attributes of a piece of orange, like its texture and its flavor, and not others, like its color. One ability of the tongue, its sense of touch, perceives its texture but not its flavor another, its sense of taste, perceives its flavor but not its texture.

Thus perception by the various special senses selects only certain types of attributes from the full array of the attributes of the object being perceived. To be sure, this selection need not be intentional or even willed, but may follow merely from the capacities of the materials peculiar to each sense organ: the transparent eye jelly has one sort of receptivity; the opaque skin another. Again, I stress, neither need the "attention" be conscious or even mental (Everson 1997: 5, 104).[61] Nevertheless, some features of the object are selected and some ignored. Moreover the features selected include no attributes of the substance:

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[60] Just as with the Stoic example of a top, whose shape affects the nature of its motion when spun.

[61] "Aristotle holds perception to be a certain physical process, wherein certain perceptual or cognitive abilities of an organ of the body are actualized" (Burnyeat 1992a: 26). So too Everson 1997: 229; Slakey 1990: 77: "Perception is simply the movement which occurs in the sense organs, not some psychic process in addition to the movement in the organs." Slakey (1990: 82–3) then claims that Aristotle's theory of perception fails, as it cannot distinguish between say smelling and becoming odorous. Yet perception cannot be reduced to a purely material process: the formal, structural features themselves are not material constituents. Cf. *Metaph.* VII.3; *Part. An.* I.1; Sorabji 1974: 175.

Still, we should not neglect how much for Aristotle perception is a physical, or, better, a physiological, dynamic process, and not a conscious one. When *we* discuss sense perception, we tend to be speaking of the experience of it, especially since we human beings do have the experience (in Aristotle's sense too) and the consciousness of the perception as well as the perceptions themselves. Aristotle himself makes this distinction at 425b12–3; 425b20. Cf. Bynum 1987: 92.

> Then, he says, perception insofar as it is such suffers nothing by such things, like sight by Diares insofar as he is Diares. For not Diares but the color of Diares is visible. [Themistius, *in De An.*, 58, 14–7]

We see Diares then not *qua* Diares but *qua* colored. Moreover we are not acquainted with relational attributes, like being the son of Diares, via sense perception either: "For the son of Diares, or Diares, is perceptible not *qua* Diares but because it has happened to Diares also to be white." [Themistius, *in De An.*, 58, 6–8]

With Aristotle's theory of perception, as with selective attention, we have a single process with two aspects (Modrak 1987: 30).[62] I have discussed this structure in Chap. 4: the relation with its *relata* forms a relational complex which may be considered going from either side to the other, just as there is but a single stairway while having the way up and the way down. Thus, on the one hand, only certain, selected attributes of the object perceived affect the sense organ so as to produce perceptions of different sorts, proper and common. On the other hand, there come to be perceptions of external objects, different ones in turn. We have a single totality of perception here, one that may be described from the perspective of the workings of perceptions signifying the objects or from the perspective of the workings of the external objects affecting the sense organs.

For Aristotle, unlike Plato, the perceiver does not look at an independent object that produces sensations in her differing radically from the attributes of that object (Modrak 1987: 150).[63] E.g., when we see red, it is not that we are looking at a physical object that comes to affect us so as to see red, while in itself it is not red. Plato's theory has this feature. For the Form of the Bed that is in this bed causes us to have a visual image of a bed in terms of material properties like colors and shapes (and formal ones like having material properties) that Forms themselves do not have.[64] Aristotle does not hold that the actual attributes of the physical objects, in modern terms, say, the wavelengths of light, come to affect our perceptual apparatus so as to give us, eventually, after much neural and cognitive processing, an experience of seeing a red patch. Instead, the object itself is red and produces a corresponding experience of the red object in us when we have the appropriate potentiality, sc., the sense of sight in the proper, normal lighting conditions.

Aristotle seems to assume that in this corresponding experience we have sense perceptions of both particulars and universals ((Ps.) Simplicius, *in De An.*, 123, 10–3; Themistius, *in An. Po.*, 64, 2–7). That we perceive, at least in some sense, the universals too should become obvious when we consider his claim that knowledge of the universals comes from making abstractions upon the sense perceptions of the particulars. [*An. Po.* 81a38–b9] There Aristotle has said that perception is of singulars and that if we lacked a certain type of perception we would also lack the knowledge of those things perceived. For we would not then be able to make an induction from the appropriate singulars. The components of induction must be given in that

[62] Cf. Modrak 1987: 39.

[63] Still cf. *Tht.* 156a-157a, where Plato mentions the view that things perceived like the white or the hot have no being in themselves but only in the relational complex.

[64] As in *Resp.* X. I do not want to defend this interpretation of Plato in detail, but just to make the contrast with Aristotle.

on which the induction is to be performed. For, if the universals were not already present, at least inchoately and implicitly, in the sense perceptions themselves, there would be nothing to abstract from so as to make the induction.[65]

Other doctrines of Aristotle support the claim that he holds us to have sense perceptions of universals in this way. First, Aristotle holds that species and genera, the secondary substances as well as universal accidents, exist *in re*, even though their existence there depends upon their being attributes of individual substances. Now, if these universals all exist *in re*, how are we to know them as existing thus? If all knowledge depends upon sense perception, as Aristotle seems to have said,[66] then knowing them depends on perceiving them. Somehow then the universals must be perceived.

Second, at the end of the *Posterior Analytics* Aristotle states explicitly that all knowledge comes somehow from sense perception, even the knowledge of first principles. [100a10–1] He denies that we have innate knowledge of universal first principles but that we have an innate capacity to acquire them from sense perception. I shall discuss in detail this process, which Aristotle calls "induction", in Chap. 7.

Thus Aristotle thinks that we come to know these universals through working on the materials given by sense perception. Hence, we "see" not only particular but also universal colors etc. As Themistius says,

> So that, in some way, there is also perception of the universal, but not in a way so as to separate it and abstract it and know it *per se*, but as mixed together with the singulars and rather hindered at that. (*in An. Po.*, 64, 7–9)[67]

In sense perception we have not only perception of particulars but also of universals, albeit indistinctly; Aristotle ends up saying: potentially, so as to require something active, namely the intellect, to move it from potency to act (Cleary 1995: 467–8, 470, n. 104). In fact he insists that we cannot have knowledge of universals from perception. [*An. Po*, 87b28–35] Perceptions are only of singulars. Still he says also that in seeing a particular color the universal color is perceived *per accidens*. [*Metaph*. 1087a19–20] Knowledge potentially is of universals and actually is of singulars. [*Metaph*. 1087a16–9]

Kahn seems to object:

> It is precisely here that the myth of abstraction will lead some readers to suppose that the universal as already 'given' in the raw data of sense can simply be extracted by ignoring or subtracting part of those data. But Aristotle has no theory of abstraction in this sense. For him the universal is present in sense-experience only if we include the incidental sensibles with their noetic component, and it is made available only if the percipient subject possesses the *noûs* or *logos* required to detect it. As Aristotle sees it, the whole process of epagoge or 'induction' which he describes in these two texts is made possible for perception only in the human case, since only here is the sense informed by a noetic capacity. (Kahn 1992: 369)

[65] Still I can agree with Kahn (1992: 367) that only singulars are perceived, strictly speaking.

[66] More about *noûs* below.

[67] Cf. Bolton 1996: 303.

I can agree that *noûs* or *logos* serves as the active cause bringing the universal from potentiality to actuality and that the abstraction consists in more than mere extraction of a fully formed universal. Still Aristotle must hold that the universal lies there ready to be abstracted somehow (Frede 1992: 290). Otherwise he relapses in Platonism, if Kahn is claiming that we have the ability to see the universal Form in its instances. If Kahn means that the "noetic component" is out there in re along with the individual perceptibles, he has my position.

Note that Kahn's point applies equally well to our "perception" of primary substances.[68] Do we "perceive" them to persist through time? Not in the perceptions taken singly. Does then *noûs* impose substantiality upon the manifold of perceptions in a Kantian way? Or is that knowledge again abstracted from what we do perceive, strictly speaking, in a complex process of abstraction?

Indeed, Aristotle holds that the sense perceptions of individuals at first are so indistinct so that we do not have perceptions of them sufficient for distinguishing them from other individuals. Rather, we have a generalized image or likeness of the perceptibles.[69] In this way, I may smell an odor but not be able to distinguish thereby the fragrance of this flower from the fragrance of that flower. As such perceptions apply indifferently to many individuals, they may be said to be universal. Accordingly he says that a small child first believes that all women as named 'Mother' and only later realizes that 'Mother' marks out one woman from all the others. In general, he says, we proceed from generalities to particulars. Still these generalities are not universals strictly. We have no definite knowledge of them, as we cannot give definitions for them (Philoponus 1991: 115, 44; 23, 51–2; 116, 85–6.; Wedin 1988: 207). [*Phys*. 184a23–b14, discussed more below]

So then for Aristotle the objects being abstracted have a natural basis. Still, he holds also that the universals are present only indistinctly, secondarily, and potentially, such that the sense perceptions about them are far less reliable than sense perceptions of particulars. [*An.* 428b22–5] Somehow *noûs* can reconstruct the universals *in re* from our sense perceptions of particular accidents.[70] Here perhaps *noûs* plays an active part, as Kahn suggests.

I am taking the particulars perceived by the senses to be individuals in the sense of singulars. After all, despite G. E. L. Owen, Aristotle does seem to give clear examples of individual accidents, like "this white" ('τό τί λευκόν) at *Categories* 1a27 (Owen 1965).[71] An Owenite might counter that the texts can be construed to

[68] Following Kant's similar remark about Hume's analysis of causality: the same grounds on which Hume rejects a rational basis for claims about causality apply equally well to claims about substance.

[69] Perhaps thus (ps.) Simplicius, *in de An.* 190, 26 when he speaks of "types" (τύπους) being presented to the imagination by the sense organ.

[70] Themistius (*in De An.*, 58, 11–4) refers to *Cat.* 7a35 on "stripping away" all the accidental attributes. Cf. Avicenna, *Al-Burhān* 160, 12–20.

[71] Most scholars today do seem to accept individual accidents (Frede 1987). Corkum (2008: 87, n. 20) gives a survey of secondary literature on whether individual accidents are non-recurrent or recurrent. Plato, *Tht*. 209c6 speaks of the snubness of the nose of Theaetetus differing from the snubnesses of other noses.

be talking not about individual accidents, but only about more or less particular accidents. For 'τό τί λευκόν' might mean only a certain [shade of] white', and 'individual' might signify only a maximally determinate individual, incapable of further division, in Plato's sense of 'division'. (I shall call such things as particular shades henceforth 'particulars'.)

In any case, whatever singulars, substances or accidental attributes, might exist, Aristotle is holding that we become acquainted with them via sense perception. Saying this does not mean that we have direct intuition of all singulars via sense perception.[72] As discussed below in more detail, we do not have direct sense perception of substances.[73] Still we come to have experience of substances, both the singular and primary ones and the secondary and universal ones, from our sense perceptions. Strictly speaking, I do not "see" Coriscus or the species dog.[74] My visual perceptions provide the materials by which I come to have experience of the primary substances and knowledge of species and genera. I can be said to "perceive" those substances only because I perceive accidents of them or because they cause my perceptions (Charles 2000: 118).

Again, clearly the "forms" received directly in sense perception, be they singular or particular, are not the same in number as those existing *in re* in the object. For, when I see the table as brown, I do not thereby rob the table of its color. When I see a stone, the stone does not disappear from public view and move into my mind (Frede 1996: 379). So Aristotle says. [*An*. 431b29–432a12] The table remains brown no matter how many people are seeing it. As the analogy of the signet ring suggests, the forms of the object, sc., its attributes, are reproduced in the process of perceiving, and moreover can be reproduced many times in pieces of the right material. Aristotle says that they are impressed upon the sense organs: the eye jelly, being transparent, receives the color of the object being perceived by reproducing it. [418a31–b1]

The analogy of the signet ring suggests too that the sense "impression" need not resemble the attribute of the object exactly. Just as the wax receives an obverse, concave impression of the convex signet of the ring, so too the eye may have a reproduction of the attribute of the object that is not identical to it even in all of its general features, although corresponding to it.[75] Here then Aristotle might be leaving open a way for sense perceptions not to be veridical and to have features other than those really in the object.[76]

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[72] I leave it open here whether there are individual items of intelligible substances, and, if so, of what sort, and how we come to be acquainted with them. As I have discussed a bit above, in '2+2=4', we have two instances of the number two. Aristotle may take these as "individuals"; witness his doctrine of intelligible matter at *Metaph.* 1036a2–12; 1059b14–6.

[73] (Ps.) Simplicius, *in De An.* 182, 1–2: "substance is apprehended by reason and not by perception."

[74] (Ps.) Simplicius, *in De An.*, 127, 32–128, 2: "…just as we say that the master and the sculpture is a man *per accidens* because he is so not *qua* man. Thus in this way substance is perceptible per accidens, because not in virtue of being substance."

[75] Hence the talk of ratios. Cf. Ward 1988: 220–1 on 424a20–21.

[76] So too Modrak 1987: 89; Robinson (1989: 69, n. 8) holds that the *eikon* must resemble things only in some respect.

5.4 The Fallibility of Sense Perception

Aristotle has the general view that our sense organs receive directly the attributes of primary substances: the red we see is the red in the apple. These proper objects of the various senses, he says, allow for no error. [*An.* 418a7–17] Even in perception proper, there is already implicit albeit indistinct knowledge of the essence. Acquaintance with such a primitive universal would include an inchoate propositional content of the formula of the essence.[77] If so, to that extent, Aristotle would be holding that our knowledge of the universal allows for no error either. Accordingly, at times he also makes *noûs* infallible too. However, at the same time Aristotle allows for illusions and delusions both for perception and for knowledge. As we shall see, if he is making a mistake in holding these views together, he is making a very modern mistake.

Aristotle says, at one place anyway, that *per se* perception has no possibility of error (Everson 1997: 17–9). [418a12; 15] We can be wrong about, he says, what the colored thing is, say, that the white patch is the son of Diares, or where it is. E.g., I may see the white patch as being on the body of the son of Diares, when in fact it is a puff of smoke. Such errors arise from not *per se* but from *per accidens* perception. Yet how can we err in *per se* perception, at least about the object being perceived—here, not the substance but the perceptible proper, the color, sound, taste…? Plato too had asserted that in these [proper] perceptions it is impossible to have false perceptions. [*Tht.* 192c] Strictly, these perceptions will be of the correlative special and common perceptibles. For instance, how can I err about seeing red while I am seeing red, or feeling motion while feeling it?

Perhaps though Aristotle is exaggerating his own position when he holds that we cannot err in perceiving the *per se* perceptibles. Elsewhere he is not so positive.[78] Instead he seems to view the possibility for error as lying on a continuum between the extremes of divine infallibility and eristic incoherence. On account of the differences of the complexity of the experience, Aristotle recognizes different degrees of

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I leave it open whether Aristotle requires a perception to have a perceiver "becoming aware of some sensible quality in the environment: [the "spiritualist" interpretation] or just that "the [sense] organ is so altered that it literally becomes like its (proper object" [the "literalist" interpretation]; so Everson 1997: 10–1. I admit that I am inclined to the literalist one, at least for the perceptions of animals like grubs. Indeed, I have been using 'perceive' and its cognates instead of 'sense' for this reason. Note that, on either interpretation, the reproduction of the form of the object being perceived need not be identical but only "like".

[77] Everson (1997: 187–8) likewise suggests that we ought not take *per se* perception as perceiving the proper object (seeing the color) and *per accidens* perception as having propositional content (seeing that the red thing is an apple).

[78] Charles (2000: 123–4) agrees that Aristotle allows for error even of the proper perceptibles. Robinson (1989: 67) says, "To the extent that the percipient reports only this bare sensation, he cannot be wrong"—e.g., in reporting an ache, a flash of light, or a drumbeat. Yet this doesn't help much: for now we have a self-conscious report applying linguistic expressions to the past perception. Surely all this goes far beyond the *per se* perception itself. Cf. (ps.) Simplicius, *in de An.*, 261, 35–262, 10.

veridicality in various types of experience. First, he says, perception of "the proper perceptibles is true, or [rather] has the least falsity" (Themistius, *in De An.*, 57, 17–36).[79] [428b18–9] Perception of these proper objects constitutes *per se* perception: vision is of the colored patches; hearing is of sounds. Yet even here Aristotle admits illusion to be possible. For instance, the eye jelly might not be clear, as when a soldier hit on the head sees a rush of darkness [*Sensu* 438b11–6], or we can continue to see the same color after looking at something else [*Somno* 459b11–3], or the ears might be ringing after hearing a very loud noise. [*An.* 429b1–2] Aristotle admits that the same sense organ can be stimulated in the same way by different objects. [*Insom*. 460b23–5] This fact too makes sensory deception and illusion possible even of the *per se* perceptibles. Thus I might see red while in fact seeing something white. So a white object may cause in part my seeing red, while normally it causes me to see white. So my perception is "false".

Perhaps we can salvage both positions by using a doctrine from Plato. Plato has Thrasymachus saying that the ruler does not err *qua* ruler. [*Resp* 340d–341a] Socrates goes on to argue that then *qua* ruler a person should have only the interests of the states and its citizens at heart, while ignoring her personal gain. Indeed, those expert at ruling will not want to rule. Consequently, it seems that Plato also accepts the distinction. So perhaps the perceiver *qua* perceiver does not err, although a judgement or statement of the perception can err. [Cf. *Metaph.* 1010b20; *An.* 418a15–6] The senses do not err, insofar as they cannot be deceived in seeing that one is seeing a color or by haring that one is hearing a sound, but can be deceived about what the color or sound is (Rapp 2001: 87).

In any case, Aristotle, although at one point saying that no deception can occur in *per se* perception, gives instances of such deception and concludes that there is only the least chance of being deceived therein. Perhaps we can save both texts by making a distinction between *per se* and *per accidens* perception in the very perception of the proper perceptibles. I can perceive the colored shape as itself or as something else, say, as some other color. My eye jelly may need time to recover from the presence of one color in order to receive a new one. Perhaps too the eye jelly can get habituated so as to respond habitually to certain visual images with certain colors. The modern literature on sense perception has lots of examples of such deception (Akins 1996). For instance, someone may put a blue apple in a bowl, and yet, even under normal lighting and viewing conditions, I shall most likely see a red oval (the *per se* perceptible) as well as a red apple (the *per accidens* perceptible). Now the red oval is a proper object of vision just as a blue oval is. Aristotle could say, if he were aware of similar examples like, say, seeing fruit at sunset, that my present seeing of the red oval shape came from the *per accidens* connection, from past experience, of an apple shape with a red color. Then Aristotle would not be taking *our judgements about* even the *per se* perceptibles to be infallible, even though the *per se* perception itself would be. But, given the paucity of the text, I find it hard to determine how far Aristotle had worked out his theory, and whether he makes such distinctions.

[79] But then (ps.) Simplicius, *in De An.*, 126, 37–127, 8.

Still he hints at them. What Aristotle means by 'false' here is a lack of correspondence with what is being represented:

> There are things which exist, but whose nature it is to appear either not to be such as they are or to be things that do not exist, e.g. a sketch or a dream; for these are something, but are not the things the appearance of which they produce in us. We call things false in this way, then—either because they themselves do not exist, or because the appearance which results from them is that of something that does not exist. [*Metaph.* 1024b21–4; cf. 1051b17–32]

My propositional report of seeing the red can be false, and the red perception itself can be false as not representing accurately the structure of what causes it. On this interpretation Aristotle looks rather Cartesian: my experience as such cannot err, although I can be mistaken about what substance causes it or in my report of it. [Cf. 428b19–21]

Aristotle admits likewise that there can be mistakes of the common perceptibles: when we cross our fingers and touch a single object, the visual experience is of one object, while the tactile experience is of two objects. [*Metaph.* 1011a33–4; *Insom.* 460b20–2] We can "see" objects moving when they aren't. [*Insom.* 459b18–20] Still, Aristotle presumes, in normal conditions a healthy subject will perceive accurately (Bolton 1996: 309). For, if not, there is no need to have a science of sense perception, since there would be no *explanandum*. Further, how could a scientist even give an explanation of sense perception, without her herself having relied on some of her sense perceptions to explain how the deceptions occurred?[80]

Thus, in light of his immediately preceding remark [428b18–9], Aristotle perhaps has overstated matters if we take him to be claiming that in all cases of *per se* perception no falsity or illusion arises. Or, perhaps, Aristotle is using the distinction that I suggested above: that the *per se* perception itself cannot err, although our discriminative judgement or report about it can, as with the blue apple.[81]

Aristotle says that much more thorough deception can occur when there is perception of accidents. [428b19–21][82] Aristotle gives the example that there is no falsity in perceiving [or claiming] that there is something white, but there can be in perceiving this white thing to be something else. [429b21–2][83] E.g., we may see the white thing as Cleon's son. We may see something as honey, but tasting it find it to be machine oil. [*Metaph.* 1011a25–7] Here Aristotle is mentioning *per accidens* perception again where one accident ('white') is predicated of another ('son'). He also admits that there can be deception about to what thing the proper perceptible

[80] As noted above, such too is, or at any rate has been, the presumption in modern psychological studies of perception. However, see Charles 2000: 121–2, n. 19 on what Aristotle requires for a sense organ to be "functioning well".

[81] Thus Graeser (1978: 86) says that for Aristotle error and falsity only if there is synthesis.

[82] There are many variants of the text here, but these do not affect the doctrine that I am presenting.

[83] Hamlyn (1961: 26–7, 1968: 106) discusses how sense can err and in what way there cannot: "a sense cannot confuse its object with that of another sense; it can err over the identity and place of the material object which possesses the quality in question. It can also err over instances of its type of object." He admits that the incorrigibility here is puzzling.

belongs: this seem to mean, what substance has that perceptible as an accident. [428b19–21][84] I may say that the human being Cleon or Coriscus is white and err.

It is worth emphasizing that Aristotle does not say that *per accidens* perception is always misleading.[85] On the contrary, if we are to have our ordinary experience of the world as well as science about dogs and stars, *per accidens* perception must be fairly reliable. For instance, judging that different attributes belong to the same individual substance requires *per accidens* perception. At the least, most statements about substances will be based on *per accidens* perception (Hamlyn 1968: 107). As with being, we should distinguish *per accidens* perception from perception *per accidens*: the former connects a perceptible with its substance, while the latter connects up two accidents (Bäck 2000: 65–70). [*Metaph*. V.7]

Also Aristotle takes the universals themselves to be abstracted from the individuals given by perception. Most universal, definitional attributes and *propria* are not given as proper perceptibles via *per se* perception (although perhaps from them via abstraction). For example, the human being has the definitional attributes of 'rational' and 'animal', where neither of these, either as universal or as individual, is given as a *per se* perceptible of vision, hearing etc. (Simplicius, *in De An.*, 127, 13).[86] Even the bronze sphere does not have its 'bronze' given in a *per se* perception; perhaps in this case the 'sphere' is (although it is unlikely that an idealized three-dimensional shape of the sort described in geometry is given as in a single, *per se* perception of sight or touch). In contrast, my seeing a red circle does seem able to give me attributes of the red circle, sc., the red and the circular, reliably in a *per se* perception.[87]

Aristotle says that much more error can occur concerning common perceptibles like motion.[88] He describes these common perceptibles as "the common things following the accidents to which the proper [objects of perception] belong". [428b22–3] Although the text is obscure, again Aristotle seems to mean predicating a common perceptible of the subject of the proper (i.e., the special *per se*?)

[84] This text has some variants and alternate readings.

[85] Modrak (2001: 233, 236) makes a similar point about imagination. *Re* incidental sensibles, see Bernard 1988: 75–86; Madden 2004: 47–8. In seeing the color, the eye cannot help but to "register" some colored object, sc., the substance. This is an incidental perception but somewhat reliable.

[86] Barnes 1994: 255. "If we were often mistaken in perceiving physical objects *per se* Aristotle could not say that the eye's perception of colored objects is always true. However, Aristotle says that the objects of indirect perception are often false (428b20), therefore physical objects cannot be objects of indirect perception" (Block 1960: 97).

[87] I do not mean that a sense perception of a red circle suffices to give scientific knowledge of redness or circles, but only materials from which such knowledge can be constructed. Actually, Aristotle generally says that color is the proper object of sight. [418a27 *et passim*; cf. *Top*. 119a30] Yet the shape too seems likely; cf. 425b6–9. It's just that no other sense besides sight perceives color, and so here we have a "proper" object in the strict sense of the *proprium*.

[88] At *Rhetoric* 1370a28 Aristotle says that imagination is weak in getting at the truth, and our apprehension of common perceptibles depends upon imagination… Cf. Themistius, *in De An.* 90, 8–13; 91, 18.

perceptibles: e.g., saying that Coriscus (a substance) or perhaps the son of Cleon (an accident) is moving towards me.

Many expressions in ordinary language concern such common perceptibles, like 'sphere'. Normally we use them to make statements about their substances. Aristotle does not seem to require these common perceptibles to be universal; they can be individual. For he is speaking of their being given by imagination, and surely other animals have imagination too without apprehending universals. [429a5–6] After all, cats see mice run too. Note once again that, although error is possible in our statements about common perceptibles, so too is truth if we are to have knowledge of the world.

Aristotle does say that in perceiving, strictly speaking, we perceive the object itself. After all, he has described sense perception of a process of receiving the perceptible forms of the object without its matter. Our seeing the red of the red apple does not amount to a *sense datum*, the way in which the apple is given to us, but instead the way in which the apple is in itself: the apple is itself is literally red and causes our perceiving it thus. Yet the substance, the apple, is not perceived strictly. Rather it is perceived only insofar as it is in the relation of perception, as a proper perceptible like a color or sound or shape (Simplicius, *in De An.*, 127, 13).

Rorty (1979: 45) and his like may then with some justification complain that Aristotle naïvely conceives of sense perception as a mirror of reality: our perceptions accurately reflect what the world is. Yet, even if this were so, Aristotle would not be banished to the realm of the pre- or proto-scientific. Indeed, until quite recently and maybe now too, empirical researchers in fields like neurology and psychology have thought that normal sense perception is veridical (Block 1960: 97; Bolton 1996: 309–10).[89] It might not be that the apple itself is red in the way in which we experience the red as a *quale*. Still, our normal experience of red has been supposed to correspond to something real in the object, sc., the apple's reflecting the red wavelengths of light. That is, the normal perceptual process has causal reliability (Charles 2000: 118). The causal interaction of light, the surface of a visible object, and our optical system generates a visual experience in lawlike ways. So, although current scientists might reject Aristotle's realism of sensation as too simplistic and naïve, they still advocate a realism. After all, we have to take the sensations of ours to be veridical in some way. For it is from the *explananda* of seeing that we have come to construct the modern scientific theories of light and of vision.

Moreover, as noted above, Aristotle seems to require only an isomorphism and not an identity of the perception with the object perceived. He does say so at least for some cases, like seeing the shape of a large object, through the shape being reproduced in (or transmitted by) the eye jelly, the whole of which is much smaller than the object being perceived. At the most, even if we ignore problems of perspective, the image in the eye jelly is much smaller than the object being perceived, with

[89] "Vision is the process of extracting from two-dimensional images information about the three-dimensional structure of the world" (Egan 1996: 232). Still, as Charles (2000: 127) notes, what we immediately perceive are "cross-modal, three-dimensional objects typically grasped by the senses working in tandem." We, like Aristotle, have to work backwards, to separate, distinct principles.

its proportions or ratios (*logoi*) still being preserved. If Aristotle allows this to be a general point about all perception, he need not be requiring that every detail of our sensory experience match up with the attributes of the object.

In any case, even in the weakened sense of isomorphism, Aristotle is not naïve enough to hold that all sense perceptions are veridical. For he does allow for some distortion of vision: a menstruating woman, he says, has a red tinge to her vision; pressing the eyeball causes a double image; looking at a bright color may cause us to see the next color incorrectly; we have afterimages of the Sun that represent what is not there and which change color. [*Ins.* 459b10–460a11] Again Aristotle holds that we are easily deceived when we are excited by emotions. [460b3–4] Someone scared will see his foes advancing when they are not; a person with a fever will see animals on the wall when they are not any.

Even a Stoical person, free of passion and having healthy sense organs, can err. We feel two crossed fingers to be one while seeing them to be two. We see the Sun as only a foot in diameter while judging it to be far larger. [*An.* 428b2–4; *Ins.* 458b28–9; 460b20–3][90]

Aristotle says that the cause of such mistakes lies in the fact that it is not in virtue of the same ability that we judge or discriminate the proper perceptible and that we have imagination. [460b16–8; 461b3–7] Aristotle is distinguishing then a faculty of judgement about the perception or an image of a perception reproduced by the imagination from that perception or image. As animals too may perhaps dream and make perceptual mistakes, as the crow does with the scarecrow, it seems that this judging need not be deliberative, self-conscious or rational, but only "discriminating" in a basic, rudimentary sense (Ebert 1983: 181ff.; Hamlyn 1959, 1976: 176).[91] Still it is a process whereby some perceptions are favored over others, and where memories of past perceptions may override what seems to be perceived at present. But more of this below.

Thus Aristotle admits two possible causes for mistakes in sense perception: first, the sense organ or the circumstances may be abnormal; second, the sense perception may be taken to be something as other than it really is, in a sort of misdescription. On the first, Plato had already remarked that Socrates healthy and Socrates sick will taste the same wine differently. [*Tht*. 159c; cf. *Metaph.* 1010b21–3] So too, Aristotle says, when the eye has been struck so as to fill the eye jelly with blood, the wounded person will not see correctly. [*Sensu* 438b11–6; cf. Plato, *Tht*. 194d–195a] Likewise, Aristotle says that memory is not always reliable. [*Mem*. 451a2–5] In this connection he mentions Antipheron of Oreus, who was insane, and took past imaginations as past perceptions. [451a8–11] It is not unreasonable then that Aristotle would agree also that certain insane people do not perceive accurately due to some defect

[90] Cf. Ross 1955: 273–4 on the finger example in psychology.

[91] Perhaps Aristotle takes this basic discriminative sense to coming from the linkage of the proper sense organs with the region around the heart via the blood and its ducts. Narcy (1996: 252) says that Aristotle is reacting to the doctrines of Protagoras and Plato at *Tht.*, 189e-190a; *Soph.* 263e.

of their perceptual organs.[92] For he uses the same cause, of not having a healthy, functional sense organ, to explain why the same thing appears sweet to some people and bitter to others. [*Metaph.* 1010b6–11; 1062b36–1063a5] Indeed, Aristotle notes that people can see differently with their two eyes if their sight is not the same. [*Metaph.* 1011a26–8]

Second, he admits that even healthy sense organs can produce illusory experiences in unusual circumstances: e.g., if you cross your fingers and touch something, you feel two objects but see only one. [*Somno* 460b20–1] So too we can continue to see the same color after looking at something else (Frede 1992: 278–83). [459b11–3] We see colors and magnitudes at a distance differently than we do up close. [*Metaph.* 1010b2–6] These examples show that, in Aristotle's terms, even normal, healthy sense perception and even *per se* perception, of the proper perceptibles, has the possibility of error. The error seems to lie not in the sense organ and its perception proper, but in how that perception is interpreted by the faculty of discriminative judgement. [Cf. Plato, *Tht.* 192c]

Indeed, this list of possible mistakes in perceptions, culled from works of Aristotle looks amazingly similar to the types of cases of sensory illusion that Descartes lists in *Meditations* 1 and 6—with the exception of the evil genius hypothesis (which resembles ancient skepticism more). Once Descartes has his God of the good λόγος though, even that difference disappears!

This second source of non-veridical sensations, sc., the misdescriptions, comes from *per accidens* perception. Aristotle distinguishes things perceived *per se* from those perceived *per accidens*:

> We speak of an incidental object of sense where e.g. the white object which we see is the son of Diares; here because being the son of Diares is incidental to the white which is perceived, we speak of the son of Diares as being incidentally perceived. That is why it in no way as such affects the senses. Of the things perceptible in themselves, the special objects are properly called perceptible and it is to them that in the nature of things the structure of each several sense is adapted. [*An.* 418a20–5]

More literally:

> A perceptible is said *per accidens*, e.g., if the white thing were the son of Diares: for there is perception of this *per accidens*, because that of which there is perception is accidental to the white. Thus too nothing is acted upon *qua* such by the perceptible [thing]. Of the [things] perceptible *per se* the *propria* are strictly perceptible, and [it is] relative to these [that] the essence [οὐσία] of each perception arises naturally. [*An.* 418a20–5; my trans.]

Strictly speaking, we see colors *per se* and also perceive shapes *per se*. Yet, we may also see certain colored shapes *as* something else. For example, I may see the white shape not as a mere white shape but as the face of Diares' son. Yet being the son of Diares does not belong to the essence of a white thing. (Remember that 'the white thing' here does not signify the individual substance that is white, but only the paronym of whiteness, taken as a subject in its own right.) Rather, the

[92] Cf. his account of the brutish, whose attributes are produced by disease or deformity. [*Eth. Nic.* 1145a30–3; also *Metaph.* 1010b6–11 on the erroneous perceptions of the weak and the sleeping and of those perceiving distant objects]

white patch that I see resembles images from my past experience that I have happened to associate with being the son of Diares via collateral information. I, like many other mammals, attach this information, based on memory and imagination to my present sensation (Modrak 1987: 70; Kahn 1992: 368).[93] I do so usually routinely and not deliberately (Cashdollar 1973: 157). So too a crow may "see" a man when seeing (the image of) a scarecrow, or a sheep a wolf while looking at a picture of a wolf or a sufficiently wolf-like image (Avicenna, *Fī Nafs* 35, 9–11; 36, 22; 148, 1–2; 163, 12–4). A connection in memory need not be veridical. It may result from accidental features of the perceiver's past experiences. A crow may see a human being as a friend or as a threat, depending on whether human beings have fed it or shot at it in the past.[94]

5.5 The Fallacy of *Per Accidens* Perception

Aristotle's account of *per accidens* perception agrees with his doctrines on relations.[95] Strictly speaking, the things perceived *per se* are the perceptible objects. These will be those attributes of the individual substances that enter into the relations of perception given by the five senses: their colors, sounds, tastes, odors, and textures—and also the common perceptibles that are also in the sense organs but are perceived in virtue of another, common ability: shapes, numbers, movements.[96]

In contrast, in perception *per accidens*, the perceiving is not of a proper object of perception but of something accidentally connected to it. Saying that I see Coriscus asserts that I am seeing an individual substance. But I do not see that individual substance, strictly speaking, but only one or more accidents of Coriscus.[97]

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[93] Everson (1997: 188–91, 39, 45) takes 418a20–4 causally, to assert: that if x is perceived *per accidens* by s, then "x is an accidental cause of s's perceiving some proper sensible."

[94] Lorenz (1963: 26) reports that jackdaws are taught by their elders about friends or foes. The elder birds have more experience. The type of "memory' here need not require deliberation, intentionality, or reasoning. [*Mem*. 450a15–6] Rather, it is a process of the concatenation of movements of the various sense perceptions in the soul. Recollection, on the other hand, requires reasoning, as the one seeking to recollect constructs a sort of syllogism, and so must deliberate and think about what she is doing. [453a8–14] Cf. Robinson 1989: 72–3; Sorabji 1972.

[95] "Aristotle's treatment of accidental perception in the DA and the De Sensu is no more than cursory—so cursory, in fact, that it would not be too hopeful to maintain that he provides any theory of accidental perception in those works" (Everson 1997: 192).

[96] It is worth noting that, while Aristotle himself does not have the clearest or most regular terminology, the English translations add to the confusion: both the special and the common perceptibles are "proper" perceptibles, even though strictly speaking only the former are perceived in virtue of the special senses. (Ross 1956: 270 discusses the problems with the manuscripts.) The common perceptibles are still "proper" perceptibles, in the sense of *propria*: some of them necessarily accompany the special perceptibles: we see no color without a shape. Note that some of the common perceptibles may be "proper" in the second sense of '*per se*' given in *An. Po.* I.4: this gives the disjunctive reading discussed above.

[97] I shall assume for the sake of the example that Coriscus is the son of Diares: in fact probably not. See Ross 1955: 238–9.

To be sure, all perceptions, both *per se* and *per accidens*, have certain accidental connections: the connection of the individual substance to the individual accident being perceived, say, the white, the particular *quale*, and the connection of that accident to the state of what is being perceived in the soul. While it is necessary for the individual accident being perceived to belong to its individual substance, still it is not necessary for me when perceiving a particular accident to apprehend that substance and understand it to have caused my perception of that accident. For instance, I see some white, colored patches. It is accidental to these colors and shapes in the object being perceived that I am perceiving them now. It is also accidental to the individual substance Coriscus that he possesses these particular colored patches, the individual *qualia*, that I am seeing now. It is not necessary that I make the correct connection between those accidental *qualia* and their substance. It is also not necessary that I see those white patches as white: I might see them as some other color (although here there is a natural causal necessity).

In addition to these accidental connections, the example that Aristotle gives, seeing the son of Diares, has two more accidental connections—and these, particularly the latter one, make for perception *per accidens* of the sophistical sort. For once again I do not see the son of Diares but only the *quale* of a particular color of a particular shape, which happens to be the *quale* of the individual substance Coriscus, which happens to be the son of Diares.[98] Being a son is yet another relation. First then, here we have the accidental connection, learned sometime in the past, between the individual human substance and his being the son of Diares.[99] Second, we have the accidental connection between a certain visual image and that individual human substance. That is, even if I have made correctly the connection between a certain visual image and that substance in the past, the image that I presently perceived is not the same but only similar to that image. Indeed, the relation between the two is not necessary; I can mistake one person for another, Coriscus might have a twin, there might be many Coriscus impersonators etc. This second accidental connection itself seems to be indirect, although Aristotle gives few details and there are various possibilities. He does hold this connection to be made by the ability of imagination common to man and animals like crows. [*Motu* 701a32–3]

Given that only rational animals know the universal, the predications for brute animals would all be singular or "general", while those for rational animals could be either singular or "general" or universal. By 'general' I mean a quasi- or proto- universal general proposition based on the generalized images that Aristotle takes babies and animals to have. A "general" statement of this sort would have a form like 'whatever looks (φαίνεται) like s is something that looks like p'.

[98] "…notons la construction et son sens : "fils de Diarès" sujet de la phrase mais sans article, est accident, et "1e blanc", datif complement avec article, est sujet au sens de suppôt des accidents" (Cassin 1996: 284).

[99] That is, from the point of view of the perceiver, the connection is accidental. It might be essential to a son to have the father that he does.

Like other animals, we make these connections via inferences.[100] The sort of "reasoning" involved here need not be conscious or deliberate, but only "discriminative".[101] Rather it resembles quite strongly the reasoning occurring in practical syllogisms. Aristotle holds that via such syllogisms animals move voluntarily but not deliberately. For Aristotle perception itself is a sort of movement, as it is occasioned by a change in the sense organ caused by motion from an external object, where that change causes the shift from potentiality to actuality of the relation of perception. [*Phys*. 244b11–2; *An.* 406b10–1; 416b33–5; *Motu* 701b17–8; *Sens*. 446b27–447a11][102] Hence it would not be strange if Aristotle's account of the motion of animals applies to the perception of animals. He himself notes the similarity between moving to the conclusion of a syllogism and moving from being at rest to action. [701a9–25] As mentioned above, Aristotle finds rationality a general feature of the world: things are full of *logoi*. So he would find such rational inference in nature to be no "category mistake".

Perhaps then the "reasoning" occurring in perception, both *per se* and *per accidens*, has the very structure of the practical syllogism.[103] For the perceiving animal might "reason" thus:

Coriscus is the son of Diares
What is now being seen [the visual image] is Coriscus
Therefore, what is now being seen is the son of Diares

Or perhaps thus:

What was once seen before is the son of Diares
What is now being seen is very much the same as what was once seen before
Therefore what is now being seen is the son of Diares

Or perhaps a chain of reasoning, a sorites:

Coriscus is the son of Diares
What was once seen before is Coriscus
What is now being seen [the visual image] is very much the same as what was once seen before

Therefore, what is now being seen is the son of Diares

[100] Not via one special sense, like touch, perceiving a perceptible of another sense, as in feeling a red patch. Cf. Brunschwig 1996: 215. He distinguishes "…deux sortes de perception par accident, celle d'un koinon par un sens spécial et celle d'un idion par un sens spécial autre que le sien. Cette tentative, je l'avoue, me paraît acrobatique."

[101] Still, Themistius, *in De An.*, 81, 32–5: "for the son of Cleon is not knowable from the color but also from many other things which it was not of a single perception to compose and examine, but is thereby perhaps of another, worthier power that the arational animals do not have in common."

[102] Cf. the definition of motion at *Physics* 201a10–2 discussed above. Also in *An.* I.3 when discussing perception Aristotle alludes to his theory of the movement of animals. Perception would be automatic too.

[103] Wedin's account of *per accidens* perception also suggests this (Wedin 1988: 94, 205–6).

The conclusions of such "perceptible syllogisms" could then function as minor premises in practical syllogisms. For these are singular statements like "this is drink; that is food; that is threat". [*Motu* 701a32–3] In this way a crow could see a plastic pellet, and determine that it is food so as to get the minor premise of a practical syllogism.

The crow wants to eat food.
This pellet is food.
Therefore, the crow wants to eat the pellet.

Then the practical syllogism is completed. The crow then moves and eats the plastic pellet, gets poisoned and dies.

Of course, many of the premises in perceptible syllogisms need justifications too, often ones involving yet further "reasoning". We could make even more elaborate chains of reasoning, as the identification of an individual substance like a human being or a *relatum* like a son from the perceptibles perceived *per se* has great complexities. Aristotle gives few details though (Bäck 2009).

Whatever the details, the general structure of *per accidens* perception remains the same: a linking together of a chain of accidental predications.[104] Now predicating one accident of another is something that Aristotle finds particularly ill-formed and unnatural. [*Int*. 21a7–11; *An. Po.* 83a14–20] Such structures, he says, have being *per accidens*, the sort of being worthy only of the sophist. [*Metaph.* 1017a8–19; 1026b2–3; 1026b15–212] In contrast, Aristotle does not consider predicating accidents of substantial subjects ill-formed. For most scientific demonstration contain these, especially if *differentiae* are not in the category of substance, as Aristotle says, at least in the *Categories*. [3a21–2] Elsewhere I have claimed that Aristotle named the fallacy of accident according to this conception of being *per accidens*.[105] The mistake lies in predicating an accident (P) of an accident (M) of the subject (S) of the latter one: S is P because S is M and M is P.

Per accidens perception could come about also by predicating an accident of a substance. In *Metaphysics* V.7 we seem to have a case of that: Aristotle says that 'man is musical' is a case of being *per accidens*. There he is focusing on the claim of being: if I say that Socrates is a philosopher, for Aristotle I am claiming that Socrates "is". However, as Socrates is dead, that cannot be. Likewise, in *per accidens* perception, I can listen to John Coltrane's music, and conclude from that sense perception that Coltrane "is" a musician after he is dead.

Also we have the predication of an accident of a substance in instances of the fallacy of accident. [Alexander, *in Metaph*. 290, 17–24] E.g.,

(3) The one who is approaching is not known by me
Coriscus is the one who is approaching
Therefore, Coriscus is not known by me [*Soph. El*. 179b1-4]

Indeed, this fallacy gets its name from these associated doctrines of being and perception *per accidens* (Bäck forthcoming). It is no accident that Aristotle uses the

[104] See Themistius, *in De An.* 81, 35–82, 14 on various modes of perceiving *per accidens*

[105] Bäck 2000: 65–74 discusses being *per se* and *per accidens*.

"Coriscus" type of examples in discussing both the fallacy of accident and *per accidens* perception. Note that Aristotle's examples of the fallacy of accident typically use singular premises. This has significance here, because perception typically establishes the truth of singular statements. We have therein additional evidence of the connection between the fallacy of accident and *per accidens* perception.

Aristotle discusses *per accidens* perception further in discussing why we have no special sense organ for the perception of common perceptibles like motion. [425a20–1] Aristotle claims that we have proper perception, of the common sensible, and not perception *per accidens* (even though this proper perception is accidental to the perceptions of the special senses). We would have only perception *per accidens*, he says, if we perceived motion in the way in which we perceive that something [red] is sweet, or something yellow is bitter, by vision. [425a21–2; 425b3] Likewise, he says, we perceive Cleon's son *per accidens* when we perceive something white, and the white thing happens to be Cleon's son. [424a25–7] In order for us to perceive the sweet, the bitter, or Cleon's son by vision, we would have to see the colored patches that we see, and then connect to it the other attributes, accidental to vision. To do this, we would have to remember, not necessarily consciously (for Aristotle that would be: 'recollect'), the connection in the past between the colored patch and the other attribute. We, like other animals, seem in fact to be able to do this: I "see" Cleon's son; the crow "sees" food in the yellow corn image and pain in the human image. Such perceiving occurs because of the conjunction of the two perceptions in the past and the triggering of the memory of one of them by the present perception of the other. In the past I saw something red that tasted sweet. The crow saw the yellow that it tasted as food, while also seeing a human-shaped figure while feeling pain and fear. Seeing a similarly shaped red thing now makes me re-experience the sweet. So too now the crow sees the yellow and has a perception of eating, and sees the human shape and feels pain and fright.

Per accidens perception thus consists in seeing one thing as another based on collateral information and memories.[106] We can consider *per accidens* perception, then, as not perception simply (ἁπλῶς), but rather as a type of 'perceiving as' (Everson 1997: 160). I see that white thing as the son of Diares. This type consists in seeing something not as it is in itself, sc., *per se*, but as something else, accidental to the object itself.

We might even take Aristotle to be saying that all perception happens under a description. We do not "see", but "see as": either as itself (cf. καθ' αὑτό) or as something else.[107] Likewise many have argued that Aristotle talks of the causes of something only under a description. So far, Aristotle would be agreeing with an anti-essentialist like Quine. We can put individual substances like human beings under various descriptions, with no description having a privileged status. For instance, Quine (1960: 199) says, as, or *qua*, bicyclist, I must be two-legged

[106] On the role of memory in *per accidens* perception cf. Weidmann 2001: 98–101.

[107] Graeser (1978: 90) notes that some cases of 'seeing as' are genuine; cf. Wittgenstein, *Philosophical Investigations* II.19. So too Michon 2001: 328–9; Wedin 1988: 94; Hamlyn 1976: 176; Barnes 1975: 266.

(in order to pedal the bicycle) but need not be rational; *qua* mathematician I must be able to be rational but need not be two-legged. Considered under these various descriptions, I have different causes. The cause of my being a mathematician would be my taking math classes; the cause of my having no legs would be a tractor accident. Likewise, I can see things as ugly, as pieces of furniture to be moved, as desks, as a pattern of shapes to be drawn, depending on my interest or selective attention. However, unlike Quine, Aristotle has the additional claim, of course, that certain descriptions are privileged and natural. Generally everything or process has an essence, a natural, necessary foundation relative to which all the other descriptions and attributes hold.

Ultimately, Aristotle takes this foundation to be the individual substance and its essence. Still, as we have seen, he does allow items in other categories to serve as the foundation and subject for accidents, to be quasi-substances. Thus, with relations like perception, what is essential to the relation is the proper perceptible, for vision the colors and shapes. For we can take "essences' more generally, as Aristotle does at times, so that accidents have essences too. Other things said to be perceived are perceived incidentally, via an accidental connection to the proper perceptibles, and so are perceived *per accidens*.

Talking of perceiving under a description might imply that we never perceive anything, neither substances like the apple itself nor even qualities like redness, except with some qualification ('as M'; 'qua M'). As Everson remarks, 'perceive' [like 'know'] can take an expression referring to a thing or a that-clause as its direct object (Everson 1997: 187). It is not clear that Aristotle would want to consider every instance of the first type ('I see a red shape'; 'I see an apple') as an instance of the second type ('I see that the red shape over there is an apple'; 'I see that the apple is red'). I am inclined not to attribute such a distinction, of object and statement, to Aristotle, though. For he gives even to animals a quasi-propositional content in their perceptions and memories. So too Aristotle does not seem to distinguish much between concepts and propositions in his discussion of first principles as I shall discuss in Chap. 7. [*An. Po.* 72a1–7]

In *per se* perception, the perceptible is being perceived under the proper description and in virtue of the appropriate aspect of the individual substance. This amounts to perceiving the object as itself. Should we identify *per se* perception with 'perceiving as itself'? It is tempting to do so. For Aristotle often does contrast the *per se* (τὸ καθ αὕτο), strictly, 'what is in virtue of itself', not only with the *per accidens* but with what is in virtue of something else.

If every perception has an implicit propositional content of the form of a 'that' clause, then every perception would be made, implicitly, under a description. If I see the red patch I am seeing the patch as red and the red as a patch; if I see a red apple, I am seeing the apple *qua* red. Yet to say that every perception occurs under a description smacks too much of infinite regress. When would we ever perceive just that which (ὅπερ) a thing is? We can get to this as Aristotle himself does: at some point we perceive the thing as it is in itself. Thus I see the red as red—or as Aristotle tends to say, I see the red *per se* or *qua* itself. So Aristotle seems to suggest immediate intuition for simple essences anyhow. [*Metaph.* 1051b17–32] Still, in a way, even these are perceived under a description, the right one.

When we are speaking, abstractly (!), of, say, vision, its proper subject, its necessary natural foundation, is relative to vision, itself an accidental attribute of an individual substance. It is this sense of a necessary, natural foundation that 'οὐσία' signifies at 418a25. Vision has its own proper objects: the visible, the things that are seen, sc., the colored [patches]. [*An.* 418a13] When we speak of an object *qua* visible, we are restricting the realm of discourse to those attributes of it that can be seen. As discussed in Chap. 4, Aristotle holds terms like 'perception' to signify relations where both the proper correlatives are in the category of *relata*. After all, perception is the perception of the perceptible; sight is the sight of the visible etc. The proper subject for an attribution of perceiving or seeing, then, is not the individual substance, but that correlative attribute: the perceivable or the visible.[108] Strictly speaking, we do not see that apple but what is visible about the apple, its color. For this color to serve in the relation of being seen, strictly speaking, it must be actually seen (in the sense of second actuality) and so is the color *qua* being seen. In the fully actual mode then, the seeing of this color is the seeing of the color being seen. These correlatives exist as always together, even though the perceptible, the color of the apple, like the apple itself, can exist before it is seen.

Aristotle uses this terminology at 418a24–5: "Of the things perceptible in themselves, the special [proper: ἴδια] objects are properly [strictly: κυρίως] called perceptible and it is to [relative to: πρός] to them that in the nature of things the structure [essence: οὐσία] of each several sense is adapted." Here Aristotle is distinguishing the objects proper to the five senses from all else. They are called 'perceptibles' strictly. The οὐσία of 418a25 signifies not substance alone but items in all the categories, as in *Topics* I.9—here those items that can be in the relation of perception strictly. In comparison to these *per se* perceptibles of the five senses, both the common perceptibles and the incidental perceptibles can be said to be *per accidens*, albeit in different ways.

Strictly then, the proper perceptibles are the *relata* in a relation of perception. Like other *relata*, they accordingly refer to their correlatives in their very definitions. (Recall that that "red" will not be a proper *relatum*, but only "red *qua* (actually being) seen".) These are the *per se* perceptibles, both special and common. Still the common perceptibles do not belong *strictly* to a special sense like vision, although they may belong *properly* (sc., as *propria*), to them.

Aristotle makes the primary sense of '*per se*' a subject's having its predicate in its very definition. [*An. Po.* 73a34–b24] Now the common perceptibles, even when named strictly, will not make reference to a correlative like the visible or the tangible in their very definitions.[109] So they, like the incidental perceptibles, are

[108] Aristotle does not make it entirely clear whether the proper correlates are 'perceived' and 'seen' or 'perceivable' or 'visible'. His theory might suggest the former, but his discussion at 7b35–8a12 suggests the latter.

[109] At best, a common perceptible will make reference to the proper perceptibles *per se* in the second sense of '*per se*' distinguished at 73a37–b1, as a number is even "*per se*", because the predicate 'even' makes reference to the subject in its definition—if it is true that a common perceptible is by definition visible or audible or gustative or olfactive or tangible.

not perceived by the five senses "*per se*". Hence Aristotle calls them perceived "*per accidens*": they do not have the structure of *relata*.

Thus a proper sense like vision has an essential relation to its proper subjects, the quasi-substances, of what is being perceived: what is essential to color as opposed to what is accidental to color, say. E.g., I may see, strictly speaking, a certain white shape, sc., the individual white thing. Yet, having that individual attribute of whiteness is accidental to its individual substance, say, Coriscus as well as to other items seen accidentally, like the shape of Coriscus. Hence "white" (the universal for that individual white) is predicated accidentally of Coriscus, as well as of his shape. Nevertheless, it is essential to the proper subject of that particular act of seeing, sc., to the white patch. The white patch "*qua* itself' or 'as such' or '*per se*' is the white patch. Aristotle equates these expressions at times. [*An. Po.* 73b27; *Metaph.* 1003a21–4] At such times, in a statement of the form 'S qua M is P', 'M' and 'P' must be commensurately universal and coextensive, as I shall note in Chap. 8. Such coextension is ideal for correlatives, and so Aristotle probably means '*per se*' to be taken thus in '*per se* perception'.[110]

All this makes the range of what we can perceive via the five senses quite small (Kahn 1992: 367). We have only the special perceptibles, mostly qualities, and the common perceptions, mostly qualities and quantities.[111] Many essential properties, even Aristotle's favorites like rationality and having interior angles equal to 180°, are not perceived: we do not see, touch…such properties. To get very far in our knowledge of the individual substances themselves and their essences from the phenomena, the perceptions appearing to us, we need to associate such items with the proper perceptibles.[112] Such associations can connect an individual substance up with the proper perceptible or connect another accident with it. The former Aristotle views as well-formed accidental complexes, the latter as ill-formed incidental complexes. The former, like 'tame two-footed animal' and 'white man' make up a single thing; the latter, like 'white walking man' and 'white musical' do not. [*Int*. 20b12–9; 20b34–5; 21a10–5] As we have seen, Aristotle generally views the latter as beings *per accidens*. [*Metaph.* 1017b27–30] Such complexes, when taken abstractly (2a), do not signify a single thing but to mere accidents somehow mashed together. At best, taken concretely (2bi), such complexes signify that two accidents are in the same thing, the same individual substance. In the latter, more respectable way, an accident (or even many accidents) forms a unity with the substance in which it is.

[110] Cashdollar (1973: 162) errs when he claims that the typical case of *per accidens* predication reverses the usual order of subject and predicate. For, in any case, *per se* perception does that too. *Per se* versus *per accidens* perception is not the same as *per se* versus *per accidens* predication!

[111] A case can be made for items in other categories: e.g., via motion we can perceive such positions as sitting, whereas like being on top of (as with one color on top of another), perhaps some relations, including those of position and having and possibly perception itself, given a very strong interpretation of Aristotle's claim that we perceive that we perceive. Aristotle works little of this out for us—and it would be quite involved.

[112] Below I discuss how we can come to know individual substances etc. at all. Here I suppose that we know them somehow, as we seem to and as Aristotle seems to assume too.

This sort of connection makes it possible to have scientific knowledge of substances and their *propria* from sense perception.

Aristotle admits that the predication of an accident of an individual substance can be construed as an assertion of being *per accidens* as well a one of being *per se*. [*Metaph.* 1017a19–21; 1017a27–30] He then is willing to allow that some complexes of an accident with a substance can be taken *per accidens*. This overlap seems to allow for the possibility of error even when we have the well-formed complex of a substance with its accident. The possibility of error becomes greater given how knowledge of substances comes from sense perception (Themistius, *in De An.*, 90, 8–13; 91, 18).

In any case, note that most associations of a substance with an accident based on sense perception start from the accident and proceed to the substance. We start with the colors and tastes etc. This would mean that the accident, the proper perceptible, serves as the subject and the substance as the predicate, as in 'the white is Coriscus' or 'the sweet is the apple'. According to Aristotle's own theory, such statements make unnatural predications and signify being *per accidens*. Small wonder Aristotle describes human knowledge as starting from the things least evident in themselves! Aristotle, like us, might well wonder if we can ever get thereby to things most evident in themselves. We need to look for his answer.

What is being perceived, properly or commonly, is, strictly speaking, a paronym of items in the categories like whiteness, bitterness, squareness. Aristotle takes the perceived individual white thing to be a paronym of whiteness. [*Cat.* 1a12–5; 10a27–32] Here, the paronym should be taken abstractly, so as to signify (2a) just a thing that is white and nothing else. [Cf. *An. Po.* 81b25–6] Aristotle does allow paronyms like the white also to be taken concretely, so as to mean (2bi) the thing that is white, the individual substance in combination with its accident. [*Metaph.* 1029b31–3] But, if the paronyms giving the *per se* perceptibles were taken thus, then we would "see" the substance, and seeing would be not only of the visible accident, the *quale*, but also of the individual substance. Still, perhaps because of this ordinary usage of paronyms and partly because of his own readiness sometimes to take paronyms thus and follow endoxic, common usage, Aristotle does talk of "seeing" and "perceiving" individual substances like Coriscus.

Many animals perceive in light of past experience, like crows and sheep. These do not appear to "perceive under a description" in the way that human beings, at any rate, self-conscious ones, do when philosophizing. For 'description' might imply some sort of linguistic or cognitive process where we make statements judging what we are perceiving, or have perceived. A crow or sheep does not do this.

Rather, take 'description' here in a minimal sense as Aristotle takes (discriminative) 'judgement' (κρίσις). So the interpretation of Charles Kahn, that *per accidens* perception is intellectual and not perceptual (in all cases), looks flawed (Charles Kahn 1979: 3; Modrak 1987: 201–2, n. 40). Hence, to say that even in *per se* perception 'S perceives the object "as itself"', as opposed to simply 'S perceives the object' might be misleading, if taken to mean that the subject has to make a deliberate, intellectual judgement about what is being seen.

Still, these caveats aside, I think that it is not too misleading to describe Aristotle's conception of perceiving, even of *per se* perception, as a 'perceiving as'. For many

animals too bring to bear their past experience, albeit not intellectually or deliberately, onto their present perceptions. As I shall discuss, Aristotle holds that many animals too have experience and practical wisdom in the way that human beings do, albeit in a lesser degree.

Aristotle also finds the intelligibility of our experience in the objects themselves, and not in our consideration of the objects. (Taking the latter tack is another anachronism to avoid.) We can see this "immanent rationalism" in his account of the movement of animals, whereby present perception gives the minor premise of a syllogism, where the major premise is universal and the inference valid. [*Motu* 701a29–36][113] A crow sees a yellow thing, brings its past experience to bear so as to "recognize" (not: re-*cognize*) it as an ear of corn or at least as food, in a case of *per accidens* perception. Then in the soul of the crow, the premise, 'I see the ear of corn (food)'[114] arises. Next the crow connects up (albeit not deliberately after reflection) this premise with 'all corn should be eaten when there are hunger pangs.' Then the crow, by necessity, as this practical syllogism is completed, moves towards the ear of corn. It can be mistaken if the corn is a fake, poisoned plastic pellet, if the crow has brain damage etc.

Once again, I stress, like selective attention, this recognition need not be self-conscious or deliberate on the part of the perceiver. Even we human beings, who can become aware and explicit about such recognitions, generally do not become so. [*Motu* 701a26–9][115] So too an animal like a crow can perceive under a description without being aware of that description or without stating it explicitly. In like wise, Aristotle views a causal explanation to apply to an event under a description, where the same event, when described differently, can have different causes (Moravcsik 1974: 13, 1975). For Aristotle, the world is a rational place—full of λόγοι—where things have real definitions giving the formulae of their essences as well as other characterization giving their accidental attributes.

Hence, even non-rational animals can be said to see and to perceive *per accidens* under a description: the crow "sees" an ear of corn and a human being. In this way, substances are "perceived". Yet such perceptions go beyond the *per se* perception of, say, individual colors and shapes. Substances like ears of corn and human beings have these colors and shapes. Yet they have them only accidentally. Indeed, at 428a12–5; 428b25–429a2, Aristotle emphasizes the role of imagination in perception itself. In this way he might be trying to explain why the crow "sees" a human being and not merely colored shapes. For "seeing" a human being goes beyond the activity of the five senses and the common sense that I have so far discussed. Still, in explaining the process whereby the crow comes to "see" the human being, Aristotle, like us, might have found it useful to distinguish what is seen, strictly speaking and *per se*, from what is seen more loosely and *per accidens*—although today we might speak strictly instead of filling in, neural processing, and collateral information. After all, the seeing of a human being would be a case, though, of *per*

[113] On the practical syllogism, cf. Nussbaum 1978: 165 ff.

[114] Or, to avoid the appearance of an 'I' of self-consciousness: There is an ear of corn and hunger pains…

[115] So too in modern homomorphic theories of perception. Cf. Rosenthal 2005 where qualitative states, representing and caused by real structures of the objects perceived, need not be conscious.

accidens perception, and such perception presumes prior memory. Hence it presumes also imagination at least in its basic function of calling up past images, and perhaps also in its more special, advanced function of concept formation (discussed below).

Everson argues that perception itself, apart from imagination, suffices for the perception of *per accidens* perceptibles (Everson 1997: 163–4).[116] He cites *Motion of Animals* [701a29–39], where Aristotle seems to say this, and also 428a10–1, where Aristotle denies that some animals imagine, although they all act upon perceiving. We might distinguish here (1) the coupling of perceptions on the basis of instinct, called by Aristotle natural powers [*Eth. Nic.* 1103a26–b2] from (2) the coupling of perceptions via the memory of past perceptions, without any consciousness or experience of the connection, from (3) such coupling with actual awareness or experience of it.[117] Even so, Everson has the point that Aristotle allows for seeing something as food without bringing in imagination and the resulting association of past images. This would be possible, given we have some immediate passions or instincts. Thus a baby animal feeling something wet will swallow. In such cases, no appeal need be made to past memory, judgement, or awareness. Again, the simultaneous perception of the sweet and the red in the past may suffice for seeing something sweet *per accidens* when seeing something red, via a memory of which there need no conscious representation.

We can still retain the account given above of the perceptive syllogism. The present stimulus would provide the minor premise, while some innate tendency of the animal would provide the major premise. As mistakes seem to happen here too—the wet might not be nutritious, *per accidens* perception can occur without recourse to imagination too. Yet, in this case too, *per accidens* perception has the feature of resulting from a chain of predicating accidents of accidents.

Is Everson claiming also that, for Aristotle, we "perceive" the substantial forms, to that the crow literally "sees" a human being? Aristotle seems not to say that, as he has said that the proper objects of vision are colors and never mentions the substances themselves. Even if we include the common perceptibles, like figure and number, with the proper ones, like red and stinky, we still do not have a perception of an individual substance itself. We can allow Everson *et al*. the claim, that the individual substance ultimately causes our perceptions, while still maintaining that, strictly speaking, we do not perceive substances, nor, insofar as imagination is tied to perception, imagine them.

As Everson notes, following Schofield, there is the problem that in a general sense 'imagination' (*phantasia*) is derived from '*phainetai*', which has the basic sense of 'appears' (Everson 1997: 178–85; Schofield 1992: 265). In this general

[116] In contrast, Nussbaum 1978: 259. As Everson (1997: 159) says, she holds that "…the capacities of perception and phantasia play a complementary role: the activity of perception is to register the proper sensibles whilst that of phantasia is to interpret the information received in perception, allowing the subject to discriminate substances as such and act on them."

[117] Everson (1997: 164–6) himself seems to make this distinction (cf. Schofield 1978: 113). He does say "Actions, then, do not require the agent to be able to interpret his perceptions so as to recognize the accidental sensibles…" (Everson 1997: 165).

sense, perception can be taken to be *phantasia*. If imagination is mixed into sense perception with all of its powers, then we could "perceive" substances. (Aristotle himself does not distinguish his uses of 'imagination' too clearly, as many have complained.)

I am inclined to say that Aristotle, in a strict sense of 'perception' and 'imagination', where they are distinguished, holds any perception of something other than the proper correlate of the particular type of perception is perception *per accidens*. Thus, we see the white patch *per se*, while we see the human being, part of whose surface has the white color, only *per accidens*. To be sure, Aristotle's example, of seeing the son of Diares *per accidens* when we see the white *per se*, is not decisive for the case of the perception of substances. For 'the son of Diares' might signify only the relational accident of being a son. Construed in this way, this example gives a complex of two accidents.

In sum, in *per accidens* perception, the object being perceived is perceived not as the perceiver herself, *qua* perceiver and *per se*, perceives. Rather it is perceived in a different way based upon other experiences and aspects of the perceiver such as innate dispositions and instincts and stimulation by external accidental causes. The one seeing, insofar as she is the one seeing, is restricted to her visual perception of seeing colors (and shapes, *qua* common visible perceptible) present to her, like the white patch now. When she perceives *per accidens*, she then is bringing in other aspects, other attributes, besides those belonging essentially to her seeing. Thus, she may remember that in the past that Coriscus, who happened to be the son of Diares, presented a profile of a white patch just like the one that she is now seeing, or just have an impulse by instinct. The remembering, the experience giving rise to knowing about the son of Diares and who and what Coriscus is, the impulse—all these lie outside of the visible, the aspect of seeing. What is perceived *per accidens* is perceived under a description belonging not to the perceptible but to something else.

Aristotle speaks of looking at a painting of Coriscus and seeing it either as a picture of Coriscus or just as a painting. He compares this to seeing an imagination either as it is in itself, *per se*, or as an image of something (Wedin 1988: 138). [*Mem.* 450b20–451a7][118] In the latter case, perceiving the image causes the memory of Coriscus; here a mistake and the fallacy of accident can arise. Again Aristotle says that when awake we might have more discrimination and say that the image perceived looks like Coriscus, whereas while sleeping we might have less and make the mistake of perceiving the image as Coriscus. [*Insom.* 461b22–30] Aristotle does not make clear what looking merely at the image in itself involves. Normally, we would perceive it as a man but just not know that it is Coriscus. This too could invite error, more error than if we just looked at the painting in terms of patches of color, as a painter might: we might recall those who see the image of Jesus on the burn patterns of a tortilla or on the rust flakes of a water tower. So perceiving the painting *per se* as a man involves more chance of error than seeing it in terms of the *per se* perceptibles of vision, the colors. Yet even there Aristotle admits error can arise: I can see

[118] Harte (2006: 25) finds the distinction already in Plato.

the colors incorrectly due to being struck on the head, having after-images, or having menstrual blood in my eye jelly.

By comparison, Aristotle under this interpretation does not look so silly. Descartes, for instance, like many others since, thinks that "I" cannot be deceived about having pains, having a visual experience of a pink patch and perhaps even of a pink elephant etc. For I have a privileged access to these experiences by direct introspection. First, note that this view of mental intuition has for its contents things and propositions indifferently, it would seem. I am aware of the pain and I can be certain *that* I am having a pain. Aristotle does the same, in claiming that *noûs* gives direct intuition of certain objects, especially singular ones, and of first principles. Second, Descartes' intuitions seem to occur under a description too. For somehow my intuition is to include the (discriminative) judgement that the sensation in question is an instance of pain. (Likewise modern cognitive science in speaking of filling in etc. gives perception at levels of which we are not conscious a function of discriminative "judgement" in the sense above and a quasi-propositional content.) I myself tend towards caution: I just had a dream where I had a sensation and then the image of a broken tooth. I still am not certain whether that sensation was a pain or not. At any rate, I had no broken tooth. Descartes admits that I can be deceived about the latter but not about the pain experience. Unfortunately, my experience does not seem so propositional. At least Aristotle has a model allowing for the possibility of error even in direct intuition, although he thinks it generally reliable (Wedin 1988: 171–1).

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Chapter 6
Thinking

Sense perceptions of what exists presently can in turn serve as material for subsequent mental operations. Aristotle says that some though not all animals are able to retain their perceptions in memory. Those that can will be able to recall them later. Aristotle recognizes a variety of ways that past sense perceptions can be recalled, abstracted, combined and used. Some of these ways give rise to thinking, and thinking gives rise to universal concepts. In a way, for Aristotle all thinking does consist in recollection: that is, the *re-collecting* of perceptions of various accidents and putting them together into a conception of the substance; the *re-minding*—a reflection of the reason immanent in nature. This collection process requires much abstraction as well as much synthesis.

6.1 On the Way to Thinking

Imagination (*phantasia*), in the basic sense of an ability to provide appearances of objects, particularly appearances (*phainomena*) that the animal has experienced in the past, is involved in all these processes (Labarrière 2002: 89; Lorenz 2006: 114; White 1990: 13; Wedin 1988: 42; Frede 1992: 280; Modrak 1993: 193–4). Aristotle says, "…imagination is that in virtue of which an image (φάντασμά τι) arises for us, excluding metaphorical uses of the term…" [*An*. 428a1–2]

In the *Sophist* Plato had distinguished an image (εἰκών) from an imagination (φάντασμα): the former has the right proportions and color of the original; the latter does not (Sorabji 1972: 4; Wedin 1988: 69). [236c2–4; cf. *Ins*. 460b18–20][1] An imagination consists in what appears to us in the basement world of becoming as opposed to what really *is* or goes on in the world of Forms. [*Tht*. 152c] Perhaps

[1] As Wedin notes, Aristotle does use εἰκών in accordance with Plato's usage at *Mem*. 450b20–451a2. For Plato the things in this world are homonyms and mere appearances of the Forms, while not necessarily preserving their structures (λόγοι). [*Prm*. 133d2; *Resp*. X; *Tim*. 37d; *Crat*.431d–433c].

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in likewise Aristotle uses φάντασμα and not εἰκών in *De Anima* to indicate that what we perceive need not mirror the object being perceived. Like (pseudo-) Simplicius (*in de An*. 208, 7–8), Wedin suggests then that the strict use of 'imagination' concerns not what appears to us in perceiving and believing but what appears to us in imagining a φάντασμα. Likewise, Themistius says that perception differs from imagination, although often, in animals having both abilities, they go on simultaneously. The perception is the external object for imagination, just as the perceptible is external object for perception: "…in virtue of the fact that the soul is moved by the perceptibles, it has a perceptive power, while, in virtue of the fact that it is able to perceive the perceivings, it is an imaginative power." [*in De An.*, 92, 39–93, 1; cf. 91, 4–25] Strictly speaking then imagination differs from perception, although in many mental experiences they accompany each other. Aristotle says also that all animals have imagination of a perceptive sort in some basic sense—presumably that of having objects appear to them: "in insects which have been cut in two; each of the segments possesses both sensation and local movement; and if sensation, necessarily also imagination and appetition;" [413b20–3] "…inasmuch as an animal is capable of appetite it is capable of self-movement; it is not capable of appetite without possessing imagination; and all imagination is either calculative or sensitive. In the latter all animals partake." [433b27–30] So Aristotle ties imagination to appetite: perhaps imagining the result of swallowing corn impels the crow to fly to it. Imaginations thus provide causes for moving from place to place.

Still Aristotle recognizes cases of animals that have perception and not imagination of a deliberative or calculative sort (Labarrière 1984: 17–49). [428a5–11] Aristotle distinguishes the common, perceptual imagination from this special, deliberative imagination (Castoriadis 1978: 151–159):

> Sensitive [perceptual] imagination, as we have said, is found in all [ἄλλοις][2] animals, deliberative imagination only in those that are calculative: for whether this or that shall be enacted is already a task requiring calculation; and there must be a single standard to measure by, for that is pursued which is greater. It follows that what acts in this way must be able to make a unity out of several images. [434a5–10]

At times Aristotle claims that some animals have no imagination—presumably in the sense of having the ability to have their past sense perceptions re-presented to them:

> Again, among living things that possess sense some have the power of locomotion, some not. Lastly, certain living beings—a small minority—possess calculation and thought, for (among mortal beings) those which possess calculation have all the other powers above mentioned, while the converse does not hold—indeed some live by imagination alone, while others have not even imagination. [415a8–12]

This last could apply to plants but perhaps also to grubs and worms responding only to current stimuli.[3] Yet, he says, even these animals have imagination in the basic

[2] Hamlyn (1968: 153) says that Aristotle here is asserting that all animals have imagination but sometimes "only in an indeterminate form."

[3] For Plato if not for Aristotle plants seem to have consciousness. [*Tim.* 77a–c]

sense of having representations of external objects appear to them. In contrast, other animals have that basic ability plus the ability to have recall of past representations. Yet fewer animals, perhaps only the rational ones, have the ability to recall past images and then combine them in new ways so as to represent possible objects and courses of actions in the future.

Aside from his not distinguishing clearly these different types, many have argued that Aristotle uses more than one conception of imagination and perhaps not too consistently.[4] Schofield (1992: 276, 265) remarks that the unity of Aristotle's conception of imagination is "somewhat fragile." It can concern our "capacity for visualizing" (or having some other sensory modality) or our ability to make perceptual judgements such as that the raindrop is moving (Schofield 1992: 250, 255). Dorothea Frede likewise observes,

> One problem is that *phantasia* does triple duty. It designates the capacity, the activity or process, and the product or result. (Frede 1992: 279)

Likewise, Bynum (1987: 101) distinguishes various abilities of 'imagination' in Aristotle: (1) a capacity to "perceive an object as an object of a certain sort" (2) a capacity "to retain perceptual traces" and "(in some animals at least…to manipulate and combine them in various ways)" (3) (if rational) a capacity "to interpret perceptual traces and their combinations."[5] [433b27–434a5] He thinks that Aristotle includes imagination in the first sense in the very process of perception. [431a8–12; 414b1–8] In the very perceiving, imagination "…discriminates one object from another by interpreting it as an object of a certain sort" (Bynum 1987: 102–3). Above I argued, to the contrary, that strictly speaking, Aristotle does not do so, in what is perceived *per se*, but is willing to do so for ordinary purposes and in more ordinary speech.

Aristotle does say that all animals, even those having only a single sense, must be able to be aware of images in such a way as to initiate movement. This seems to imply that (almost?) all animals recognize objects as food or non-food and as sources of pleasure or pain. [414b1–8][6] Yet they do so not in perceiving *per se* but in perceiving *per accidens*. Aristotle does say at 431a13–4 that "that which can desire and that which can avoid are not different either from each other or from what can perceive: but what it is for them to be such is different."[7] Yet he does not say that the thing perceived and the thing desired are the same, strictly, as the paronym, namely the desire or the perception, but just that a single subject is being signified. That's the point of saying that their "being" is different. (Remember that being *per se* covers the accidents in the categories.)

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[4] Block (1961: 50, 75–7) argues that *De Anima* comes before the others, the *parva naturalia* and the biological works. However, as Aristotle does not announce that he is making a fresh start, I shall pursue a unitarian interpretation.

[5] Also see above on Everson and Schofield.

[6] Today we would qualify that: amoebae, bacteria *et al*. apparently start eating whatever they come in contact with.

[7] Hamlyn's translation (Hamlyn 1968). My position follows his and Ross' comment (Hamlyn 1968: 146; Ross 1965: 304). Cf. too Modrak 1987: 84–5.

Perhaps in likewise Aristotle says, "… the faculty of imagination is identical with that of sense-perception, though the being of a faculty of imagination is different from that of a faculty of sense-perception; and since imagination is the movement set up by a sensory faculty when actually discharging its function…" [*Somno* 459a15–18] That is, we have but one event, the experiencing of an external object. Yet insofar as we consider that experience in terms of its causal relations to an external object it is perceiving, and insofar as we consider it in terms of being a mental event of representing it is imagining. This would parallel what Aristotle says about looking at a painting of Coriscus in two ways as discussed in Chap. 5.

Some like Schofield make Aristotle Wittgensteinian by taking imagination as a family concept. Others solve the problem by making Aristotle Kantian. Following Schofield—and Aristotle's remark at 434a9–10 that via deliberative imagination a unity is made out of several images—Dorothea Frede (1992: 283, 286, 2001: 157–8, 161) suggests that Aristotle makes imagination be presupposed for having the unity of a perceptual field, e.g., for having different patches of colors being perceived together.[8]

Is Aristotle consistent in his use of '*phantasia*'? In a basic sense, imagination is the faculty of having things appear to us. Along these lines, Scheiter (2012: 252–3; 258) holds that Aristotle takes it to be a capacity to recall previous sense perceptions, namely images. This ability is common to the five senses. At the same time, it differs from the common sense, which is the ability of putting together—coordinating and synthesizing—the proper perceptions of the five senses, including the common perceptibles *qua* visible or *qua* tangible etc. Again, if we follow the Kantian lead, Aristotle could be taking imagination in this basic sense to associate the various perceptions of the proper senses so that they be perceived together—i.e., to unify them into perceptual fields. For nothing in Aristotle's definition of perception proper indicates that it performs the task of having the forms of the objects perceive appear together (Frede 2001: 157). As the general faculty of making appearances to us possible, imagination might do this. (Even animals having no recall need to be able to have such a unity in order to respond to present stimuli.) In this way then, Aristotle would have a doctrine rather like Kant's view of the imagination in the Transcendental Deduction B. The imagination still would not have objects special to it, as it is a general schema of things *qua* appearing—whether these things be the individual substances and their attributes, or other things, like the perceptions themselves, both present and past. In this way, imagination in the proper sense can produce hallucinations and dreams from what is presently being perceived, or phantasms from memories of past perceptions etc.

Note that having such a multiplex concept of imagination need not be a liability. At any rate, neurologists today have the same liability:

> …these essentially reproductive forms of imagery…, but there is something passive and mechanical and impersonal about them, which makes them utterly different from the higher and more personal powers of the imagination, where there is a continual struggle for concepts and form and meaning, a calling upon all the powers of the self. Imagination dissolves and transforms, unifies and creates, while drawing upon the "lower" powers of

[8] She admits that Aristotle provides little explicit text. Cf. Schofield 1992: 250.

> memory and association. It is by such imagination, such "vision", that we create or construct our individual worlds. (Sacks 2003: 59)

One way to give the imagination unity is to have it perform the same function on different inputs. This might be the key: we shall see Aristotle asserting this recursiveness explicitly in the case of the intellect. At any rate, despite the fuzziness of Aristotle's conception of imagination and the details of the mental processes, let me sketch how Aristotle takes imagination to construct concepts from sense perceptions.

6.2 Flights of Fancy

Already in many cases of present *per accidens* perception, it would seem, there has to be memory not only of past sense perceptions but also of past experiences. At any rate, this holds for those cases where the animal acquired these connections through experience and not instinct. When the disposition to act, upon being presented with a perception of a certain type, is given by innate impulse, memory need not be required: seeing a slithery shape may cause us to feel alarm and pain; perched on a cliff, we may see the ground rushing at us, perhaps on account of a genetic basis for fear of snakes and fear of heights. Likewise Aristotle can reasonably hold that some animals have no memory although all animals perceive and move. However, many cases of *per accidens* perception do involve past memory: typically those in which training and habituation are possible. Crows can be trained to see something yellow as bitter and inedible or as food, to see a human being as friend or as foe. In such cases to see the yellow as bitter or as food implies that the animal, rational or not, remembers, whether consciously or not, the past perceptions of seeing yellow and tasting bitter or palatable, coordinates those two sense perceptions, and then has the experience built upon those connections via imagination.

Again, some cases of *per se* perception, especially of the common perceptibles, involve memory too. To see something as moving, like Avicenna's example of a drop of rain falling, requires that a sequence of images from past sense perception be represented, in memory and imagination, and superimposed, somehow, so as to generate an experience of "seeing" the drop move. For at any given instant we have but a static image.

Again, recognizing and identifying individual substances involve memory as well as *per accidens* perception and perhaps an operation of imagination more advanced than the simultaneous presentation or the mere reproduction/production (re-production) of images ((Ps.) Simplicius, *in de An.* 277, 35–7). Judging that we are seeing the same individual substance, that it has persisted through time, requires that we have access to memories of it. In imagining a dog via remembering past experiences of that dog, we animals can re-create an image or phantasm of that dog in the imagination. This image tends not to have all the detail of the original sense perception and experience of that dog. Moreover, generally it is abstracted from

the particular setting in which the particular dog was perceived at first. For we animals can then recognize the same dog on the basis of past experience, even when the dog's posture or location has changed. Thus, some features of the original sense perceptions and experience have been preserved and others left out, or subtracted. For, if not, we would not think it possible, or act as if it were possible, that we are "seeing" the same dog again, at a different time and place.

Aristotle holds that imagination has no special objects (Wedin 1988: 58–61; Frede 1992: 281). Rather it works upon the objects of the senses, both the special and the proper ones. This feature of imagination has importance for his theory of abstraction. For it makes the output of the special senses, their perceptions or *abstracta*, the input for the operation of the imagination.

Like perception and knowledge, memory and imagination are types of motion. [428b10–4; 429a1–2] They have the logical structure of relating two *relata*, one a state in the mind, the other the object being imagined or remembered. Here the object is itself a mental state, a perception or even a past memory or imagination.

Memory and imagination in such uses deal with individuals. Memory and imagination function also in the formation of universals from individuals. For, if we gain knowledge of the universals from the individuals, as Aristotle insists against Plato, surely we have to remember the various individuals all at once in order to abstract their common features.

Aristotle does not give many details about these various stages of proceeding to the universal from the singulars via operations of memory and imagination (Scheiter 2012: 262, 274).[9] Nor do his surviving texts make it too clear how many stages there are, whether they form a linear or a branching sequence, etc.[10] For my present purpose, of examining Aristotle's theory of abstraction, I need not have all the details of his theory of perception, though (Modrak 1987: 82–8). I wish to establish mainly that the sense impressions received by each of the special senses become material for further mental processes. These processes have a serial order. They become interrelated to each other through a higher or later process taking as its input the output from an earlier or lower process. Aristotle holds that the series is not *ad infinitum* but ends at "the ultimate abstractions", the objects of theoretical science like geometry and first philosophy. These processes, from sense perception onward, have the common structure of selective attention: certain features of the material received as input are retained and others removed. In short, Aristotle's perceptual theory has the structure of a *finite recursion*.

On the other hand, these mental processes themselves may do more than to eliminate some features of the materials upon which they work. They may also add or

[9] I shall offer a reconstruction from the point of view of the content of perceptions and imaginations in the next chapter. See too Schofield 1978: 123–6.

[10] Given Aristotle's dislike of infinite regresses, it is likely that he would assume an end to the sequences. Given his theory in the *Posterior Analytics* and in *Metaphysics* XII of putting all predications and all causes into a single series, it is likely that he would want there to be a single series of mental operations leading to and stopping at the ultimate abstractions. Yet, as Pellegrin, M. Frede *et al.* have emphasized, Aristotle in practice is much more flexible in his classifications and goes where the data lead him.

combine features to that material.[11] After all, Aristotle does contrast 'abstraction' with 'addition', i.e., 'combination' or 'synthesis', as we have seen in Chap. 2. We have always the basic function of imagination, of making different sense perceptions appear together in a perceptual field. Still the imagination needs to do much more reconstruction. For instance, the common sense puts back together features concomitant in the object being perceived that have been perceived separately by the special senses organs, like the shape seen and the shape touched, so as to have a conception of shape *simpliciter*. It enables us to have a conception of a three-dimensional body as both solid, from touch, and as spherical, from vision. Some ability, likely the imagination or [inclusive 'or'] the common sense or perception *per accidens*, puts together perceptions of different types as belonging together, as coming from a common source. For instance I judge that the same thing is yellow and bitter from seeing and tasting a lemon. Eventually I come to judge that what I am perceiving is a lemon. The same ability seems to be able to put together past perceptions, sometimes correctly and sometimes not. I may see a yellow fruit and judge it to be bitter, and be right. However I may see also the yellow of an apple and judge it to be bitter, because I have seen many yellow lemons and never a yellow apple. All these cases are *per accidens* perceptions where features are put together that are not perceived together. Like modern scientists, Aristotle assumes that ordinarily we are not deceived.

The perceptions are correct or incorrect according to these features being or not being present in the original objects perceived. Again, with an "ab-normal", "de-form-ed", diseased or traumatized sense organ, the accidental circumstances of the sense organ contribute to what is being perceived. [*Metaph.* 1063a1–9] Likewise for abnormal circumstances: after seeing a bright flash of light, I may see a red object as blue.[12]

The abstraction found in sense perception does not constitute the whole process of sense perception of individual substances and their attributes. While some features are abstracted, or taken away, from the materials worked upon, other features are added on. The dual processes, of abstraction and synthesis (addition) are required in order to obtain perceptions of more than the proper perceptibles as they appear in the "now", sc., at the present instant of time.

Aristotle gives an instance of how both abstraction and synthesis arise in mathematical thinking (Sorabji 1972: 6, 73). He holds that thinking always requires a

[11] Cf. Ackrill 1981: 67. M. Frede 1996a: 380: "Pour avoir des pensées, il ne suffit pas d' avoir la seule capacité passive de penser, il faut également un analogue de l'art du constructeur qui explique que la réalisation de cette capacité passive de penser prend la forme d'une pensée. C'est donc dans ce sens que le penser, vu comme passion ou mouvement, presuppose non seulement une capacité de penser, mais aussi un agent qui produit les pensées."

[12] Accordingly I do not want to go all the way with Modrak's claim that sense perception is veridical while imagination is not (Modrak 1986, 1987: 82). Still, she does say that, despite the connotations of '*phantasia*' as giving mere appearances and not realities, some *phantasmata*, such as those of memory "…must provide reasonably reliable information. Memory is also a crucial link in the cognitive chain leading from perception to knowledge. Here again it must be trustworthy…" at least in certain conditions (Modrak 1987: 82).

phantasm. [*Mem.* 449b31–450a1] The imagination constructs the phantasm from sense perceptions but does not mirror them. Thus in thinking of a triangle,

> …though we do not make any use of the fact that the quantity in the triangle is determinate, we nevertheless draw it determinate in quantity. So likewise when one thinks, although the object may not be quantitative, one envisages it as quantitative, though he thinks of it in abstraction from quantity [literally: he thinks of it not *qua quantum*]; while, on the other hand, if it is something by nature quantitative but indeterminate, one envisages it as if it had determinate quantity, though one thinks of it only as a quantity. [*Mem.* 450a2–7]

So we imagine a triangle with a definite shape but then abstract away from that. Again we can imagine something without definite quantitative features but then *add on* those features *as if* it had them. Likewise imaginations can have features of both abstraction and synthesis (Avicenna, *Fī Nafs* 147,14–8).[13]

To say that I "perceive" bronze spheres and raindrops moving is colloquial but misleading. For the perception of individual moving objects requires perceiving motion as well as perceiving individual substances. The perception of motion depends upon combining, or "adding" together, different perceptions given at different times. But all this need give me only the experience of a colored patch moving across my visual field or a feel of crawling across my hand. To have the experience of the same object, an individual substance doing the moving, I need to have an experience of it. For this various perceptions from the different senses must be coordinated so as to give me an experience of an individual substance. At the same time, though, to recognize the same individual substance to be persisting at different times and locations requires further abstracting away from the other perceptual features contained in the individual perceptual field for each of the senses. Then too all these perceptions must be combined in such a way as to get an experience of there being a single individual substance in motion. For surely the colors and shapes that I see from moment to moment may differ. Yet, while ignoring those differences, I may judge, in the basic discriminative sense of 'judging', that there is a single individual substance in motion. Of course, I may be wrong in my judgement.

Aristotle drops hints but says little on what is required to get a perception of an individual substance, like a raindrop or a bronze sphere, and then to attribute motion to it. Perhaps he had worked out only a few of the general features.[14] Certainly from our perspective we could understand his limitations as we are learning how complex such apparently simple experiences are biologically and neurologically, not to mention conceptually. At any rate, in the fragments that we have Aristotle gives few details.

Still we do have enough evidence to make a point easily overlooked. Even though Aristotle has individual substances take primary place in the order of being, they do

[13] Cf. (ps,) Simplicius, *in De An.* 166.5; 166, 17, on *sunesis*. [*Eth. Nic*. VI.10]

[14] Things hadn't improved much later on. Cf. D. Frede 2001: 173: "The phantasiai of the primary senses provide insight into the essences of simple things, while those of the common sense and the accidentals are the material for more complex assessments with propositional content. Unfortunately Aquinas does not work out the details of this theory…"

not have primary place in our experience. That is, they are not evident or primary to us, although they might be evident and primary in themselves. On Aristotle's theory of perception we do not apprehend individual substances at first glance. At best we apprehend them only after a process of judging (κρίσις), which need not be reflective as Aristotle holds that some other animals do it.

All these apprehensions concern only individuals. Aristotle asserts also that via abstraction we come to know the universal from them. Once again, the coming to be of the universal in the intellect from the individuals perceived requires both abstraction and synthesis. The particularities of the individual must be ignored and their common features focused upon. To think of a bronze sphere in general, the particular sizes, spatial locations, causes etc. have to be taken away. At the same time, common features of the bronze material and shape, being solid, being heavy, having a bronze color, being able to move, being in place and in time, etc. are focused upon and combined so as to belong to the same thing. Some of these features are individual common perceptions, while others are individual proper perceptions.

6.3 Experience

Experience (*empeiria*) arises from memory and imagination. Aristotle says that "many memories of the same object bring to completion the capacity of experience." [*Metaph.* 980b29–981a1] Animals live mostly through memories and imaginations, but share little in experience. [980b25–7] Still they do have experience.[15]

For Aristotle, experience comes about through an abstraction process working upon the different memories of the same object that are brought together, so as to extract—and then combine—certain of their common features. This process is not haphazard but selective. For an animal, particularly a human one, does not seem to attend equally to all the common features. Rather, the animal attends selectively to those features that seem to pertain to, for example, eating, danger, profit, or (inclusive) some other utility that has had importance for that particular animal. Some of the features are present by instinct; others depend on the animal's particular past history: whether a crow has had fear and pain associated with a human image or not. Aristotle again gives few details. In general, the selectivity comes from the animal's having certain functions, and even, sometimes, voluntarily or deliberately chosen goals. Thus it can come not only from past conditioning and reinforcement but also from habituation or from a rational process or from appeal to established theory.

Aristotle says that experience is quite closely connected to reasoning. [980b27–8] Art and science arise from experience. [981a1–3] Experience is knowledge of individuals, while art, like science, is knowledge of universals. [981a15–6] A single object comes from the many memories of the experience. Thinking obtains the

[15] Alexander (*in Metaph.* 4, 15–22) claims that Aristotle denies that animals have experience. However I agree with Gregorić and Grgić (2006: 12, n. 28) who note that Aristotle assumes that many animals have experience (*Hist An.* 612a16–7; 614b21; 629b24; *Eth. Nic* 1118a20–1).

universals by abstracting upon the individuals given in experience. Human beings have the later stages of art and science, while the non-rational animals do not.

Despite his caveats, Aristotle thinks that the same account explains both human and brute experience, just as he holds that there is a single theory for the motion of animals. All animals have some degree of cleverness and practical wisdom (*Hist. An.* 612a2; 612b18–21; 614b18; *Eth. Nic.* 1118a20–1; Gregorić and Grgić 2006: 3–4).[16] It is just that rational animals are then able to perform further abstractions to get more general universals and theory and (sometimes) to give discursive justifications for their judgements (Frede 1996a: 160–2; Gregorić and Grgić 2006: 5, 15–6; Politis 2004: 38).

An animal can apply its past experience to new situations similar to but not identical with it. With the "determination" or "inference" (in the sense that there is one in a practical syllogism, without there needing to be conscious choice), there comes to be a common pattern or paradigm somehow applicable to the singularities of the different individual situations. Such a common pattern looks like "a rudimentary universal", say, of an ox:

> These many memories of oxen are experience of oxen and that is the first very rudimentary universal concept of an ox in the soul … Because what he wants to show against Plato is that very, very, very gradually, and very, very, very naturally we can progress stage by stage without unexpected leaps towards higher and higher mental states, involving universals. Of course, this very rudimentary concept of an ox is a very long way from a scientific concept of an ox, and later in the chapter he shows how scientists would go on to acquire a scientific concept of an ox, and that, admittedly, does require reason and intellect and does involve something of a leap. (Sorabji 1993a: 7)[17]

Experience starts from a collection of singulars grouped together according to some principle. The principle seems to be something like a generalized image, which Aristotle says is given in perception itself. It can be used as a template for recognition and action: the image of a scarecrow or the outline of a wolf may scare a crow or sheep.[18] This general image is given by perception. In the past it may have had linked associations with other things, like hearing loud noises, like gunshots or howls, and these in turn with yet other things, like feeling pain. These links constitute *per accidens* perceptions of the singulars.[19] Via recalling them, experience can bear on present perception and action:

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[16] Gregorić and Grgić (2006: 11) also note the connection of experience to *per accidens* perception.

[17] Cf. Sorabji 1993b.

[18] Alexander (*in De An.* 68, 10–3) says that perceptions leave types or models in the imagination—or perhaps for the imagination to use; cf. 70, 3–7; 72, 5–10: types are the impressions left as with a signet ring—so the metaphor suggests a quasi-universal. He also observes, 71, 22–3, that practical activity follows imagination in animals as well as in men.

[19] As perceptions are typically of singulars, it is understandable that Engberg-Pedersen (1979: 316) says that experience contains no universal element (other than the one that does with perception), but is closely connected with memory. "It is a state of mind that at one moment connects the memory of a number of individual cases."

In effect, the experience enables the connections established in past perceptions *per accidens* to come to be made also for the present perception of the generalized image (Gregorić and Grgić 2006: 10–2). The scarecrow image by itself can suffice for perceiving gunshots and pain—but, of course, only *per accidens*. Memory and imagination provide the connections and most of the content. When we act by experience, we have no theory. We cannot explain very well why the connections hold, except that they have held in the past for us.

Via experience we might be able to learn which accidental connections, given to us in *per accidens* perception, do not lead to mistakes in our lives and fallacies in our theories. Hence Aristotle says that the inexperienced cannot become moral experts nor have practical wisdom (*Eth. Nic*. 1095a2–4; 1042a11–6). Yet experience has *per accidens* perception as its foundation. We may try to acquire a knack for guessing from it. Still mishaps will happen: fallacies of accident.

In sum, experience depends upon perceiving *per accidens*. Mistakes can often arise from making judgements from *per accidens* perceptions. Aristotle holds the fallacy of accident to arise from making such judgements. Moreover, such judgements typically furnish the premises for the practical syllogism, by which animals move and act (Bäck 2009b: 124–5). Small wonder that Aristotle seeks to move on to the essential connections promised by scientific theory.[20]

> People with experience can recognize one case as like others, but not say why or in what respect….they lack articulate knowledge of the concepts needed for an adequate explanation. (McKirahan 1992: 242)

Above all scientific knowledge requires having essential or necessary connections between the terms in a demonstrative syllogism. Ideally the middle term should give the cause why the conclusion is true. [*An. Po*. I.13] Yet every demonstration invokes some general principles: even a demonstration of the fact offers an explanation in general terms (Frede 1996a: 160–2; Politis 2004: 38). Experience differs from science because it does not explain why the fact is true (Gregorić and Grgić 2006: 17–9, 24).

By defining science thus, Aristotle has excluded it from dealing with contingencies. Art also works from reasons yet deals with contingencies, mostly with the goal of making something. Practical wisdom again must deal with contingent outcomes, for the sake of acting. [*Eth, Nic*. VI.4–5]

Everson (1997: 289) defines 'experience' as "an acquired perceptual concept… exercised in perception (and *phantasia*)." Experience allows us to, say, perceive that something is a cigarette, he says: "Simply in virtue of possessing that *empeiria*, however, one will not be able to provide a definition of a cigarette, but only (generally) to recognize one when one sees one." He says that experience differs from art in two ways: (1) the former is only about individuals, while the latter is of types (2) experience is not able to think of the properties independently of how they perceptually appear, whereas art [and science] can (Everson 1997: 228). Both of his

[20] Sorabji (2005: 174) likewise takes 100a6, "experience *or* universal", as two options—a rudimentary universal like ox or a grasping of the essence.

points need emendation: (1) he describes the universal judgement as having the form: (x)(φx ⊃ ψx) But this does not suffice: For actual perceptions of the individual cases grouped together in experience have different individual attributes, and not merely universal ones, as his symbolization suggests. Moreover, as knowledge for Aristotle concerns the universals at the level of species and above, the universal quantifier misleads when it reduces the knowledge of art and science to individuals having those universal properties: the relations between the properties themselves and not merely between their instances make the induction possible. (2) As for his second point, even in experience, or in memory and imagination for that matter, certain features of the original perception have to be thought of in isolation, to the extent to allow them to be detached from their original contest and to be compared or conflated together. Somehow experience can abstract away from particular symptoms and features common to all the relevant instances experienced in the past. For instance, even if all cases of measles that I have seen concern Athenians, by experience I can recognize measles in a Persian. So the universal predicates are somehow restricted to essential ones—or at least some accidental ones are ruled out. Generalization from experience looks necessary for experience too: otherwise how would an experienced person be able to apply the past, perceived cases to the new ones?[21] So experience has at least some independence from features of the perceptual experiences. What it does not have is insight into the causes and principles for those universal predicates.

"Art arises when a single understanding (ὑπόληψις) about the similar [cases] has arisen from many thoughts of the experience." [981a5–6; *An. Po.* 88a4–8] 'Ὑπόληψις' literally is "a taking up". In this taking up, many features of the similar cases, say, of measles, are once again discarded while others are kept and grouped together. Then some of them are taken to be more important for what causes the disease and for what the disease is than others. Aristotle says "art" here because he is thinking about a case of a disease where we seek to bring something into existence artificially and not by nature, sc., we seek a cure.[22] Science, in contrast, concerns what comes to be by nature. I take it that his account will apply equally to cases of science, where all that is sought is the understanding of what exists already.

In a disease like measles, the fever or spots, common features of the experience abstracted from the individual cases, might be judged to be not the causes but the

[21] So too Everson (1997: 224) admits that "to acquire an experience is to acquire a concept." He says that there is "no ability to think of properties independently of how they perceptually appear." He appeals to "demonstrative concepts of properties" (Everson 1997: n. 78), but this interpretation of Aristotle might be too involved. Cf. Everson 1997: 227, n. 84. He also notes that the color of the rash of the present patient may be not quite the same as the color of the past ones, but still that the experienced doctor "will be able to recognize the rash" (Everson 1997: 226). The question is: how? Indeed, "re-cognize" is suggestive…

Gadamer (2004: 350) says that Aristotle agrees that "experience is valid so long as it is not contradicted by new experience."

[22] Cf. Themistius, in *An. Po.*, 63, 25–6. Cf. *An.* 427b6–11; 429a10–1 where again the practical and theoretical knowledge are set together; also *Eth. Nic.* 1139b14–1141b8 on the difference between productive art and contemplative science.

effects of the disease. Again, other features, such as wanting to watch more television when sick than when healthy, might be taken to be accidental symptoms and irrelevant. A person of experience would see symptoms of measles and say: this person has measles, and then proceed with the treatment that has worked in the past for other cases called 'measles' from the symptoms. However, as Grice (1957: 377–88) has noted, not all cases of measles have all the symptoms, nor do the symptoms (white spots inside the mouth) always indicate the presence of measles. One who knows what it is to be measles, the essence and the cause of the disease, could check the diagnosis by looking for the measles virus. As Aristotle notes, a person with more experience may do better at curing patients, particularly if she is more adept about spotting the symptoms. [*Metaph.* 981a20–4] Still, in a way she does not "know" why what she is doing works. [981b2–3]

6.4 Perceiving and Thinking

Although Aristotle begins rather hypothetically in giving his account of thinking [*An.* 429a13–4], he does end up affirming the similarity of thinking to perceiving: "just as what is able to perceive is related to perceptible things, so too intellect to the intelligible things." [*An.* 429a17–8; cf. 431a8; 427a18–21][23] In both thinking and perceiving by the senses, the result is becoming acquainted with, or recognizing, some beings (γνωρίζει τῶν ὄντων). [427a18–21]

Aristotle does note some differences between perception and thought. They differ in their respective objects: singulars and universals. Again, strong stimulation of a sense makes it less capable of perceiving than before, while (so Aristotle says anyway) a strong stimulation of *noûs*, the faculty of thought, by a highly intelligible object make it more capable of thinking than before. [429a29–b5] Perceiving requires a sense organ while thinking has no organ. [429a24–7] Aristotle thinks that thinking, in some of its aspects, is separate from the body and hence impassive, while perception is not separate and so is passive.

Note though what I have claimed above. Strictly, a sense is a certain capacity of a sense organ. So if the sense organ did not exist, neither would its capacities.[24] Likewise it is reasonable that a capacity of a sense organ would be affected by some changes to the sense organ. We have seen Aristotle admitting this: vision changes when the eyeball is pressed or is full of blood. Now a sense organ has more than a single capacity (and only some of its capacities have perceptual features). In this

[23] Charles (2000: 111–2, 132–5, 142–3, esp. n. 3) agrees and notes as the main difference that thought deals with abstract objects that do not exist independently of the thinking process. So too Wedin 1993: 130, 134–5. We could also add the difference of the non-physical character of active noûs. Cf. Sorabji 1992: 213.

[24] Simplicius (*in de An.* 200, 200, 14–5) on 427a9–16, claims that perceptive judgement or discrimination (κρίσις) is active and impassive like *noûs*. However, although we can distinguish the faculty of judgement from the perceptive capacity, it is not clear that Aristotle would say that the former exists when the animal dies—except insofar as it is a function of *noûs*?

way the eyeball gives us not only perceptions of the colors, the proper perceptibles of vision, but also perceptions of common perceptibles like shapes. It does so in virtue of different capacities, one proper, one common. Likewise, Aristotle is taking thinking to be a certain capacity of a soul, but, unlike a sense, not to be a capacity of a part of the body—or, at least in some of its aspects, not to be a capacity even of the whole body. Hence he thinks it impassive and perception passive because the latter has an organ while the latter does not. [429a26–7; 30–1] Other abilities of the soul—the common sense, memory, imagination—for Aristotle do not have their own special sense organs either: they are not capacities of a certain part of the body. Still he thinks them to depend somehow on the existence of the whole body, the organism. [413a3–5] Evidently these abilities are capacities of the whole, living organism.

In contrast, intellect (*noûs*) somehow does not depend on the existence of the living organism. I say 'somehow' since "the *noûs* in us" does depend on the existence of the organism.[25] That is, as discussed below, we need to distinguish different aspects or types of *noûs*. I, this human being, no longer think when I am dead or even when I sleep. Perhaps the thinking of what was formerly my *noûs* still goes on, but it is not *my* thinking. In a sense then the *noûs* in me, an individual substance, does depend on my existence and on my having perceptions, imaginations and experience ((Ps.) Simplicius, *in de An.* 278,10–2). In a way then, somewhat by analogy, we can speak of the "organ" of thought, just as the commons sense or the imagination has its organ, sc., the organism in a certain state, or uses organs of the body in certain respects, so too the common sense uses the organs of the five senses in its own distinctive respect.

With all these differences noted, the main point holds: for Aristotle thinking and perception of its various kinds are capacities or abilities of the same type. [429a22–4; 28–9; 429b8] Indeed, he treats them in tandem as *relata* in the *Categories* (as discussed in Chaps. 3 and 4). As Alexander (*in Top*. 116, 11–117, 2; 117, 25–118, 5) says, they are the same by analogy: that is, they have the same structure.

For both the capacities of the special senses, imagination etc. and the capacity of thought, the "organ", rather, a certain capacity of an organ for the senses and the organism for thought, itself has no actual attributes of its own. It is just the capacity to take on the appropriate forms (both essential and accidental) of the objects that it discerns. [429a21–2] In both cases too, the "organ" itself does not change, in the sense that it retains the same capacity to receive these forms.

Thinking differs from perceiving mainly in having different sorts of items for discerning.[26] Mind "perceives" the imaginations (φαντάσματα) provided by the

[25] Thus the Greek commentators, perhaps also following theories other than Aristotle's, from Alexander onwards distinguish many types of *noûs* (Alexander, *in De An*. 89, 19–30; 107, 28ff., esp. 113, 6–9; *Mantissa* 108, 29 *et passim*).

[26] Robinson (1989: 75, n. 12) says "…perception and thinking…are alike in that they both are assertoric. They are entirely unalike, however, in that thinking can have totally "abstract" objects for its content." I think he makes two mistakes here: first, 'assertoric' cannot be applied in the same sense to perceptions and thoughts; second, for Aristotle, an object can be totally abstract and still have perceptual content.

special senses and then coordinated and combined by the common sense, memory, and the imagination. Although Aristotle is a bit sketchy about the details of these earlier stages, there has already been a lot of abstraction, from the matter of the individual substances existing *in re* that were perceived, as well as a lot of synthesis (πρόσθεσις) of the various "forms" perceived into memories, imaginings, and experience.[27] "Thus the intellectual faculty (τό νοητικόν) thinks the forms in the images." [431b2]

In contrast to perceiving, thinking grasps the essences of the objects thus perceived: not 'flesh' but 'being flesh'; not 'water' but 'being water'; not 'magnitude' but 'being a magnitude'.[28] From the last example, we can conclude that Aristotle is considering essences not merely for substances but for items in all the categories, in the sense discussed in the *Topics*. [103b25–9] As in perception, the thinker focuses on certain aspects of the perceived objects, sc., those necessary to the aspect specified: the color, the magnitude, the shape, the materials (flesh or water). Once again, we have a process of selective attention, although the materials of the input and the output in this process differ from the materials of the abstraction process in perception. Instead they are based on them.[29]

Finally, even those essences may serve as output for a final stage, so as to produce "those that are in abstraction". [429b18] To illustrate this process, Aristotle uses the snub. It is worth noting that the snub itself as an object is the result of a lot of abstraction processes. We see, perhaps, Socrates stalking about like a pelican. Actually, first we see colors and perceive shapes at different point of time. We focus on certain of those shapes in memories from the visual array at different points of time. We judge that we are seeing Socrates with his various body parts via making connections *per accidens*. We then consider only his snub nose, itself an amalgam of various experiences of his snub nose. We realize, from synthesizing others of our past experiences, that we have seen other snub noses, and arrive then, by focusing selectively on the common features of those noses similar in shape, as a universal concept of the snub. (Various processes of synthesis would be required here too.) Even here we probably don't yet have the essence of being snub. It might be that all the snub noses of which we have experience were Greek and male noses. Yet it is not part of the definition of the essence of 'snub' to be 'Greek male concavity in a nose', yet only 'concavity in a nose'. Somehow then, we are able to recognize and focus on the necessary attributes of being snub, and rule out the universal yet contingent common features.[30]

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[27] Alexander, *in De An*. 83, 12: *noûs* deals with synthesis.

[28] The latter example seems to belong, strictly, to a later stage of the abstract objects discussed at 429b18ff.

[29] Charles (2000: 144) takes 430a3–8 to indicate that universals are not in material objects. I can agree that, in one sense, sc., as thought about explicitly in act, that is so, while in another sense, of being there potentially and inchoately, that is not so. See Chap. 9.

[30] Aristotle is rather silent on how this is possible and happens, but not so later Aristotelians like Avicenna. See Bäck 2009b.

At any rate, although once again Aristotle gives few details, from our experience of the snub nose, we extract the essence of being snub. It, in turn, can become the subject or input for yet a further, a final process of abstraction. When we consider the definition of being snub, concavity in a nose, we can treat the 'nose' as the matter and the concavity as the form, its essence (τὸ τί ἦν εἶναι). [429b19; *Metaph.* 1030b31–2] If we focus on the shape, and not on the nose, we arrive at the notion of concavity. We have then arrived at one of the abstract objects of the sciences, here geometry.

As we shall see in discussing Aristotle's view of such mathematical objects further below, Aristotle thinks that these objects, being simple, allow of no further abstraction. [Cf. 430b7] As these objects are the final objects of a sequence of abstraction processes, it is understandable why Aristotle would call them "the things that are in abstraction" [429b18] or "the things from abstraction". [*An. Po.* 81b3][31] Still, these descriptions might (mis)lead us into believing that the abstraction process involved in the formation of the abstract objects of the sciences is of a type *sui generis*. Rather, I suggest, the abstraction process remains of the same logical type as the other processes of perceiving and thinking. What changes is the material put into this process: the things produced by this abstraction admit of no further abstraction.

Accordingly, Aristotle says that the discernment of the mathematical objects is either by something different or by the same thing in a different way. [429b20–1] The 'something different' allows for the possibility of mathematical abstraction having a distinct mental faculty, as it might turn out that some animals can think about essences like the snub without being able to think about those like concavity (as modern neurological research strongly suggests!)—or that we need some new way to use the same abstraction process to purify the universal from its accidental features. For just as we purify our idea of snubness from features universal in our experience of noses, like 'male' and 'Greek' (or in modern times, 'terrestrial' or 'in the Milky Way'), so too we are able to purify our mathematical conceptions like concavity from accidental, universally concomitant features like nose flesh. (As the Greek commentators influenced also by Platonism will suggest, perhaps we need a *noûs* intuiting pure essences to do this.)

Aristotle then sees perceiving and thinking as processes of more or less the same type that form part of a continuum in the consciousness of a human being.[32] Indeed, on account of this continuity, we, like Aristotle, commonly say that we "see" dogs and running, although strictly, these experiences require more than the operation of a single mode of sense perception.

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[31] Aristotle seems to allow for stages of abstraction within mathematics itself, say, instances of circles to circle in general or from triangles with particular angles to triangle in general. Cf. *Metaphysics* 1035b1–3; 1036b32–5. If so, Themistius (*in De An.*, 96, 5–8) is wrong when he says that a statue and being a statue are different, but not point and being a point, for the substance is the same as its form in the case of immaterial substances. For the abstraction seems to require intelligible matter for its base.

[32] Cf. Hamlyn 1968: 138: "a kind of unity of the faculties". So too Everson (1997: 8–9) against Burnyeat; Reeve 2000: 160, 181.

Taking the standpoint of selective attention may also help to solve the puzzles that David Charles (2000: 140–1) raises about thinking in Aristotle's theory. He asks: if thinking is like perceiving, how can it have the content that it does? Are the forms already present in soul, or are they acquired by abstraction? In a way, both: the forms are present in potency, and there is abstraction, selective attention already at the level of the sense organ. As I have discussed in Chap. 5, Aristotle insists that we cannot have knowledge of universals via perception. [*An. Po*, 87b28–35; 92b2–3] Still he says also that in seeing a particular color the universal color is perceived *per accidens*. [*Metaph*. 1087a19–20] Knowledge potentially is of universals and actually is of singulars. [*Metaph*. 1087\a16–9]

The ubiquity of selective attention does not result in a materialist theory. The continuum of perception and thought implies also that matter, being more or less en-formed in Aristotle's theory, has the active potentialities of the form and of *noûs*. That is, Aristotle does not recognize a completely inert, brute matter existing *in re* any more than he accepts transcendent Forms. *Noûs* does not work its magic on unsubstantial shadows in Plato's basement; rather the things from which *noûs* makes its abstractions are substantial out in the sunlight and have some magic of their own.[33]

Some Greek commentators claim that, in addition to doing the abstracting, thinking makes judgements about the sense perceptions ((Ps.) Simplicius, *in De An.* 205, 1–7). Actually such judging constitutes part of the abstracting. Thinking is required for judging that the perception gives an accurate representation of the object. An abstraction process requires such judgements about which features of the sense perception to throw out and which to keep. Aristotle says that we cannot prove a thing's substance or essence (*ousia* or *ti estin*) by perception or by pointing. [*An. Po*. 92b2–3] Again, none of these judgements need require conscious deliberation but only "discrimination". To be sure, Aristotle gives few details here. But he does need to recognize such discriminative processes. For instance, if I see the image of a snub nose in water or in a curved mirror, the image will not look snub. This image is excluded from a conception of the snub even though other images of the same nose can be included, again by *per accidens* connections.

Another interpretation, popular among the Greek commentators with Platonist leanings, has thought differing from perception in that thought produces its own objects while perception does not ((Ps.) Simplicius, *in De An.* 206, 14–8).[34] This would indeed be grasping the universal in "some different way". *Noûs* would be producing (recollecting or intuiting) the universals transcendently somehow and would then go hunting for resemblances in the general types provided by the

[33] Rorty 1979: 45: "The substantial forms of frogness and starness get right into the Aristotelian intellect, and are there in just the same way they are in the frogs and stars…"

[34] Some modern interpreters have the same view. Ross (1956: 47), for example, suggests that productive mind "divines the existence of abstractions that are never presented in experience"; Caston 1993: 111, 125; Gerson 2005: 140–52. Wedin at times seems to favor this view (Wedin 1988: 111). However he seems to end up with a view of strong supervenience, where for Aristotle the mental properties necessarily arise from the physical states and are reducible to them.

imagination ((Ps.) Simplicius, *in De An.* 280, 21–4; 233, 10; -6; 233, 24–6; Philoponus, *On Aristotle on the Intellect*, 25, 80–91). Aristotle does indeed hint at direct intuition of simple essences; in some sense *noûs* does not err at what it does. [1051b17–32] Nevertheless he says often that knowledge of universals requires having had the requisite sense perceptions. [*Sensu* 437a1; *Phys.* 193a4ff] Elsewhere he says that intuition of simple perceptibles has less chance of error than of complex ones. [*Sensu* 447a11] Perhaps the same holds for the intelligibles. Then they too could be apprehended as abstractions from the perceptions: the simpler, the more infallible.

On the other hand, Wedin (1988: 157–8) argues that having a public language is a necessary condition for acquiring universal knowledge. Then even sense perceptions, at least of the human rational sort, where their reports use universal terms, would depend upon using the linguistic abilities of *noûs* and upon no transcendent insight. He says that the *noûs* in us is "separate only in abstraction" from the whole mind (Wedin 1993: 152). If Aristotle does indeed endorse this view, it is hard to see how he holds the existence of universals to depend upon the existence of particulars and for them to be related by abstraction—unless language is learned via abstraction from them. Of course, stating the judgement, 'I am seeing an ear of corn', requires linguistic abilities. Yet Aristotle allows for sense perception and experience of the non-rational animals too, which do not make such speech acts. Anyway for him thinking is the mental language signified by the spoken language and is prior to it. The concepts of the mental language are supposed to be based upon sense perceptions. Again he gives few details. (Below I shall look further at how Aristotle says universals "arise from" particulars before abandoning the attempt.)

Still Wedin's account may work well in explaining self-consciousness. As already discussed, Aristotle says that, in seeing, we and other animals see that we see. [*An*. 425b12–22][35] It is not clear that this amounts to self-consciousness. Still Aristotle says that

> …he who sees perceives that he sees, and he who hears, that he hears, and he who walks, that he walks… and if we think, that we think… [*Eth. Nic*. 1170a29–32]

Once again Aristotle puts perceiving and thinking in parallel and remarks that both are self-reflecting. He says also that after grasping many universals *noûs* comes to grasp itself as an object. [*An*. 429b9]

Perhaps in grasping universals we come to think, in the inner language of thought. Once we do this enough, we also make judgements about our judgements, particularly when we make false ones, and become self-conscious. So too an animal typically becomes aware that it is not seeing by vision when it is not seeing properly—or, more likely, in the middle voice, that there is something wrong with the seeing. Perhaps in making the linguistic judgement, mental or verbal or written, self-consciousness arises fully. (At 428a23 Aristotle does claim that opinion and belief must be

[35] (Ps.) Simplicius (*in de An.* 290, 6–8; 187, 8) holds that perceiving that we perceive holds only for rational animals.

accompanied by "discourse of reason" (*logos*)—and this might hint at this point, depending on what '*logos*' means there.)

This would attribute to Aristotle a view like that of George Herbert Mead. Mead (1913: 377) speaks of self-consciousness arising in the child from role playing after the *personae* fade out and leave only the speech. Using the first-person pronoun 'I' makes the self-reflection fully actual because it is already separate in the sentence. Thus

> Helen Keller explained that it was when she learned that "everything has a name" and that by words one can communicate with another, that her self emerged, she become self-conscious [Her teacher was her "other".]. (Miller 1973: 50)

Self-consciousness would then involve much abstraction of the linguistic judgements of thought: abstractions upon abstractions.

6.5 The Infallibility of *Noûs*

> …one must be content to state some points better than one's predecessors, and others no worse. [*Metaph*. 1076a16–7]

If we accept the continuity and structural similarity of perception and thought for Aristotle, we have a solution about the problem of the infallibility of *noûs*.[36] In several texts, Aristotle does seem to assert that *noûs* cannot err in grasping the primary principles. So too Plato seems to have said clearly. [*Resp*. 477–8; 532–3] Yet, there are also strong grounds for taking Aristotle to hold *noûs* to be fallible.[37] For one thing, as Aristotle's worthy predecessors had *noûs* and did grasp what they at any rate took to be the first principles, their results should be infallible. Yet Aristotle claims that none of them were completely correct in claiming to having grasped the first principles completely, e.g., in their accounts of causality. [*Metaph.* I.3–10][38] He says the same about his own efforts.

If we assume that thinking is like perceiving, and that grasping the primary objects of science is like perceiving individual objects, we have a solution. Just as Aristotle says that perception has the least chance of error when the perception is of the perceptibles special to the sense being used, so too *noûs* has *the least chance of error* when being used to grasp the (most?) primary principles. Still, even here *noûs* can be wrong—especially in a diseased mind, just as an injured or sick eye does not see colors correctly.[39] Indeed, at *Posterior Analytics* 100b5–12, after saying that ἐπιστήμη and νοῦς are always true, Aristotle then characterizes *noûs* as "more

[36] Themistius (*in An. Po.*, 64, 7–8) interprets *Posterior Analytics* II.19 thus.

[37] Cf. Bäck 1999 and the other articles there; Charles 2000: 135, n. 50.

[38] So too Modrak (2001: 107) speaks of individual mistakes and the pragmatic grounds to accept the consensus of experts.

[39] Cf. Charles 2000: 138: "…one need not know, in thinking, that the thoughts one has are caused in an appropriate way by an appropriate object."

precise", "better known", and "truer". As with sense perception, after stating that perception of the proper perceptibles is always reliable, Aristotle seems to back away from the absolute claim and admit exceptions. Then he has the position that what is closer to the primary principles has a higher degree of proof and less chance of error as it has less composition, makes fewer additional suppositions and postulates, and is separated from the primary principles by fewer demonstrations. [87a31–7; *Metaph.* 982a25–7]

Moreover, just as with sense perception, we can make a distinction between *per se* and *per accidens* thinking. [*Metaph*. 1051b25–6] If we grasp the first principles as they truly are, in themselves [*per se*], then we have no, or little, chance of error. Yet, if we grasp the first principles under the wrong description, as being other than what they are (*per aliud*), deception is possible. Moreover we can be deceived about whether our apprehension is *per se* or *per accidens*. For instance, Aristotle notes that sometimes we might think that a certain sort of matter like flesh is essential to the form of man but err. [*Metaph*. 1036b2–7]

Aristotle's predecessors may have apprehended the first principles via *noûs* in some sort of *per accidens* thinking (Charles 2000: p. 135 n. 52).[40] This interpretation does explain why Aristotle assumes that they did indeed grasp some aspect of the truth, but not the whole truth. For instance they "saw" the material cause *as* the complete cause. Yet using *noûs* makes the thinking neither infallible nor even transparent. After all, look at the sort of thing he says about his predecessors:

> What the followers of Empedocles and Democritus do, though without observing it themselves, is to reduce the generation of elements out of one another to an illusion. [*Cael*. 305b1–3]
>
> Discussion of the other views may be postponed. But this last theory which composes every body of planes is, as is seen at a glance, in many respects in plain contradiction with mathematics. It is, however, wrong to remove the foundations of a science unless you can replace them with others more convincing. [*Cael*. 299a1–6]

So Aristotle has a way of allowing *noûs* to be infallible but still able to make mistakes. Just as with his theory of perception, we see things with the mind under a description: we perceive Coriscus as a man, as a banker, as food, and (falsely) as the one who is approaching, so too we think of triangles as being a three-sided plane figure, as being talked about by mathematicians, and (falsely) as having no obtuse angles. Aristotle does say that *noûs* is infallible, and is a sort of intuition. Yet, like sense perception, the intuition can be indubitable while its description erroneous.[41] Hence his doctrine of *per accidens* perception.

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[40] This conception of *per accidens* thinking gives an explanation to his query why Aristotle throws in "except accidentally" at 1051b26 in talking about our knowledge of incomposites.

[41] A rival, Neo-Platonic interpretation has *noûs* being infallible because either it apprehends the essence or it fails to do so even though there is the belief that it has succeeded. The latter allows for mistakes in thinking, but the mistake does not lie in the operation of *noûs* but in how "we" interpret it. But who is this "we"? Cf. Berti 1996: 402. Wedin (1988: 171) defends the infallibility of *noûs* by restricting it to my awareness that I am thinking, along with lines of Nozick's "reflexive self-reference". Aristotle might accept this (Cf. *Eth. Nic*. 1111a7–8), but that does not seems sufficient.

This fits well with the history of science. I may think that copper has the atomic weight of 140 (incorrect). Yet that is what my instruments and calculations tell me. Relative to them, I am correct. Yet the connection is accidental. I may again give the atomic weight of copper as the weight of a certain isotope. I could be right, within my margins of error, about the isotope's weight, but wrong about the element's weight. I have put my findings under the wrong description: I saw the weight as a and not as b.

Yet more fundamental than the particular judgements I make is the fact that they are universal and theoretical. Somehow I am able to make the leap from particular sense perceptions and observations to these generalizations. I apprehend those generalizations. Rational animals like human beings can make such theories; non-rational animals like goats cannot. Aristotle takes *noûs* as the ability to make such generalizations, to apprehend the universal and the judgements being made—correctly or incorrectly. At the least, the mere act of apprehension, of something as universal, is infallible. I cannot be mistaken about making the apprehensions; I can be mistaken about what I am apprehending.

We might distinguish various types of *noûs* to resolve the apparent contradiction further.[42] Aristotle suggests viewing active *noûs* like light in his theory of vision (Wedin 1993: 139–41; Frede 1996b: 381). [*An.* 430a15–7] Just as light is necessary for us to see at all, so active *noûs* must permeate the rational soul in order for us to think. Unlike sunlight, this divine "light of reason" is always on. [430a17–8; 430a19–22] As Kosman (1992: 347–8, 354) puts it, this active *noûs* makes it possible for us to think actually, in the sense of first actuality: actually having the ability to think in contrast to particular, actual acts of thinking, which can still be erroneous.[43] Active *noûs* serves as the cause of our thinking; Aristotle identifies it with the divine (Frede 1996b: 388). [*Eth. Eud.* 1248a24–9]

However, in contrast to this active *noûs*, the *noûs* in us thinks and judges. [429a23–4] It changes with its objects and comes to be and passes away. [430a14–5; 430a24–5] Presumably, even when in an existing animal, it does not think always. (At any rate, mine doesn't.) Now this *noûs* in us, the passive intellect, is what changes and becomes all things, at least in form, when it thinks.[44]

> …[theoretical *noûs*] is correct always, namely when it is *per se* and not connected to inferior lives and types of lives and knowledge…" [(ps.) Simplicius, *in de An.* 298, 27–8]

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[42] From the Greek commentators on, many types of *noûs* in Aristotle have been distinguished. Cf. (ps.) Simplicius, *in de An.* 254, 31–4; 261, 2–24. Reeve (2000: 173) says that Aristotle has a person like me being the conjunction of two substances, active noûs and the human being. He explains that the *noûs* in us is able to err because it has superlunary matter that can mix and become sullied; hence error is possible for us (Reeve 2000: 58, 161, 169). I don't see Aristotle recognizing two substances in me: he routinely holds that the soul is the form of the body, and the compound is the human being.

[43] He claims that Aristotle's discussion agrees with Plato, *Resp.* 508C (Kosman 1992: 350). So too M. Frede 1996a, b: 382.

[44] The form has to be replicated as I said above. Cf. M. Frede 1996a, b: 379. Brentano (1977: 14) identifies the passive intellect with the imagination.

Relative to the theory of vision this passive *noûs* would be like the colors. We have already seen how Aristotle admits mistakes in the perception of colors. In our perception, light never occurs without some color.[45] So too in our thinking *noûs* never occurs without having some particular thought. Aristotle admits errors in our perceiving colors. Just as mistakes can occur in our perception of colors, so too mistakes can arise in our thinking of universals.

Active *noûs* makes it possible for us to formulate abstract general principles. Still, though guaranteeing generality, *noûs* does not guarantee infallibility. [*Metaph*. 1074a15–7] We experience the activity of *noûs* as a simple act of intellectual insight.[46] We also assume that if we proceed carefully the generalization process gives reliable results. We have to assume this to do science.[47] Though pragmatic, i.e., willing to accommodate his standards to what we can obtain and achieve in practice, Aristotle views science as a progression towards the absolute truth about reality. Still, this mental act of *noûs* does not guarantee truth by itself. We may not have made enough observations; we may have misdescribed what we see, as in the Coriscus example; we may have reasoned fallaciously, like Melissus.

We then have to test the candidates for first principles thus obtained. We do this both by dialectical (including logical) analysis and by looking at the explanatory power of those principles and their agreement with experience (Cleary 1994: 61).[48] Aristotle does this himself with much effort. Surviving dialectical examination becomes a necessary though not a sufficient condition for establishing first principles (Bolton 1991: 21).[49] By itself dialectic does not prove or establish principles. Rather, it tests them, and passing this test partially justifies them. [*Soph. El.* 172a21][50]

Noûs functions similarly in practical reasoning, where it apprehends not only the universal but the singular. [*Eth. Nic*. 1142a25–30] "Practical insight (*noûs*) is like perception in the sense that it is non-inferential, non-deductive; it is an ability to recognize the salient features of a complex situation" (Hardie 1981: 233).[51] Here *noûs* typically makes judgements that an individual falls under a universal: "this is drink; that is food; that is threat." [*Motu* 701a32][52] Once again distinguish having the ability in general from having it and using it correctly.

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[45] Cf. Wedin 1988: 177–8.

[46] Sorabji (2005: 173) calls it "intellectual spotting".

[47] Cf. Popper 1963: 58: "…why is it reasonable to prefer non-falsified statements to falsified ones?…from a pragmatic point of view the question does not arise, since false theories often serve well enough…because we search for truth (even though we can never be sure we have found it)…"

[48] Cf. *On the Heavens* 270b1–6.

[49] He holds that dialectic does not establish scientific principles inductively (Bolton 1991: 18–9). Cf. *Soph. El.* 17033–9. I would say, rather, that dialectic can contribute to their discovery as well as to their establishment.

[50] So too Taylor 1990: 133; Smith 1993: 354.

[51] Cf. Nussbaum 1999: 155, 158; Broadie 1991: 234; Reeve 1992: 70.

[52] For a fuller account of practical *noûs* see Bäck 2009a.

So *noûs* is infallible at what it does. But what it does is not to apprehend first principles as true. Rather, *noûs* is the mere ability to apprehend principles, sc., universal things, directly, just as sense perception can apprehend singular things directly (Themistius, *in An. Po*., 64, 7–8). *Noûs* makes it possible for us to formulate abstract general principles. Still, though guaranteeing generality, *noûs* does not guarantee infallibility. We experience the activity of *noûs* as a simple act of intellectual insight. Still, this mental act of *noûs* does not guarantee truth. We may not have made enough observations, we may have misdescribed what we see, as in the Coriscus example; we may have reasoned fallaciously, like Melissus; we may have cognitive disabilities, like natural slaves. Although not infallible in its results, *noûs* is infallible in its process, in being able to apprehend the universal.[53] We have direct apprehension of universal beliefs and cannot doubt that we are apprehending them. Still we may err in our judgements about these apprehensions, just as we can look at a map and misread it. For Aristotle non-rational animals cannot apprehend the universal at all; rational animals can apprehend the universal but not always or correctly; a divine rational substance apprehends the universal always and correctly.

> The investigation of the truth is in one way hard, in another easy. An indication of this is found in the fact that no one is able to attain the truth adequately, while, on the other hand, no one fails entirely, but every one says something true about the nature of things, and, while individually they contribute little or nothing to the truth, by the union of all a considerable amount is amassed. [*Metaph.* 995a24–7]

6.6 The Physicist and the Mathematician

The details presented above of Aristotle's theory of mental processes help to explain why Aristotle says that the physicist uses "addition", i.e., synthesis, and her experience in acquiring the objects for the study of physics, while the mathematician uses "subtraction", i.e., abstraction, in acquiring the mathematical objects (Modrak 2001: 116). [*Eth. Nic.* 1142a16–9] I have claimed that the objects of both physics, bodies in motion, and mathematics, shapes and numbers, require both abstraction and synthesis in their formation. [*Metaph*. 1077b34–1078a5; (ps.) Alexander, *in Metaph*. 735, 37–736, 9] Even the perception of individual bodies, shapes, and [instances of] numbers requires both abstraction and synthesis. How then do physics and mathematics differ? Why then does Aristotle say that the objects of mathematics come from abstraction, while those of physics come from synthesis?

One difference may lie in the types of abstraction and synthesis being required. Both do require synthesis and abstraction in order to have perceptions of individual things, both substantial and accidental, as well as thoughts of universals. But, once we get the universal objects, the two differ. Aristotle says that physics considers "objects having the principle of motion within themselves", whereas mathematics

[53] My account combines the two options distinguished by White (2004: 734).

deals with "things that are at rest, although its subjects cannot exist apart." [*Metaph.* 1064a30–3; cf.1025b19–21; 1026a12–5] That is, the objects of mathematics do not exist *in re* separately from matter but are considered as being separate from matter and from their being movable. Again, natural objects have final causes; the abstractions of mathematics do not—they are considered apart from those causes. [*Part. An*. 641b10–2; cf. *Cael*. 299a11–6]

In order for the physicist to consider individual things *qua* movable, she must abstract away from the color, texture etc. of those objects and consider them only *qua* moving. [*Phys*. 202a7–8] Then she must abstract away from universal properties necessarily belonging to those objects: being colored; being animate (or: being inanimate). The physicist considers, say, the individual bronze spheres universally, as moving bodies and just as moving bodies. So like mathematics natural science demands abstraction.

On the other hand, being movable is an accident, an inseparable or proper one, of physical objects.[54] The physicist then adds on to or synthesizes the essential accident of movable with the definition of the physical object (the perceptible substance) so as to have an object to study. [Cf. *Metaph*. 1029b31; 1030b15; 1031a4–5; (ps.) Alexander, *in Metaph*. 733, 23–38] In terrestrial and in celestial physics yet other accidents are added on: everlasting or perishable; moving rectilinearly or moving circularly. [*Cael*. 269b1–2; *Metaph*. 1069a30–1069b1]

Like the physicist, the mathematician starts by thinking about individual things, both substances and accidents. The very perception of these individual things involves both abstraction and synthesis. The geometer then focuses on the accidents of shape, while the arithmetician on those of number. Such foci follow processes of abstraction. The geometer abstracts also from the individual features of geometrical objects, including the perceptible ones (if there be any[55]), like having a particular length or diameter. [*Mem*. 450a1–7] So, like the physicist, the mathematician arrives at considering bronze spheres in general. Here though the contrast comes, as the mathematician has also to abstract the bronze and perceptible matter away from the sphere, even though the individual bronze sphere will cease to exist as the individual that it is, a bronze sphere, if it ceases to be bronze—and will cease being the substance that it is, if it ceases to have matter. [*Phys*. 193b31–194a6; 187b27] The mathematician will be abstracting away not only the essential accident of being movable but also the material constituents of the very essence and definition from the sphere (Studtmann 2002: 225).

So the physicist is adding an accident, moving, onto the concept of the bronze sphere, or more generally, to the universal concept of the solid, perceptible sphere. The universal concept of the solid sphere has been formed by abstraction from the particular features of the individual spheres. Still, physics studies its accidental

[54] I hazard that being movable is a *per se* accident of bodies, in the second sense of '*per se*' in *Posterior Analytics* I.4, as every body must be at rest or in motion.

[55] As I shall discuss somewhat below, there is some dispute whether Aristotle recognizes mathematical objects to have physical instances. Modrak (2001: 120) suggests that they are not perfectly exemplified *in re* but only at best as potentialities; in n. 3 she worries about 403a12–4.

features of being in place and in time, of having weight etc. These attributes may be essential to the solid moving sphere, but only as *propria* and not constituents of the essence, as given in the definition. [*Phys*. 202b30–1; *Cael*. 268a1–6]

In most cases, the physicist will abstract away from some of the essential, definitional constituents of the individual or universal substance. So it is part of the definition of a moving frog to be an animal. Yet the physicist does not consider the frog *qua* animal. Still she keeps considering some of the essential, definitional features of the frog: its being a body; its having matter.

In contrast, the mathematician will have to abstract away *all* essential, definitional constituents of the individual or universal substance. E.g., she will be considering the form, the 'sphere', of the individual bronze sphere, apart from the bronze, its matter. I say 'all' because mathematical attributes are all quantitative or qualitative accidents. (Strictly the sphere is not the essence of the piece of bronze which has come to have a spherical shape for a time before being flattened.) None of the essential constituents of the definition remains, except perhaps in the implicit sense that a substance must be presupposed for the accident to be in. That is, an accident cannot serve as a subject in its own right unless it has some substratum in which to subsist. Aristotle recognizes this. So he postulates an intelligible matter to serve as substratum. Perhaps mathematical objects retain some essential non-definitional attributes of the substance: being a figure in general; having some numerical quantity. Yet these will be *propria* or *per se* accidents and not constituents of the definition of the substance.

In both mathematics and physics there is selective attention. 'Attention' contains both abstraction and synthesis, with abstraction being the selection or analysis, and addition being the combination or synthesis of apprehending the attributes together. Once again, I stress, selective attention need not be a conscious or even a voluntary process. E.g., the eye jelly cannot but receive impressions of color and shape of an object when it is healthy and active. It also cannot but ignore the sounds, feels, flavors, and odors of that object. So too the coordination of sense impressions of the special senses by the common sense is largely an automatic process.

Thus both the physicist and the mathematician have to abstract away from those features of the object that are irrelevant to their subjects. A physicist does not consider a frog as green or as alive or as a frog or animal but only as a moving object. Still she does not abstract away from the matter although she does abstract away from the species and genera or the objects that she studies. Physics retains some substantial, definitional features: being corporeal, being perceptible or occupying space.[56] Likewise the mathematician abstracts away the irrelevant aspects. But, unlike in physics, these irrelevant aspects include the matter and other definitional constituents.

This difference makes the accidents being retained in the two sciences have a logical difference in their subjects. The mathematician will be abstracting from all the essential, definitional constituents of the individual or universal substance.

[56] Being movable or being at rest does not seem to be part of the definition of such substances but rather an inseparable, *per se* accident or *proprium*.

She will retain some accidents, perhaps some essential ones or *propria*. Yet the substance serving as the original subject has been erased completely. On the other hand, the physicist will keep some essential, definitional features. To that complex, serving as the subject, she adds on accidental attributes of being movable and moving rectilinearly or circularly (*propria* or common accidents) to the entire complex of essential constituents.[57]

When Michael Wedin observes about mathematical abstraction,

> One must be careful here. The separation is connected with Aristotle's notion of abstraction, but historically this has been given more than one reading. On the one hand, it has been seen as abstracting from or eliminating matter, on the other hand, as simply eliminating those of an object's properties that are irrelevant to its role as a mathematical object. The first view adopted by Philoponus (1991) and Simplicius (1882a), promotes the opinion that Aristotle's mathematical objects are properties such as diagonality and triangularity. The second, and more pleasing, view treats them as physical objects regarded in a certain way, namely, as exemplifying specific mathematical properties. (Wedin 1988: 4, n. 5)

he may have a false dilemma: the mathematician must do both. When the mathematician abstracts the concave, she abstracts away from the matter of the snub so as to get its form by itself. Does she thereby abstract also from such features as being Greek, being terrestrial, being immobile—attributes whose existence depends upon the existence of matter? We might suppose so. The trouble lies in the concave having still to retain some spatial features in order to be a geometrical object. In some sense these spatial features depend upon matter as well. So we must keep such material attributes. However, if we abstract only from the particular material of the nose, the flesh, we are left with lots of attributes not pertinent to a geometrical object, like being terrestrial. Hence the abstraction must be from the matter as well as from irrelevant attributes.

Furthermore, which spatial attributes are relevant to a geometrical object depends upon such factors as the level of generality. A sphere or triangle in geometry continues to retain some spatial properties. Yet the mathematicians may abstract from its position relative to other figures; in the case of figures in general also from its specific dimensions or particular angles.[58]

Aristotle says that the mathematician treats a geometrical object as if it were separate from motion and from the natural body. [*Phys*. 193b31–5] She also may give to it some features not present in the original physical objects. [*Mem*. 450a2–7, quoted above] Aristotle says also that the mathematical objects have intelligible matter—enabling them to serve as subjects in their own right. Being enmattered, these objects are not the "Platonic properties" like triangularity. They retain the

[57] Pichter (1992: 377) takes mathematical abstraction to be an operation of *noûs* getting at the real essence of things. He goes so far as to translate '*eidos*' as 'Anblick' at Pichter 1992: 380.

[58] Lear (1988: 244–5) claims that Aristotle uses abstraction differently in his account of arithmetic. There the abstraction specifies the unit to be used in counting, generally "the most natural description" of the object. In geometry the abstraction picks out which properties of the object are to be considered. He claims that Aristotle runs the two together in saying 'considering an x with respect of its being a P'.

substantial structure of matter and form. So the objects of mathematics are, strictly, triangles and twos, not primarily triangularity and duality (Lear 1988: 242–3).

What they are exactly leads to the question of the essences of Aristotle's substances. For now just note that the objects of mathematics are all accidents: numbers are *quanta* and figures are *qualia*. [*Phys*. 193b23–5; *Cat*. 4b223; 10a14–5] These accidents have a relational structure as they satisfy the conversion proper to *relata*. E.g., 'numbers are numbers of the numbered'; 'the numbered are numbered by numbers'; 'figures are figures of the figured'; 'the figured is figured by a figure'. Mathematics then deals with objects that are not substantial at all but rather are accidents of substances: quantities and qualities having relational structures.[59] These accidents are treated *as if* they are subjects in their own right—just in the way *relata* are: they are made into quasi-substances. This is why Aristotle says that mathematical objects have an intelligible matter. The accidents serving as mathematical objects need to have this in order to serve as subjects.

Aristotle treats the objects of physics differently. They apparently retain enough of their substantial nature of body to keep to the original substances as subjects. So they do not need intelligible matter as they keep the original perceptible matter. [*Phys*. 194a19; 194b10–3] Moreover, the objects of physics do not have a relational structure. To be sure, 'movable' and 'motion' are relational, as Aristotle recognizes explicitly. But not so for 'movable body'.

In sum, mathematics studies certain accidents of individual substances: geometry their shapes; arithmetic their numbers.[60] Substances generally can change their shapes and numerical features and persist. Abstracting away from all features but those accidents, mathematical objects end up being complexes of accidents of substances. As they abstract away from the substantial features themselves, we can see why Aristotle would call them "things from abstraction" in contrast to the objects of physics, which retain least some substantial features and their matter—even though the objects of both mathematics and of physics are obtained through an abstraction process. Aristotle says to treat these mathematical complexes of accidents "as if" they are subjects in their own right. To give them unity he supposes an intelligible matter to give them substrata. We shall see Aristotle according this same sort of quasi-subsistence to universals in general.

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[59] In Chaps. 3 and 4 I have discussed how Aristotle admits this.

[60] (Ps.) Simplicius, *in de An.*, 277, 10–2: "All such things concerning/about which is the material for mathematicians are accidents."

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Chapter 7
The Process of Abstraction

> Abstraction is, as it were, a mixture of perceptual induction and intellectual deduction based upon the difference of what is *per se* and what is *per accidens* (Avicenna, *Al-Burhān* 162,7–8).

In his psychological works Aristotle focuses on how the singular objects of perception arise from the substances in the world and how the universal objects of knowledge arise from objects of perception. In his logical and ontological works Aristotle seeks to show how universal concepts and propositions are abstracted from the perceptual content so as to provide the objects of science. Although his remarks are sketchy, I shall try to extract from them an epistemological account of how we come to know the universal.[1]

7.1 Grasping the First Principles

In the last chapter of the *Posterior Analytics*, Aristotle investigates how it is possible for us to know the immediate premises, the primary principles, of demonstration. [99b20–6] Demonstration assumes these and cannot prove them. Aristotle rejects Plato's answer, that we have innate, pre-existing knowledge of these premises. [99b26] We are, he says, rather, in a middle ground where we do not have actual knowledge of these primary principles but where we also are not completely devoid of them. [90b30–4] As in his discussions of coming to be, Aristotle turns to the third option, the middle ground between being and not-being, that of potential being, what can be but is not in act. [Cf. *Phys*. I.7] We have then, in actuality, *noûs*, namely the actual capacity or potential (δύναμις) to have this knowledge, although we do not yet have the knowledge itself in act. This potential knowledge is not as accurate or strictly a knowledge as the fully actualized and articulated knowledge of

[1] Cleary (1995: 481–90) denies that Aristotle has an epistemological theory of abstraction.

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demonstration. [99b26–7; 99b33–4] Here Aristotle has echoes of the fallibility of *noûs*, as discussed in the previous chapter. [*Metaph*. 1076a16–7]

When Aristotle speaks here of "first principles", he is speaking not only of axioms and definitions but also of the universals signified in those fundamental propositions (Solmsen 1929: 95–101; Barnes 1975: 249, 254–6; 1994: 271; Hamlyn 1976: 178; Graeser 1978: 92, n. 2; Harari 2004: 35–6; Kahn 1981: 385–6).[2] [*An. Po*. I.10] We have to explain how we came to know, for example, not only that taking equals from equals produces equal remainders, but also what a line is, and that lines exist. [76a40–b6] Again, how is it possible to know that the essence of a human being is to be a rational animal, as well as what 'rational' and 'animal' signify? When Aristotle seeks to explain how we come to grasp the universals from sense perception and experience with individuals, he is seeking to explain at the same time our acquisition of concepts and of propositions, sc., of thoughts of the relations between those concepts.

I have suggested that for Aristotle all perceiving and thinking occurs under a description: we perceive something as such-and-such. Thus perceiving and thinking for him are of objects having propositional structures, or, conversely, if you like, of propositions having an object-like structure, as in grasping a state of affairs.[3] Aristotle takes this position in his account of knowledge in the *Posterior Analytics* where he routinely groups, or conflates, the acquisition of the two, concepts and fundamental propositions, together.[4] Again, in his psychological theory, Aristotle does not give separate explanations for the acquisition of concepts and for the acquisition of universal generalizations. Finally, and fundamentally, we can see why he would group the two questions together (Wedin 1988: 129; Sorabji 1982; Lloyd 1969: 261–274).[5] Like a spoken word signifying an item in the categories, its corresponding concept is a mental sign of something existing *in re*. Likewise, a statement of similar type (of first intention) asserts that a certain complex obtains *in re*. Thus, 'this animal' signifies a certain animate substance existing now, and 'this animal is running' signifies that a certain act of running belongs to that substance now, that this running animal exists now. Unlike the Stoics, Aristotle does not recognize *lekta*, as separate items. That is, he does not admit to their being "states of affairs" in the modern sense, sc., as items existing *in re* over and above the individuals constituting them.[6] That is, thoughts both of substances and of substances being a certain way have their truth makers: in the former, a single item in the categories; in the latter, a complex formed from multiple items.

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[2] Kahn (1981: n. 2) notes that Euclid didn't keep these apart either. However Charles (2000: 268–9, nn. 45, 47) denies the conflation. Likewise Harari 2004: 5, 16–8.

[3] On these lines, De Rijk 1987: 37, 43–42, 60, n. 60, 1996: 131; Matthen 1983: 125–31; Nuchelmans 1973: 33–5.

[4] E.g. *An. Po*. II.1–2; Kahn 1981: 394; Bäck 1999: 165.

[5] However Ross (1949: 675–6) separates principles as universal statements from universal concepts.

[6] Crivelli (2004) thinks otherwise.

To be sure, Aristotle then has the problem of explaining how we extract such statements as the principle of non-contradiction from sense experience. In any event, that is not a problem for my interpretation but his problem, given his assertion that all knowledge comes from sense experience. [*An*. 432a3–10; *Mem*. 449b31–450a1] Still, I shall return to this issue when considering his account of mathematical and metaphysical knowledge.

This continuity, of universal concept and statement, agrees with the structure of predication that I have argued elsewhere that Aristotle accepts: we can say not only that Socrates "is" but also that Socrates is an animal and is white. [*Int*. 19b14–22] We can take the first sort of statement, of *secundum adiacens*, to be an assertion that what is signified by the subject term. 'Socrates' exists in reality. Likewise, the second sort of statement, of *tertium adiacens*, asserts that the complex asserted by the subject and predicate, the animal Socrates or the white Socrates, exists. In each case, a complex of items is asserted to exist *in re*. So there is continuity between concept and proposition, so that grasping the first principles will include both. [Cf. *An. Po.* II.1] Or, better: the dichotomy of first principles into simple concepts and propositions is anachronistic.[7]

Aristotle gives an account of truth and falsity in the *Metaphysics* compatible with such a continuity. Aristotle takes 'truth' to be one of the meanings of 'being'. [*Metaph.* 1017a30–2; 1051b1–2; 1051b22–3] He recognizes truth for compounds like 'white wood' [1051b20] as well as for simple beings and actualities, presumably like 'wood'.[8] About the latter, he says no error is possible about the essence except *per accidens* [1051b25–6]—surely a reference to his doctrine of *per accidens* perception and knowledge. That is, we think of a simple being as something else. On Aristotle's own account, his predecessors did that a lot, and perhaps even he himself does a bit.

However, Aristotle's pronouncements on the infallibility of *noûs* give one reason to preserve the distinction between concept and proposition and make *noûs* infallible even for the apprehension of propositional axioms. (Pseudo-) Simplicius (*in de An.* 249, 3–15; 250, 16–39) remarks that no error is possible in thinking of indivisible, simple forms, whereas error is possible in making statements about them, as statements have parts and so are compound.[9] What does thinking of a simple form involve? As Simplicius agrees, the judgement that I am perceiving an instance of it, or that it has a certain definition, or even that it "is", involves thinking something not simple but complex. This seems to make *noûs* an ability to apprehend intelligible objects and claims about them. The act of apprehending is infallible; its content, what is being apprehended, still has the possibility of error. It then will be able to grasp truths about them—but also falsehoods.[10] Still my apprehension of each part of the statement as being a constituent of it can remain infallible.

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[7] See Bäck 2000: 100–24.

[8] Mignucci (1996: 407–8) notes that Aristotle holds that terms of propositions are neither true nor false. Cf. Berti 1978: 144–5. So the account of simple intelligibles will have to be complicated.

[9] Cf. *Metaphysics* 1051b17–32.

[10] Cf. Plato's account of falsity in the *Sophist*.

Noûs then enables us to have direct intuition of intelligible objects. I intuit that I am perceiving Coriscus as the one who is approaching. I cannot err in perceiving this judgement, even though my description can err. I can think that π is a rational number; I cannot be mistaken that I am apprehending π thus, although I can be mistaken about the correctness of that insight. A non-rational animal, lacking *noûs*, cannot apprehend π thus or in any other way. *Noûs* then become the ability to have intellectual experiences or apprehensions. It does not provide a guarantee of their truth. It is infallible at what it does, but it does not have the function of guaranteeing the truth of the first principles—only of making it possible that we can apprehend them at all.

At best, for Aristotle, we have "knowledge" of these first principles—the universals, their essences, and statements about them—inchoately and inarticulately at first. Just so, a child has quasi-knowledge of the universal woman when seeing her mother. [*Phys*. 184b12–4] It is worth noting that 'mother' also is not a substance term but a relative. So, if Aristotle is speaking precisely—and there is good evidence to think he is, as, like brute animals, children have no acquaintances with substances as substances—the child does not perceive the natural kind, the human being, but only an accident, the human being in her relation as parent. Moreover, the child also does not judge certain objects to be 'mother' in virtue of the proper definition of the *relatum* 'mother', but only by her accidental attributes, given in *per accidens* perception, of having the visual appearance of her mother. So the child neither has an accurate apprehension of the universal nor correctly identifies the individual things that exemplify that universal. Still, the child has started to "think" in terms of universals, although, perhaps, not in the strict sense of 'think'. For the universal in its essence need not be grasped; i.e., the child need not know its definition. In a sense, animals too have perhaps this acquaintance with the universal. Aristotle does admit that they have experience and practical wisdom of a sort. [*Metaph.* 980b25–7; *Eth. Nic.* 1141a26–8][11] Thus a child, or a cat for that matter, might recognize as 'mother' or as 'woman' or as 'human being', via its actual past experiences, only things having dark skin or red hair. Still, in a sense, there is experience of the universal. Aristotle defines the universal as "what is naturally predicated of many". [*Int*. 17a39–40] Thus, a child, in recognizing or calling many objects 'mother' on the basis of a perceived if not a real similarity between those objects, is making use of the universal, at least in a primitive way.

Accordingly, we need not have a clear and distinct grasp of the first principles. We need grasp them only indistinctly and fallibly, as we develop this capacity. We begin with an indistinct and perhaps inaccurate grasp of the universal. We head towards a more accurate apprehension of the universal, by recognizing that it is not

[11] Again, at *Metaphysics* 981b10 as well as in the passages cited above, Aristotle says that perception gives "knowledge" (γνῶσις) of particulars. D. Frede (2001: 161) observes that intellectual knowledge of the definition of a universal does not suffice for identifying a particular instance of it. Imagination fills in its details. All animals have imagination of a sort [*An*. 434a5–10] and so they will have knowledge of a sort.

necessary for something to have red hair or dark skin to be a mother or a human being. In making these judgements (which, in historical fact, have been difficult for many societies to make!), we may come to grasp the definition, the formula of the real essence of a universal expressing a natural kind (as opposed to a merely conventional or a Cambridge universal) (Modrak 2001: 85, 90). Induction is the process whereby we come to be familiar with these first principles determinately. [72b29–30]

Aristotle says that we appear to share "this capacity", where he is speaking of *noûs*, the ability to grasp these first principles, with all other animals. [*An. Po.* 99b34] The reason, he says, is that they have an innate capacity of judgement, namely perception. Now this remark looks strange, since Aristotle is discussing the special and common axioms of science. [*An. Po.* I.10–1] But arational animals cannot have knowledge of these universals. So why do they have this capacity too?

Several points here deserve notice. First, Aristotle describes perception as able to make "judgements" (κριτικὴν) or "discriminations" (in the sense discussed above). [*An. Po.* 99b35] He has also implied, in the lines preceding, that these "judgements" will be neither fully articulate nor infallible. Moreover, if all animals have the capacity to make these "judgements", they cannot have to be made deliberately and self-consciously. Instead, they seem to have to be performed by instinct and habit. For instance, an animal in the presence of an apple sees there to be a red shape, the *per se* perceptible, and then "judges" that the red shape is sweet by associating it with past memories (or perhaps through some natural disposition, some genetic predisposition, as we might say). In any case, this sort of judgement occurs via *per accidens* perception. This interpretation agrees with what I have just said about how the child grasps a universal like 'mother'.[12]

Second, Aristotle has brought up this perceptual ability to explain how we rational animals can grasp the first principles. Evidently, he believes that he can explain an ability to know through the features of an ability to perceive. But why? We can resolve this puzzle if we recognize that Aristotle has the view that the same operation whereby perception arises in animals can produce other things such as memories, experience, and comprehension of the universal, when applied to other materials as input. This solution agrees with (my interpretation of) Aristotle's psychological theory of perception and thought and their similarities. For, as he says there, thought is a kind of perception. That is, the operation is abstraction, and it is recursive.

Third, given Aristotle's paralleling the ability to perceive the (*per se*) perceptibles with the ability to know, he seems to be allowing for error in both cases. I have already discussed two causes of error in sense perception even of the *per se* perceptibles that Aristotle admits: the sense organs may be abnormal; the *per accidens* connection might be fallacious or taken as a *per se* one. Further, in this very passage [99b26–34], as in the *Physics* passage just discussed, Aristotle says that we have at

[12] See Chap. 5 and Bäck 2009 on the practical syllogism and its relation to the fallacy of accident and perception.

the start the first principles inchoately and not determinately. How then can even Aristotle tell when the first principles have been grasped determinately, accurately, and infallibly?

To be sure, at 100b7–8 Aristotle does say that *noûs* and science are always true and do not admit deception. [Cf. *Eth. Nic.* 1141a2–6] We might ask: true at what? Perhaps, as with sense perception, the mere apprehending of intelligible objects brooks no deception. Still our judgements and descriptions of them allows for deception, just as we perceive what we perceive without error but are led into error by our judgements and descriptions of these perceptions.

Still how to explain Aristotle's claim that *noûs*, science, *phronesis* and wisdom cannot be deceived? Perhaps he means to say that this infallibility is but an ideal for us: beginning with the indistinct universals of sense perception, we start with what is not evident in itself but rather confused, and work towards this idea. [*Metaph.* 1029b1–12] That is, *noûs* as such may be infallible but not the *noûs* in us. [72a1–4][13] After all, Aristotle recognizes that there were many scientists before him, and claims that most of them were wrong in most of their claims (Bäck 1999).[14] Note that he might be saying mostly that *noûs*, as it gives us the primary principles of science, is the most clear and certain of what knowledge we have. [100b8–13] Indeed, at *De Anima* 428a3–6, Aristotle classifies *noûs* among those faculties that can be in error—at any rate, as far as we can know. Perhaps the best way for us to check on the accuracy of our apprehension of first principles, for Aristotle as well as for us today, lies in working out their full articulation in demonstrative science and then checking the claims being made with our experience.[15] So too in *Republic* I Socrates claims that the ruler *qua* ruler cannot err, although human rulers err.

In any case, Aristotle recognizes a continuum from perception to knowledge, with the same process being applied to different inputs and outputs, where the process is not different in kind in form, but only in matter and content (Modrak 1987: 118–25).[16] [417b18–23; 429a13–18; 429b20–1] Indeed, he uses 'γνῶσις' to signify both the knowledge of demonstrations and their immediate, primary principles [99b21–2; 27; cf. *Metaph.* 980b1], and the perception of animals. [99b38–9] As we have seen, he frequently suggests a parallel between perception and knowledge, and mainly emphasizes only the difference that the activity is performed on different

[13] Accordingly many different types of *noûs* came to be distinguished in the Aristotelian traditions. Cf. Hasse 2000.

[14] See the previous chapter for a possible resolution of the problem over the status of *noûs*, in terms of *per se* and *per accidens* perception.

[15] Cf. Hempel's D-N method. This would bridge the gap that Ferejohn (1991: 4–5) sees between the method of scientific explanation developed in the bulk of the *Posterior Analytics* and the intuitionist, quasi-Platonist grasp of first principles by noûs in its last chapter. Cf. Charles 2000: 265–6 on how the first principles are known and how they become known as starting points.

[16] Until quite recently, such a continuum theory would have been rejected roundly by contemporary scientists. Yet now the view has its supporters. See Ballard 1996: 116–7; P. S. Churchland and V. S. Ramachandran 1996: 155–6. Another current reason to accept the continuum theory is that the same Gettier problems that arise in considering knowledge have counterparts in veridical perception. Cf. Lewis 1996: 549–50.

types of objects. He even grants that the memory of animals is a sort of knowledge (ἐπιστήμη). [*Mem.* 451a26–8; cf. 450a15–6]

7.2 Induction

> In the order of nature, deduction through the middle term is prior and more familiar, but deduction through induction is clearer to us. [*An, Pr.* 68b35–7]

In its most general sense, induction for Aristotle involves getting at things more primary from things less primary (von Fritz 1964: 623–76; Ross 1949: 46–51, 481–3; Thompson 1975; Couloubaritsis 1980: 471; Upton 1981: 172–6). In contrast, deduction or demonstration consists in moving from the more primary to the less primary. Aristotle says, "it is clear that we must know the primary [principles] by induction." [100b2–3] At *Nicomachean Ethics* 1139b28–32, Aristotle says that induction allows the universal to be grasped, and that syllogisms proceed from these "principles". The principles thus grasped include then both universal conceptions yielding definitions and axioms like the principle of non-contradiction (Hintikka 1980: 429). To use Aristotle's slogan, in induction we move from what is most evident to us and least evident in itself to what is most evident in itself and least evident to us. [*Phys*. 184a15–21; *An. Po*. 71b32–72a5] By deduction we move the other way, from what is most evident in itself and least evident to us to what is most evident to us and least evident in itself. By repeated processes of induction we get at the first principles of science and its universals, which are the ultimate abstractions. For Aristotle the things most evident in themselves consist in principles common to all the sciences, like the principle of non-contradiction, and those peculiar to a particular science, like the parallel postulate in geometry, as well as the objects dealt with in those sciences. Normal science then consists in demonstrating theorems via deductive syllogisms from these universal first principles along with other assumptions. By repeated processes of deduction, ending with expository and practical syllogisms, we become able to apply science to the objects with which we have initial acquaintance.

Aristotle inherited this conception of induction from Plato. Richard Robinson thinks that Plato has three types of induction: intuition of the universal via a survey of instances on the same level of generality; a complete enumeration of such cases; an inference to the universal, an inference that can be overturned.[17] For Plato not all induction leads to a universal; induction can yield a conclusion on the same level of generality (Robinson 1953: 35–8; Vlastos 1991: 267–8). Mark McPherran (2007: 359–60) has examined Robinson's evidence and mostly concurs with his results.

Thus, in general induction means getting at something more primary from something less so, where the latter often are singulars or more specific universals (Ross

[17] In this third sense, cf. (ps.) Simplicius, in de *An.* 188, 16: *epagōgē* in the sense of reduction to the impossible.

1949: 487).[18] It need not mean an enumeration of particular cases from which more general conclusion is inferred. Yet often Aristotle does take induction thus: if all individual instances of S are P, then S is P universally. [*An. Pr*. 68b27–9; 69a13–9; *Top*. 105a13–8; 108b10–1; 156a4–7; *Eth. Eud.* 1248b25–6] Aristotle routinely describes induction as starting from the singulars given by sense perception. Still, even when there is an enumeration, the enumeration need not be complete for the induction to proceed.[19]

Aristotle contrasts induction and perception.

> Now of first principles we see some by induction, some by perception, some by a certain habituation, and others too in other ways. [*Eth. Nic*. 1098b3–4]

Induction here consists in the movement from those singulars to something more primary. Hence Engberg-Pedersen (1979: 305) describes induction as "something like attending to particular cases with the consequence of insight into some universal point is acquired or as acquiring insight into some universal point as a consequence of attending to particular cases."[20] Induction gives the first principles or starting points for theoretical science; perception gives the starting points for practical reason, by supplying the minor premises in practical syllogisms (Bäck 2009: 123–5).

The perception by itself does not give the universal. To be sure, Aristotle does say that 'what does not twinkle is near' can be established by induction or through perception. [*An. Po*. 78a34–5] Perception provides direct apprehension, typically of singulars. For instance, I can just see that the light nearby does not twinkle, or I can infer, by enumeration of the cases that I and others have seen, that all lights nearby do not twinkle. Still, Aristotle says,

> …even if perception is what is of such and such, and not of individuals, still one necessarily perceives an individual and at a place and at a time, and it is impossible to perceive what is universal and holds in every case; for that is not an individual not [read: nor?] at a time. [87b28–31]

The universal holds at many times and places; as such it cannot be perceived. Once we have the universal, we can understand the cause. If we were on the moon, we would see it eclipsing the sun and from seeing that several times, via induction, we can get to the universal. [87b39–88a5; 90a28–30] Once we have located the position of that universal in the hierarchy of universals, we can construct the demonstration why the moon is eclipsed.

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[18] This account of induction covers Caujolle-Zaslavsky 1990: 362, n. 3. Harari (2004: 5, 16–8) wants to keep the process to getting the universal and the process of concept formation by induction more distinct.

[19] Hintikka (1980: 427) comments on *Prior Analytics* 68b15–21: "It is this passage that has encouraged the idea of "complete induction", in other words, the idea that Aristotle is thinking of C as made up of a finite number of subclasses which together exhaust the range of B. This is not very likely, however." Hintikka goes on to note that Aristotle lists other bileless animals elsewhere. [*Part. An*. 670a20. 677a15–b11]

[20] Cf. *Topics* 105a13–4; 100a6–7. Cf. Caujolle-Zaslavsky 1990: 384.

How does induction differ from abstraction? Abstraction is the general process of selective attention, of fixing upon certain aspects of an object while ignoring whatever other ones of which one happens to be aware. Induction for Aristotle, as I have said, extracts or selects something more primary from a group of things less so. Now abstraction need not produce something more primary or more universal. Nor need it operate on a group. I can abstractly consider the particular shape of this particular table. These two are on the same level of generality, with the substance table being primary to the shape. To be sure, abstraction figures in every induction, but not every abstraction is an induction.

Others say otherwise. For instance, Kahn (1981: 354) holds that abstraction is a special case of induction.[21] To be sure, Aristotle does say:

> …it is impossible to consider universals except through induction (since even in the case of what are called abstractions [literally: those said by abstraction] one will be able to make familiar through induction that some things belong to each genus, even if they are not separable, in so far as each thing is such and such), and it is impossible to get an induction without perception. [*An. Po*. 81b2–6]

We get to universals by abstracting out what is most primary *simpliciter* from the less primary, which here is also the more particular. This holds for the simplest and most primary objects of mathematics, the things said from abstraction. Aristotle contrasts what is prior to us with what is prior *simpliciter*: the former is closer to perception; the latter is furthest from it and closest to the universal—and is simplest because it has the least combination of elements. [72a1–4] When the inductions aim at getting to these simplest universals, induction is indeed a process of going from the particular to the more universal. Still not all inductions do this, and not all abstractions are inductions.

Given my conception of induction, I also see no need to agree with C. D. C. Reeve (2000: 19–20), who gives Aristotle two types of universals: one tied to perception in experience via particulars, and the other tied to thought in science via induction. Again there is no need to exclude inference from induction as Engberg-Pedersen (1979: 305) does.[22] Induction can cover both types of universal; it may or may not involve logical inference. Ross however concludes that Aristotle's technical sense of induction involves inference (1949: 483). I agree that induction moves to the more primary. Still this need not involve a deliberate logical inference. In this way a crow sees this-here yellow shape as an instance of food, so as to get a minor premise in a practical syllogism (Bäck 2009: 117).

How does induction relate to *noûs* in the apprehension of first principles? A common interpretation is that induction proposes "putative first principles", and then *noûs* intuits whether or not these principles are correct (Modrak 2001: 104; Bolton 1996: 299–301; Engberg-Pedersen 1979: 311. Caujolle-Zaslavsky 1990: 372; Couloubaritsis 1980: 449; Barnes 1994: 260–2). Yet this seems too strong, given the

[21] Cf. Modrak 2001: 118; Cleary (1995: 472) says that Aristotle does not mention abstraction in *Posterior Analytics* II.19, and that many commentators assume it, but without textual support.

[22] I do agree with his contention that Aristotle does not consider an induction a "logical" inference (Engberg-Pedersen 1979: 307).

fallibility of *noûs*: even the philosophers err in judging which principles are correct. Rather take *noûs* as the ability to grasp the result of that process.[23]

As noted in the previous chapter, Aristotle does seem to recognize the fallibility of *noûs*—the *noûs* in us humans at any rate. Modrak (2001: 106–7) herself asks for the warrant of the truth of these putative first principles, and finds it in an externalist justification.[24] That is, if the causal conditions for knowing are satisfied, then the principles are true. This condition would agree with Aristotle's correspondence theory of truth. Still it would seem to make it forever impossible for us to know for certain that we have apprehended the first principles correctly.

At the end of the *Posterior Analytics* Aristotle gives a picture of how we come to grasp the universal from sense perception by induction. By sense perception we become directly acquainted with particulars. Repeated sensory experience of similar particular things produces a single memory in the mind, a phantasm applying indifferently to all these particulars. When we apprehend this phantasm as universal via *noûs*, sc., as applying to all similar cases, even beyond those actually experienced, we have apprehended the universal.

In effect, the induction here consists in sense perception plus memory plus *noûs* yielding the universal. The process need not be deliberate but only discriminative, as with animal experience. The universals thus generated look mostly to be single concepts. But principles are propositional. Perhaps we could get propositions via relational universals: we perceive so many particular cats on particular mats, apprehend the universal concept of cat-on-mat, and come to the universal judgement that every cat is on the mat (καθ' αὑτό). But it's hard to get to the principle of non-contradiction or the parallel postulate in this way.[25] For terms like 'contradiction' and '(perfectly) parallel' hardly seem given to us via particular sense perceptions.

Even if we could, and did, apprehend universal principles in this way, the mechanical nature of this process sets Aristotle another problem: given that we come to apprehend the universal without volition, willy-nilly, why then do not all people with the relevant experience with a reliable causal structure agree on these principles (Hamlyn 1976: 179)? Like Socrates, or Descartes for that matter, Aristotle seems to present the picture that if we but attend clearly to our thoughts, we cannot but help acquire knowledge of the universal. But most of us don't. Thus, taken as a psychological causal process, induction does not suffice for us to discover the first principles of the sciences infallibly. I am inclined rather to consider Aristotle "naïve" in a pragmatic sense: we apprehend universal claims abstracted from the

[23] Likewise Hamlyn (1976: 171) says that induction "is not just the transition to that state [of insight by *noûs*]; rather it is that which makes it possible."

[24] Cf. Irwin 1988: 104.

[25] At one point he seems to imply that the principle of non-contradiction needs only the apprehension of its existence. [*An Po.* 71a13–4] Yet that principle does require combination of simples into a sentence, and so admits of truth and falsity. So probably it is not a single concept. Or, perhaps, we might take Aristotle to say, like Descartes, that in the case of logical tautologies no inference is needed but only "the light of reason".

particulars, defend the ones supported by the phenomena, but still are willing to revise them and make fresh starts should we have reason to do so.[26]

In sum, induction is the process of getting at or jumping to more primary features from more particular ones (Von Fritz 1964).[27] *Noûs* is the ability or disposition to make such jumps (Gauthier and Jolif 2002: 490; Barnes 1975: 256–7, 275). For Aristotle (as for us) science consists in a very messy mixture of looking at the available observations, reports, and expert opinions, analyzing and drawing inferences from this material, and then theorizing, testing the outcome, and thereupon revamping the theory, including its first principles. The result is a more or less coherent scientific theory, continually in process of systemization, unification, and revision. Despite his occasional theoretical exaggerations, Aristotle follows this conception of induction in his practice. True, Aristotle does hold that, if we could reconstruct the complete hierarchy of universals, we would grasp the universal infallibly—but neither he nor we are there yet.

7.3 The Ladder of Induction

Just as Plato uses love as a force to pull us mortals up to the apprehension of Beauty itself, so too Aristotle uses induction to bring us lovers of sights and sounds to a divine perspective, the apprehension of the first principles of theoretical science.

At the end of the *Posterior Analytics* Aristotle gives a picture of how we come to grasp the universal from sense perception. By sense perception we become directly acquainted with particulars. Repeated sensory experience of similar particular things produces a single memory in the mind, a phantasm applying indifferently to all these particulars. When we apprehend this phantasm as universal, sc., as applying to all similar cases, even beyond those actually experienced, we have apprehended the universal. Aristotle calls this ability to grasp the universal '*noûs*' ('comprehension' or 'intellect'). '*Noûs*' then is "a generalizing capacity or ability that is responsible for the fact that a universal point, something, that is, which goes beyond what is grasped in sense perception, may come to be present to the mind" (Engberg-Pedersen 1979: 308).

As Aristotle's psychology already has suggested, apprehension of the primary universal principles arises in stages from sense perceptions, for those animals fortunate enough to have all of the stages. Some animals have only the perceptions of the moment with no retention; others have these present perceptions with the ability to remember them (memory), and to retain and recall them (recollection and imagination) [*Mem.* 450a15–9]; others can combine their memories of particular sensations into a single experience. "For the many memories of the same object complete the

[26] Phenomena and *endoxa* have a problematic relationship. See Owen 1986: 240; Nussbaum 1986: 244, 274–5; Bäck 1999: 164–8.

[27] Modrak (2001: 102–3) distinguishes various aspects of this process.

capacity for a single experience." [*Metaph.* 980b29–981a1; cf. *An. Po.* 100a4–5][28] These stages arise from the repeated application of abstracting, taking the output of one stage as the input of the next stage. Here Aristotle is viewing induction as a process of abstraction of universals from singulars. The recursive feature of abstraction helps to understand what Aristotle says about induction.

Aristotle has then a chain of mental processes—perception, memory, recollection, imagination, and experience—each using materials produced by the prior process in the sequence. The next stage, of grasping the universal so as to be able to provide the primary principles for science, operates on experiences for its material.[29] "From experience or from the universal now at rest in the soul" arise the principles for art and for science. [100a6–7; *Metaph.* 981a1–3][30]

Although Aristotle does discuss how knowledge of the universal arises from perceptions in the last chapter of the *Posterior Analytics*, his main goal is to explain how to get a hierarchy of universals so as to be able to locate and intuit the first principles, as Brentano (1977: 145) has said.[31] Aristotle is running this account of the formation of the universal together with his explanation of this hierarchy. I suggest, tentatively, the following reason for his running the two together: to get a fully articulated, "determinate" conception of any universal requires grasping the hierarchy of universals. For Aristotle, determinate understanding requires being able to articulate the definition. The definition of a (non-ultimate) universal comes from its genus and *differentia*, which are higher universals in the hierarchy. So the process of coming to grasp a universal determinately comes along with the process of coming to grasp the entire hierarchy. Here Aristotle does not distinguish propositions sharply from concepts. For the propositions can be read off from the hierarchy of universals, just as information can be contained in a map.[32] The principles grasped by induction would then include universal concepts, their definitions, existence claims about them, as well as the common and special axioms using such universals. [Cf. *An. Po.* II.3; I.10][33] Moreover, the two processes have a common structure, namely the operation of abstraction, done recursively.

According to his own testimony, Aristotle gives two versions of his account of this process, the second being clearer than the first. [100a15] Thus we have two passages expressing features of the same doctrine, sometimes the same ones,

[28] Alexander (*in Metaph.* 4, 13–6) wants Aristotle to deny that animals have experience altogether. Still the text suggests that animals do have a bit of experience: as Hume will have it later: of the same sort as human beings but limited by having less capacity of memory and sensation. Cf. Ross 1953: 117.

[29] I agree with Modrak (1987: 162–4) that Aristotle views both concepts and propositions to be apprehended. Our knowledge of the universal will ground both definitions and the axioms, both common and special to the sciences.

[30] Translators like Mure assume that the experience itself is of the universal, and so take the "or" inclusively.

[31] Robin Smith has a similar view and I am indebted to him for this point.

[32] For instance, Braddon-Mitchell and Jackson (1996) have argued that cognitive representations have a *map-like* rather than a linguistic structure.

[33] So too Hamlyn 1976: 178.

sometimes different ones, on the formation of the universal: (1) "And from experience, or from the whole universal that has come to rest in the soul (the one apart from the many, whatever is one and the same in all those things)…" the principles arise. [100a6–8] These "many things" would be the perceptions.[34] The "one", the universal, is at rest relative to those perceptions giving its features, because perceptions are motions presented only for the moment of the perceiving. [*Phys*. 244b11–2; (ps.) Simplicius, *in de An*. 264, 20–35] If the universal were contained in the perceptions and not apart or separate from them, the universal too would be moving about and fleeting, and not yet differentiated from the other features of the perceptions.[35]

(2) Likewise Aristotle says, "when one of the undifferentiated things makes a stand, there is a primitive universal in the mind…" [100a15–6] That is, when one of the things that was formerly undifferentiated in the perceptions stands still, by being abstracted from the moving perception so as to remain still standing in the mind even when the perceptions have gone, the universal appears. Aristotle calls such universals "states" of the soul. [100a10; 99b18]

This second passage goes on to give further details. At the first stage, a universal arises in the soul. Aristotle says:

> …when one of the undifferentiated things makes a stand, there is a primitive universal in the mind (for though one perceives the particular, perception is of the universal—e.g. of man but not of Callias the man); again a stand is made in these, until what has no parts and is universal stands—e.g. such and such an animal stands, until animal does, and in this a stand is made in the same way. Thus it is clear that it is necessary for us to become familiar with the primitives by induction; for perception too instills the universal in this way. [100a15–b5]

The first universal at the level of the lowest species arises when the many undifferentiated things come to rest so as to make apparent the one common thing apart from, or in addition to, the many things that have it. [100a6–8] The perceptions and the representations derived from them do not have a definite, differentiated structure. Rather, they change and flit about, rather like the birds in Plato's aviary. Thus we may have many different visual images of different women or even of the same woman, whom we can misidentify.[36] The images themselves are colored shapes, while what is represented by them is the image of this or that woman. Note, once again, that we cannot be deceived about the colored shapes that we are apprehending but can be deceived about to what subjects or substances they belong or err in our descriptions of them.

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[34] Or, perhaps, as Engberg-Pedersen (1979: 317) suggests: "repeated cases of attending to a perceptible state", i.e., to the same perception.

[35] Barnes (1994: 264) says that 'rests' (ἐρεμήσαντος) at 100a6 means only 'remains'. He cites *Phaedo* 96b8, *Int*. 16b21; *Phys*. 247b11—but there the sense does seem to be 'come to a standstill'.

[36] At 100a4 πολλάκις τοῦ αὐτοῦ may be taken to mean "often of the same thing"—that is, the perceptions giving rise to the universal are often of the same thing, like the same woman, but need not be.

At this first stage, "there is a primitive universal in the mind." We might think here of *Physics* 184a21 & b13, where Aristotle suggests that we have in sense perception itself an indeterminate, fuzzy image common to many things before we have a determinate perception of a singular. Thus a child has an image of "Mother" common to many women before she can perceive Mother uniquely and determinately.

However, 100a16–b1 says that "one perceives the particular, perception is of the universal—e.g. of man but not of Callias the man." Now "Callias the man" sounds very much like the indeterminate mother image of the *Physics* and likewise one of the "undifferentiated" things at 100a16.[37] A child might have a clear distinction, namely, be able to reidentify an object, like the woman Mother, or even women in general, without having a distinct one, sc., being able to give criteria for distinguishing that object from other objects: the child has not grasped the universal by apprehending its definitions, the formula of the essence. Such a generalized image or "concept" (not in the strict sense, if animals have these) might include features like being red-haired or dark-skinned: not the concept of human being strictly, but only the features of the generalized image. Thus the primitive universal is not this indeterminate, fuzzy image.

So perhaps instead Aristotle means by 'primitive universal' at 100a16 what he meant at 99a34 (Barnes 1994: 266). There he defines a universal D that such that each of its instances d_i is a D but without [A to A] conversion: every d_i is D, but not every D is d_i. Here the point is that the universal D is not commensurate, or coextensive, with any of its instances d_i. The first or primitive universal, he says, is one where this holds and where in addition the universal is coextensive with the totality or set of its instances (Irwin 1988: 512, n. 11). Aristotle has already stressed that "primitive" universals must be commensurately universal in this way. [*An. Po.* 73b32] Thus 'man' is such a universal, an *infima species*, but not 'Callias the man'.

Aristotle then goes on to say that this universal "man" can then be taken as one of the items making a stand. When Aristotle goes on to say that "such and such an animal stands until animal does," he is thinking of the species of animal. The genus animal is the universal primitive for them (Hamlyn 1976: 179). It in turn can be taken as one of the items making a stand until we get the universals without parts, namely, ultimate abstractions having form but no matter (Barnes 1994: 265–7).

Once a universal is produced, it in turn is taken as material on which to perform induction and abstraction. That is, the universal standing at one stage, as output from an induction, can come to be the input for a further stage of induction until we get simple things on which no abstraction can be performed as they have no parts. Here clearly Aristotle views these successive processes to be all of the same type.

Moving from something more particular to something more universal involves abstraction. Induction is a type of abstraction where often the more universal is picked out of the more particular. When the output has no parts, then there is

[37] Thus Summers (1987: 27) says that the particulars called up by imagination "…were, of course, the "forms" of particulars at the first level of abstraction from external sense. They were not, however, sufficiently abstracted to be the "universals" subject to the activity of intellect."

nothing to pick out with a residue left—such things without parts will be the ultimate abstraction. Aristotle argues at some length that the hierarchy thus generated has an end and that the process occasions no infinite regress. [*An. Po*. I. 19–22; *An. Pr*. I.27]

These successive stages of induction produce a hierarchy of universals or terms. In this hierarchy, when there is no term intermediate between the two, the relation of the higher to the lower one is "primitive" and generates an immediate proposition. So too, after a rout, in making a stand one after one, the soldiers are (re-) constructing a hierarchy or formation. As Brentano and Robin Smith have observed, Aristotle's main concern is to grasp the principles for demonstration and science, those propositions that are primitive and "immediate", namely those for which there is no middle term coming between its subject and predicate making a demonstration of its truth possible. Aristotle says that induction grounds the truth of such predications. [*An. Pr*. 68b15–8]

Aristotle says that perception produces the universal and that perception is of the universal, even though the singular is perceived. [102b5; 102a15–7] These claims agree with my interpretation. The perceptions of the five senses are of individual things, like colors, sounds, and tastes. Still these individual things have universal as well as singular attributes. Indeed, if the universal were not present somehow in these experiences of the individuals, they would not be able to be abstracted nor would it be able to be claimed that these individuals have those universal attributes.

Aristotle says that "from" experience or from the universal at rest in the soul arise principles for art and science. [100a6–8] Given his view of experience, the difference would be that experience provides universal concepts and some statements connecting them on the basis of *per accidens* perception. The universal at rest in the soul will help to constitute the whole hierarchy of universals from which the principles of science and their justifications can be read off and where the connections are no longer *per accidens* but *per se*.[38]

7.4 The Rout Metaphor

Despite all that has been made of it, Aristotle gives a rout metaphor merely in passing:

> …as in a battle when a rout occurs, if one man makes a stand another does and then another, until it comes to the beginning (ἐπὶ ἀρχὴν). [100a12–3][39]

[38] Wedin (1988: 157) says: "I have ventured to inject language acquisition into the discussion of concept acquisition partly because the alternative account of how nous gains awareness of features of the world that exceed the strictly sensible is wholly mysterious." My hierarchical account is linguistic too, except that for Aristotle the language in question is the mental one.

[39] Or: to the principle? Barnes has changed the text, perhaps for the sake of his interpretation and not on account of manuscript evidence, so as to get "a position of strength is reached."

I would suggest, as Aristotle himself might be doing at 100a15, that this metaphor is "unclear". For it presents some features of how a universal comes to rest in the soul from the many things, the individual perceptions, which are (presumably) moving about in it, and other features of how an ordered hierarchy of universals comes about in the soul. The ambiguous application comes about because Aristotle uses 'stand' in his description of the rout at 100a12, as well as in his description of the first universal coming about [100a15–6] and for the entire array of universals. [100b2] My account will explain why Aristotle would be tempted to run together the two accounts: the same process of abstraction operates in both.

By saying "until it comes to the beginning", Aristotle is thinking of his hierarchy of universals. Aristotle is considering here how to get first principles for the sciences, both ones common to all and those particular to some.

Aristotle says that we must recognize the primary things by induction. [100a10–3] By his own admission, he is going too fast here. [100a14–5] Rather, there is a series of inductions for each level of universals. At each stage in reforming the hierarchy of universals induction comes into play. [100b1–3] So we get knowledge of the first principles for science by induction, ultimately from perceptions. Once we have the universals in the array, we can construct principles like definitions by reading off universals that have no mediating connection. Thus, if animal is directly above dog, we have as an immediate principle that dog is animal, which is its proximate genus.

Aristotle compares this to soldiers in a rout. One can make a stand and then another until they get back to the original order of their formation.[40] So, just as in a rout, we do not have presented to us the elements of our experience in an orderly array. Rather, we can perceive the universals fleetingly, without order and with many accidental connections, in the moving field of perception and experience.[41] Via memories and cognitive abstractions upon them we can get the universals to stand fast. We need for them to come to be in an organized array displaying the hierarchy of universals. Once one stops and another and so on, until we come to the beginning of the array, so as to end the infinite regress of universals, the rout has ended.

What is scattered is the array or structure, which is like the universal. We start from what is most familiar and evident to us, singulars—indeed at first the accidents. These exist, and we perceive them, at different places and times. Yet many singulars are instances of the same universal. We need to get these singulars to take a stand, so as to present the single universal of which they are instances.

Gadamer gives a clear statement of the general point of the rout metaphor. (It is an analogy instead, if soldiers are to the formation as universals are to the hierarchy, or as perceptions are to the universals.): An observation is confirmed by its being repeated. For, at first it does not stand fast as something definite in perception and

[40] This text has mss. difficulties; cf. Ross 1949: 677 and Barnes, *in situ*. All the variations though agree that this is the general sense.

[41] In Chap. 5 I have argued that the content of perception must include the universals, in order for it to be possible for them to be abstracted.

in memory. By repetition it comes to do so. Then other observations join it, "…and then finally the whole fleeing host stops and again obeys a single command. The whole army under unified control is an image of science" (Gadamer 2004: 345–8). Note that here we have the same conflation of the two processes: the formation of a universal and the formation of a hierarchy of universals.

Gadamer claims that the rout metaphor is an imperfect analogy since it assumes that before the rout the army was standing fast, whereas, before the induction, at least for the individual perceiver, there were no perceptions or experiences of universals standing fast. However, if universals exist *in re*, as secondary substances dependent for their existence upon the primary ones, or insofar as the principles of science for Aristotle are real, then this point does not hold. Rather, via perception and thought the scientist re-creates and re-presents the real structure of the world. In fact the Spartans and even more so the Macedonians were capable or wheeling, reforming, and changing up their phalanxes.[42] Still, I admit, the rout metaphor does have a Platonic flavor—as Aristotle is responding to the account of knowledge as recollection given in the *Phaedo*. The point is that Aristotle can reclaim and transform the Platonic feature of re-formation by making it a process of re-collecting the scattered elements of the universal from their sense perceptions where their representation is often quite tainted with accidental features.

Aristotle's rout metaphor gives structurally the same account for the formation of universals as induction does. In his second, "clearer" account, Aristotle speaks first of one of the indistinct and undifferentiated individual perceptions taking a stand in the soul, so as to produce a "first" universal, i.e., one first in time and perhaps also first in the series. Then from such as this one arise other universals, as from a certain sort of animal to animal, until we get to the most general ones. [100a15–b2; cf. *Phys*. 247b5–7; *An.* 417b18–23] Here we have a formation of universals, each of which is formed from being a one standing still apart from a many moving about. The standing still of the soldiers in formation after running away from their formation applies to both processes, the formation of the hierarchy as well as the formation of each universal in that formation: the first row of the phalanx needs to be completed before the second row can be formed etc. Nevertheless, given the common structure of abstraction, Aristotle has some reason to conflate the two processes. For they all count as inductions, namely, as abstractions from the more particular to the more general and primary.

Does then saying that the rout has ended means only that there is a permanent formation or also that the original formation has been restored? The pseudo-Aristotelian *Problems* explains cloud formation as a rout: once one man stops, others will rally around him and the rout stops. [941a9–13] In this case there is no original formation to recreate.[43] However, to repeat, Aristotle thinks that our thoughts can reflect real structures: the mental language gives likenesses of real

[42] Instead of 'rout', τροπή *might* mean just 'a turning' or 'a wheeling around', namely, of a military formation, a phalanx.

[43] Hamlyn (1976: 178) claims that, if the original formation is being recreated, "…we should indeed be back with the Platonic solution of the problem of how learning is possible…"

objects. [*Int*. 16a4–9] As Aristotle insists that species and genera are real objects, for us to have materially true concepts would require that these re-present them.

In order to understand the analogy of the rout in more detail, let us look more at the analogue. In Aristotle's time, infantry—the soldiers who did in fact "stand"—were arranged in phalanxes. Routs of infantry in the formation of a phalanx were common—especially when facing Spartan infantry, itself arranged in a phalanx. Reforming the phalanx or even taking any sort of stand thereafter was not so common. Only the Spartans and the Macedonians had the training necessary for shifting positions within a phalanx or reforming it on the run. Otherwise a phalanx was typically formed by a set overlapping of shields with a norm of three to eight rows deep without specialized positions formed by soldiers jostling about to take some position or other.[44]

Phalanxes had several common features. Individual excellence counted for little. Indeed a solider stepping out of formation to do individual battle could be found guilty of a military crime.[45] A phalanx demanded collective action. What was true of the whole phalanx tended not to be true of its parts, and *vice versa*—as in the fallacy of composition and division. The cardinal virtue of a phalanx was εὐταξία, being well ordered, and its cardinal vice ἀταξία (Spivey 2004: 21). Aristotle himself remarks, "without order (σύνταξις) infantry [hoplites] is useless." [*Pol*. 1279b19–20] He also holds that an army gets its ordering from its general. [*Metaph*. 1075a13–5]

However, if Aristotle was thinking of the innovations of Philip and Alexander of Macedon, his analogue would have more detail. For the infantry in a Macedonian phalanx did specialize in position and did, to some extent, regroup, although not frequently after a rout (indeed, they were seldom routed). It is likely that Aristotle would have seen the drilling of infantry by Philip and Alexander of Macedon including the formation of phalanxes, perhaps on the fly.

In the specialized Macedonian phalanx, being well ordered functioned like justice with each part doing its own task well:

> Professional corps of light infantry, slingers, archers, and javelin men rounded out the composite army group, supplying both preliminary bombardment and crucial reserve support. These Macedonian contingents were not a fragmentation of forces, but rather a diversification and sophistication in arms: they were a symphony, not a cacophony, [p. 36] of professionally equipped men. (Parker 1995: 35–6)

We can see the same specialization in the analogy between an army and the universe in the pseudo-Aristotelian *On the Universe:*

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[44] However, Lesher (2010: 100–101) claims that there is no instance in Greek military history of a phalanx being reformed after a rout.

[45] Cf. *Politics* 1285a13–4, where Aristotle quotes Homer (*Iliad* II 391–393): Does he not say: "When I find a man skulking apart from the battle, nothing shall save him from the dogs and vultures, for in my hands is death." The context is that a king has the power to kill citizens while on military campaign, but still the passage might mean that the main offense is not cowardice but breaking the order of the formation.

> When, therefore, the ruler and parent of all, invisible save to the power of reason, gives the word to all nature that moves between heaven and earth, the whole revolves unceasingly in its own circuits and within its own bounds, sometimes unseen and sometimes appearing, revealing and again hiding diverse manners of things, from one and the same cause. Very like is it to that which happens in times of war, when the trumpet sounds to the army; then each soldier hears its note, and one takes up his shield, another dons his breast-plate; another puts on his greaves or his helmet or his swordbelt; one puts the bit in his horse's mouth, another mounts his chariot, another passes along the watchword; the captain betakes himself straightway to his company, the commander to his division, the horseman to his squadron, the light-armed warrior hastens to his appointed place, all is hurry and movement in obedience to one word of command, to carry out the orders of the leader who is supreme over all. Even so must we suppose concerning the universe; by one impelling force, unseen and hidden from our eyes, all things are stirred and perform their individual functions. [*On the Universe* 6]

Given the specialization of the members of a phalanx or an army, the rout metaphor applies well to Aristotle's wanting to reconstruct the full hierarchy of universals, from which we can then construct first principles like axioms and definitions. This would have to be a reconstruction of the original: for Aristotle such a phalanx would have only one way to be well ordered.

An observer not already familiar with a phalanx or army would not see it clearly with only a few soldiers in place. Yet, as more take their places, the formation is filled in and its structure becomes more apparent. Moreover, the formation has attributes different from that of its individual components: it is not alive, whereas the soldiers are; it is a turtle, while they are not; in particular, the order or "form" of the phalanx differs from that of an individual soldier in it (Everson 1997: 226).[46] Yet they also have some common features: both are military; indeed, both are "human", not in the same sense, since the soldiers are individual human substances, while the phalanx is a military formation, designed and staffed by human beings.[47] The constituents of a phalanx are not precisely human beings, but rather soldiers or perhaps particular types of solders like shield-bearers. In Aristotle's ontology such items are not substances but *qualia*, paronyms of qualities like being a soldier or boxer.

Or, perhaps, to make the metaphor of the rout yet stronger, Aristotle might be thinking of a few soldiers coming to make a provisional formation, albeit not a phalanx at all, and certainly not a complete phalanx. Then those provisional formations come together into yet larger formations, until the whole formation of the phalanx is reestablished and becomes clearly discernible. This would resemble the process of developing scientific theory.

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[46] Everson (1997: 268) says that in experience all that is required is that there be a sufficient number of perceptions, and not that they be arranged in a certain way, unlike the soldiers. Still, the animal having the experience has to have the faculty of the right sort to store and bring up the memories: so does that thereby provide the analogous structure? Notice that in the perception of the motion of a raindrop the perceptions must be arranged in a certain way.

[47] Parker 1995: 37: "The fourth-century BC Athenian general Iphicrates had foreseen these multifaceted military innovations when, in typically Greek fashion, he compared the new army to a human organism: light-armed troops as hands, the cavalry as feet, the infantry phalanx proper as chest and breast-plate, and the general as head."

Likewise, we might surmise, sense perceptions by themselves do not offer a clear idea at all of the universal formal structure or essences of the objects being perceived. Still the provisional formations of the phalanx and of the universal may give rise to inaccurate conceptions of it. They might form fuzzy general notions like the Mother of childhood or like those coming from experience, perhaps based on *per accidens* connections. Yet repeated perceptions—once combined, likely by the imagination—may give rise to a more distinct image of the structure. Moreover, just as the battle formation has quite a different nature and constituents than the individual men composing it, so too the structure revealed by many individual perceptions taking a stand may have quite different attributes than those of its constituents. If, in the analogy, we think of the formation being established gradually after the rout, in stages, we have the stronger point that likewise the different stages—the perceptions of the inchoate universals, the memories, the *phantasmata*, experience, and the universal—come to be established in a series of processes. Further, perhaps, just as the soldiers have different places in the military formation, so too the objects at each stage have a definite place in the structure of the whole. Again, in these processes, some of the structural features of the earlier stages are lost: a perception is not a material object; a memory is not of what presently exists; what is seen of the apple is two-dimensional, while the memory of the apple might be three-dimensional. Yet some other properties may reemerge: the experience concerns common features of the individual cases; the universals have some features of the individual cases, but also a nature apart from them that contains features not present in the individuals. Thus the apple that is seen, the individual substance, is three-dimensional, what is seen is not, but what is imagined (or constructed from a series of visual perceptions) is three-dimensional once again. So too snubness has the structure of concavity plus that of the appropriate nasal materials, while concavity is what it is to be snub (its form, as snubness is concavity in a nose) but also is a mathematical property whereas snubness is not. [*Metaph* 1037a29–33]

Gadamer objects that the rout metaphor differs from the process of induction in that in perception we do not have at first the complete formation, as we do in the battle prior to the rout.[48] However, in a way we do, although we have them potentially and not actually. Aristotle holds that the universals in the categories exist *in re*. Yet, we do not perceive, or, better, experience, them clearly when we have this or that individual perception or experience of individual animals and not of the genus animal. Moreover, the individual features of animals that we do perceive strictly, sc., the *per se* perceptibles, are not the essential constituents of the definition of animal: neither 'animate' nor 'mobile' nor 'substance' (etc.) is a *per se* perceptible. Rather, all these are perceived *per accidens* or (and/or) require further mental operations to be experienced, via the common sense and memory and imagination, even to give an experience of motion. From having an experience of motion it is still a jump to judging that something is "mobile", namely, able to move even when it is not moving now. Other attributes like 'animate', 'substance', and 'rational' are yet even further removed from sense perception. So, as far as what is "evident to us",

[48] So too Hamlyn 1976: 178.

the essential features, those "evident in themselves", have been "routed": the colors, shapes, sounds, smells, feels, and tastes that we apprehend easily do not constitute the essences of the objects being perceived. In a young mind, the order of nature has been routed, and needs re-establishing through education and rational activity, so as to make the induction. *Noûs* is the ability to make an induction. So in a way like the phalanx, the formation of the universal is being reestablished in the process of induction. The universals existing *in re* come to be reestablished in the soul.

However, it may be objected, Aristotle had no actual, historical instances of a phalanx being reformed after a rout. At best the soldiers would cluster together in a group, or retreat without panic, as Socrates and Laches did at Delium. [Plato, *Symp*. 221A] At best, perhaps in a new battle the phalanx would be reformed.

I agree with this objection. The re-formation of the phalanx is the *ideal* or the result of a long process. So too for our re-formation of the hierarchy of universals serving as real principles and causes in the world. Hence, despite the use of induction and *noûs,* our science, even Aristotle's own theory, is fallible. And he often admits that: in his "fresh starts", in his noting that his account of projectile motion and of the unmoved mover are at best tentative, and in admitting that he may have omitted some species of qualities [*Cat*.10a25–6]. We continually re-form-ulate so as to get our theory of match reality, to cut reality up at the joints. [*Phdr.* 265e]

7.5 The Relation of *Noûs*

Aristotle sees the ability to grasp the universal, strictly speaking, to depend upon having deliberative imagination. He distinguishes perceptive imagination, found in many animals, from deliberative imagination, found only in rational animals. [*An*. 434a5–7] The latter, and apparently only the latter, have the ability to make one out of many *phantasmata*. [434a7–10; cf. 431b6–10] That is, via imagination animals can associate a food with a pleasant sensation, whereas in deliberative imagination a rational animal tries to understand why the food causes the pleasant sensation. In this way, dogs drink antifreeze while humans generally do not. The same images are used in both types of imagination, but in the latter, cognitive use, the image is used as an instance, or token, of a more general type:

> The images are used symbolically in thinking about abstract objects. Aristotle remarks that in this case the *phantasma* is used in the same way that a geometer uses a drawing. The geometer ignores particularizing features such as size in order to treat the drawing as an arbitrarily selected instance of its class. (Modrak 1987: 128)

In short, the phantasms provide the basis for thinking, via the deliberative imagination, of the primary intelligibles, the universals. [*An.* 432a12–4; *Mem*. 450a1–9] When thinking of magnitudes via *phantasmata* of determinate quantities, the intellect thinks of these phantasms "as if" they did not have these definite attributes. The universal is already present, potentially in the phantasm: "Thinking is the actualization of a noeton, the material substratum of which is a *phantasma*" (Modrak 1987: 123).

Here however arise some complications. Malcolm Lowe (1983: 17), for instance, claims that Aristotle recognizes two kinds of thinking: (1) an apprehensive sort, continuous with sensation (2) an autonomous sort, not continuous with sensation, but independent of it. Some of Aristotle's predecessors (surely not Plato!) held thinking to be continuous only.[49]

After presenting their views, Lowe (1983: 19–20) says, Aristotle objects: (1) *noûs* is unmixed [429a18–27; cf. *Part. An.* 641b9–10] (2) sensation and thinking differ in how they are affected [429a29–b5] (3) mind eventually (once activated by thinking universals so as to become self-conscious (Cf. Alexander, *in De An*. 85, 25) comes to need no external stimulus.[50] The autonomous sort of thinking looks to have a radical discontinuity with sensation and to constitute a process *sui generis*.

One problem with Lowe's bifurcation of active *noûs* and passive sense organs is that for Aristotle there is form, and hence activity, "all the way down". That is, eyes and ears being compounds of matter and forms have active principles too. The notion that material objects are purely passive may be anachronistic. Still, an account of Aristotle's theory of thinking does need to explain the impassivity of *noûs* as well as its ties to sense perception.

Another distinction might help here. As Kahn (1981: 400) notes, Aristotle asks at 430a5, without seeming to give an answer, why, if active *noûs* always thinks, we do not always think. Do we then "have" active *noûs*? Kahn then argues, *contra* Aquinas, Ross *et al*., that active *noûs* then is not part of us. Rather, active intellect "has nothing to learn from experience" (1981: 412).[51] It is like light, not like someone seeing. Likewise, David Charles (2000: 130) suggests that for Aristotle active *noûs* has two functions, that of light and that of causing our thoughts. Kahn then takes Aristotle to be a suprarationalist, as the sensory input does not suffice for our knowledge of universals. On the other hand, Aristotle tends to stress how much the universals depend and come from the particulars grasped by sense perception. Once again a tension between a natural and a super-natural *noûs* arises.

Perhaps we can resolve these issues by returning to the analogy of *noûs* with light. Aristotle's teacher has already made the analogy ((Ps.) Simplicius, *in de An.*, 131, 17–23; Kosman 1992: 350; Frede 1996: 386). Just as the Sun makes it possible for us to see, so too, he says, the Form of the Good makes it possible for us to know. For Plato the Sun is not light but, while itself unchanging, light flows from it and makes it possible for us to see. Likewise the Form of the Good always is. While having no relations to other things in itself, it provides the light of reason always, so that we might see with the mind's eye. Yet most of us lurk in dark places. So we do not use this light, just as those living in basements or caves do not use the light from the Sun. Still, insofar as we are good, via participating in the Good, we are knowers through using the light of reason. We do wrong only through ignorance by not "seeing" or knowing which things and actions are good. Insofar as there is the Good in us, we ourselves are knowers.

[49] This seems like the two types of universals recognized by Reeve.

[50] Cf. Slakey 1961: 86–7; Robinson 1989: 63, n. 2, who takes Aristotle to be a dualist.

[51] Cf. Kahn 1981: 407.

Notice that 'know', like 'love', expresses a relation, between the one who is the knower (the *lover* of wisdom!) and the object known (sought after and *loved*).[52] The Form of the Good provides the activity of the medium in which the two connect so as to produce an act of knowing. Likewise, Aristotle says, light is the relation by which the perceiver and the perceived color connect up so as to produce an act of perception. [*An*. 418b9–10] The one seeing and the color of the object seen are brought together by means of light; the knower becomes acquainted with intelligible objects via the light of reason, namely the knowing generated by the Form of the Good.

Think then of both light and that kind of knowing as relations connecting two *relata*. View such a relation not as a passive configuration but as an active cause making the connection possible. In this way light and the knowing from the Form of the Good serve not as passive media but as actualities operating upon the things to be related. Thus Aristotle describes light as an actuality of the medium and not the medium—as an *energeia*, literally an "operating upon".

As we today have abandoned the notion that light needs an ether as a medium, Aristotle's view of light becomes hard for us to understand. So consider sound instead. It has a medium of air or water. The source of the sound is a struck object; the recipient is the one receiving the sound and listening, a living substance *qua* hearing. The sound waves connect the source and the recipient of the sound, and *make it possible* for them to be related. Here the sound waves have a causal force and serve as a relation. Likewise for Aristotle light has a causal force, although he does not distinguish light from its medium as sharply as we do in the case of sound and although he has a different view of the causal mechanism involved.

On this analogy with light, we can understand how Aristotle's doctrine of *noûs* agrees with his analysis in the *Categories* of knowledge as a relation. The active, impassive *noûs* serves a function for Aristotle similar to light or to the knowing emanating from the Form of the Good for Plato (Alexander, *Mantissa*, 107–111). [*Gen. An*. 736b27] Aristotle distinguishes the ever-active *noûs* from the *noûs* in us that has the potential to become all things. [*An*. 430a14–5] The latter perishes along with the body, while active *noûs* does not. [430a24–5] Now Aristotle does admit, at 430a22,[53] that *noûs* does not think only at some times. He says also that we do not remember the [former?] activity of *noûs*. [430a23–4] From these texts it would appear that both the *noûs* in us, once activated, and active *noûs* think—but the former only potentially, while the latter actually. [Cf. 429b8–9] Probably Aristotle means that the *noûs* in us, once activated, is a potentiality in the sense of the first actuality: it can now actually think upon demand but actually does not do so always, as when we sleep. [412a21–9]

Yet how then does the active *noûs* come to preside in many of us as separate consciousnesses? What happens to the *noûs* in us after death? Will it continue to

[52] As discussed in Chap. 3, Aristotle does not use the knower as the *relatum* but knowledge, a certain state in the soul of the substance who is the knower.

[53] However, this text has manuscript difficulties; cf. the apparatus. I do not wishes to Jaegerize and exclude it, however.

have an individual experience? Aristotle is silent—perhaps obeying Wittgenstein's *dictum* that whereof we do not know we should remain silent.

Still, let me speculate and not remain silent. Take active *noûs* as the relation connecting the things to be known with the knower. Aristotle says that *noûs* is that by which the soul thinks. [*An*. 422a23][54] That relation of knowing exists always—at any rate, for Aristotle so long as there are some knowers and some objects to be known. [Cf. *Cat*. 7b15] As for Aristotle species are eternal and possibilities always have instances in the past and will have more in the future, his species end up existing always (Hintikka 1973: 93–133). [*Gen. Cor*. 338b6–17; *Metaph*. 1047b2–6] Hence the relation of knowing exists before we have it, even though we do not remember its former instances, as those concerned other knowers and not us. Thus active *noûs* is an ever existing species or form (*eidos*) connecting up knowable things with knowers.

In discussing the eternal recurrence of species—including knowledge and *noûs*!—Aristotle mentions the *relata*, father and child. [*Gen*. 338b9–11] There he notes that it is not necessary that the father's coming to be presupposes the child's coming to be, although the child's does presuppose the father. However, if we make the finer distinction of *Categories* 7, we can again say that the dependence is mutual: Socrates the father does depend on coming to be, *qua* father, on the existence of his child. Socrates the substance has no such dependence.

The *noûs* in us, being a knower, has the structure like a *relatum* like father. What then is a knower? For Aristotle, some substance in the relation of knowing. The knower is that substance *qua* knower, as a father is an individual substance just in the relation of having a child, and a head an individual substance just in the relation of being a constitutive part. The eternal *noûs* then is the relation; the knower, the *noûs* in us, is the *relatum*, an accident of a primary substance.

It may seem strange to take '*noûs*' to signify both a relation and a something being related in that relation. Yet, I submit, the same ambiguity occurs for 'father' and 'knowledge' in such statements as 'the father is the father of a child' and 'knowledge is knowledge of the knowable'—the latter of which, I have suggested, Aristotle analyzes as having the *relata*, knowledge and the knowable, being related by the relation of knowledge. After all what does '*noûs*' mean? It has been translated variously as: intellect, mind, understanding, intuition. All these end up in the category of *relatum* and thus should have the same structural features as Aristotle attributes to the relations of knowledge and perception.

On this account then what is the *noûs* in us? An individual substance like Socrates *qua* knower—i.e., only insofar as being in the relation of knowing. Strictly the *noûs* in us is then a *relatum*, an accident of the human being. True, Aristotle says that the soul is the form and first actuality of the body. Yet, though a normal human being has the potentiality to think, it need not actually think ever: a child dying young never does. [Cf. *An*. 417b9–14; 429b5–9] So then *noûs*, like 'knowledge' and 'perception' is a relation. As in *Categories* 7, Aristotle says about actual knowledge that it

[54] Cf. Ross 1956: 294: "…knowing is a being acted upon, and involves a community between the knower and the known…"

is not prior to the object known, whereas potentially it can be prior. [*An*. 430a19–22] That is, the individual substance that comes to be known exists before its being known, but, *qua* being known, it is simultaneous with the knowledge in the soul.

How does an individual substance come to have such a relation in actuality? For there ever to have been a *noûs* in us, Aristotle has said, it had to have become actualized by materials from sense perception. In doing so, it has become the passive intellect, which is perishable. The individual substance has to have the capacity to become so actualized and so to come to know intelligible objects. That is, it has to acquire the aspect of being a knower. Human beings have it; rocks and goats do not.

At death, the *noûs* in us has come to be no longer in us. That is, a dead human *is* no longer a thinking, rational animal. Perhaps the *noûs* in us comes then to be in something else, but not in us. However perhaps not: the *noûs* in us, being an individual *relatum*, may just perish as such *relata* do. In this sense, then, the *noûs* in us is perishable: there no longer remains that individual substance having that relation.

When Aristotle wonders whether this *noûs* in us can ever perish, he is asking whether this aspect of rationality, once actualized, has an existence separate from the human organism generating it and can exist without it. He seems to say so:

> Insofar as the realities it knows are capable of being separated from their matter, so it is also with the power of thought. [429b21–2]
>
> When separated it alone is just what it is, and this alone is immortal and eternal [430a22–3; cf. 413b24–7]

The point is that, the *noûs* in us, like all *relata*, can come to serve as a subject in its own right. Aristotle has said that the scientist cuts off such parts of being and treats them "as if" they existed separately in their own right. He leaves it open whether the same might happen in reality as well as in science. Indeed, if our sciences chop up reality at its joints, their subjects have an independence, and then the *noûs* in us may exist always…somehow. [*Phdr.* 265e][55]

Yet, even if we suppose that the *noûs* in us persists after we perish as human beings, it does not follow that there is a personal immortality for us. If the *noûs* in us is embodied in the *pneuma*, then it would seem that after death the individual consciousness would be lost. [*Gen. An*. II.3] The *pneuma* in us while we live might still persist but not within the confines of our bodies. Without these bodies there is nothing to individuate the *pneuma*. For, like 'water', '*pneuma*' is a mass term, and *pneuma* is a mass of stuff. Our soul would be like a drop of water, which, when rescued from the droppiness caused by the confines of the body, would return to the sea of water, while losing its individual identity. Yet perhaps, if *noûs* is unmixed [ἀμιγής 430a18] strictly speaking, then it would have no physical connection. Then it would not be clear if it would persist as an individual after death. Like Aristotle, I too leave this issue for the Averroists and their opponents to dispute (Davidson 1992).

[55] Picht 1992: 377 "Während aber die Abstraktion eine bloße Vorstellung ist, mit dem Seienden, von dem dos Vorstellungsbild, wie man zu sagen pflegt, abstrahiert worden ist, unmittelbar nichts mehr zu tun hat, erfaßt die aristotelische ἀφαίρεσις die wahre Struktur des Seienden selbst."

7.6 Ultimate Abstractions

> Die Zahlen sind nicht blosse Gebilde der Vorstellung; Sie sind wirklich in der Natur; aber als reine Zahlen erkennen wir sie nur, wenn der nous sie heraushebt. (Picht 1992: 377)

In light of his Pythagorean and Platonist background, Aristotle puzzles over whether the objects of mathematics are substances actually or are merely quasi-independent from perceptible substances. He ends up saying not. Rather he considers them things said by an abstraction starting from the individual physical substances accessible to sense perception. [*Metaph*. XIII.1–2] Then mathematical objects can function as separate, independent *subjects* when we consider those substances *qua* planes or *qua* lines or *qua* numbers. [XIII.3][56] Thus he says that we can consider something straight touching a bronze sphere at a point just *qua* straight. Then it turns into a geometrical line, which has the property of touching a sphere at only a point, as it is no longer a physical object, that is, a primary substance. [*An*. 403a10–6]

Aristotle considers the objects of mathematics, the numbers of arithmetic and the figures of geometry, to be the ultimate abstractions ((Ps.) Alexander, *in Metaph.* 733, 23–4; Cleary 1995: 479–80). Aristotle puzzles over whether these are substances or not. [*Metaph*. III.4] They seem to be accidents of substances. Yet they are able to exist independently and do not come to be or pass away. So it is difficult to know what the objects of mathematics are.

Still Aristotle has positive doctrines for them elsewhere. He takes numbers and lines by themselves to be *quanta*, while shapes like triangle are *qualia*. [*Cat*. 4b22–4; 10a11–6] *In re* these are accidents of substances: not the number three so much as three musketeers or goats; not sphere so much as this bronze sphere.

Notice that Aristotle uses concrete terms to signify mathematical objects. Given what he says about qualities and not *qualia* being the items in the category, he seems to have a solution to his *aporia*: As discussed in Chaps. 4 and 10, a quality or quantity exists *in re* only as being in a substance. Insofar as it is in a subject it is the *quale* or *quantum*: a thing having the quality or quantity. The concrete term may be taken abstractly as well. Then it is taken *as if* it is a subject in its own right, just as happens routinely with *relata*.

Aristotle assumes these doctrines in his account of the mathematical objects. He says that number is twofold: (1) the counted and the countable [literally: numbered and numerable], and (2) that by which we count [enumerate]. [*Phys*. 219b6–7] The first are the *quanta in re,* while the second are the numbers in the soul—presumably those ultimate abstractions. [Ammonius, *in Cat*. 59, 21–60, 8] These are the *relata* for number itself, which is another relation and has the conversion proper to relation: the number, the abstraction, is the number of the numbered (things) is the world; the numbered is numbered by a number. Aristotle's saying 'the numbered or the

[56] Mendell (2004) says: "Hence, 'things by removal' may be one way of explaining perceptible magnitudes *qua* lengths. This is the concept which does most of the work for Aristotle." He calls the mathematical account "qua realism".

numerable' presumably is making the same distinction that he makes at *Categories* 7b15ff. about the relation of perception: as actually "perceived" the *relatum* is simultaneous with the other *relatum*; as potentially perceived, or "perceptible", it is not. So too the three goats exist prior to being counted and then are *countable* but not *counted*, but do not exist beforehand *qua* three or *qua* numbered before actually being counted.[57] Likewise in geometry, a figure is the figure of the figured. As Aristotle says explicitly for the relation of knowledge, likewise the species and individuals of numbers and figures themselves need not be *relata*. Rather numbers are *quanta* and shapes like spheres are *qualia*.

Aristotle neither reduces numbers to the actually perceived quantitative attributers of primary substances nor takes them to be substances existing in their right. Instead he offers a middle road, the option that mathematics deals with perceptible magnitudes, "not as [*qua*] perceptible but as such". [1077b12] That is, it studies those very magnitudes—not the things having those magnitudes—as subjects in their own right even when in fact they are not. [1077b19–20] So it would study the formal structure or an aspect of the compound. In reality we do not perceive 3, but, say, three goats. To be perceptible, concavity needs to be in a substance, say, a nose, and, likewise, to be perceived, threeness needs substances. Yet we abstract the concavity and 3 and study them separately. So too, Aristotle says, in the other sciences we study what are accidents of the primary substances, just as medicine studies the healthy. That science has essential features of the healthy, and, relative to that science, attributes that were originally accidental to the primary substance, say, Socrates, can become treated, as *subjects* of that science, *as if* they were essential, while essential ones can be treated as accidents. [1077b34–1078a2; 1078a25–8] Aristotle thinks that each thing might be best seen, "if someone posits while separating what is not separated." [1078a21–2] The geometer and the arithmetician do this with numbers and figures. He says that doing so "…makes no difference nor does any falsity result." [*Phys*. 193b34–35] However, he admits, sometimes it does make a difference: when there is a good chance that people suppose that what is being separated abstractly is a separate, independent substance. Thus "it is surely better to say not that the soul pities or learns or thinks but rather that the person does so in virtue of the soul." [*An*. 408b13–15; cf. 4O2b10–1] For many people treat the soul as being not quasi-independent but really independent.

Aristotle admits that mathematical objects are prior in account (λόγῳ). However, he denies that what is prior in account must be prior in substance. [*Metaph*. 1077a36–b2] That is, the constitutive elements of something are prior in the theoretical account. Still they are posterior in existence. There the individual substance comes first and only afterwards are its elements abstracted from it.

The same holds in general for all compounds of substances and accidents: "For the white is prior to white man in account but not in substance. For the white cannot be when separated." [1077b6–8] Aristotle explains that the white man, the compound of the substance man and the accident white, is the whole from which the

[57] Thus 'countable' is not almost a synonym of 'counted' as Ross (1936: 598) has it.

white cannot exist apart. Still the white and the man are prior as being constituents of the whole, the white man. He concludes from this, first, that "what is from abstraction" (τὸ ἐξ ἀφαιρέσεως) is not prior and, second, that what is from addition (τὸ ἐκ προθέσεως) is posterior. [1077b9–10] He explains that "the white man is said from the addition of white." [1077b10–1] The posteriority and priority here then concern the priority of being, of existence. Aristotle is saying that, just as the white does not exist prior to the white man, so a mathematical object, say the number 3, does not exist prior to its existence in a compound, like the three goats. At best 3 has not a simple existence, but an existence in the respect of being a constituent or part (a possible part anyway) of such compounds. [1077b15–6; 1076a35–7] A compound like the three goats arises from the addition of the 3 to the substances. In linking together the examples of the white man and the mathematical objects, Aristotle implies that the white is abstracted from the white man, just as the 3 from the three goats.[58]

This passage helps us understand also that when Aristotle thinks of things from addition he is thinking of compounds composed of substance and accidents. (These have to be formed in the lawlike manner described in *On Interpretation* 11.[59]) His claim that physics studies such things makes sense: for physics studies the natural objects, individual substances with their accidental features of motion, place and time added on—while focusing on those substances only *qua* moving. Here we need still to consider the substances: the moving does not flit around from place to place by itself apart from its substance. [*Metaph*. 1036b28–30; *Cael*. 299a15–7][60] So physics studies substances *plus* their accidents. In contrast, mathematics will study things from abstraction (or: subtraction), where we study certain accidental features in isolation, as if they were separate from their substances.[61] For Aristotle then some sciences can study attributes as if they are subjects independent of their substances while others cannot. Mathematics studies accidents *minus* their substances. "Three", "concave" and perhaps "white" can be studied thus, in arithmetic, geometry, and optics respectively; "moving" cannot, but can be studied together with its substance in physics.

To see the connection between abstraction and addition, consider again Aristotle's favorite example of the snub. Snub the accident can be abstracted from the snub [-nosed] man, just as the white from the white man. Indeed there are several abstraction operations already going on here, even if we neglect those involved in our coming to judge that we are perceiving individual human beings having snub noses. (For these perceptions themselves are not immediate but result from long sequences of abstraction, as we have seen in discussing Aristotle's psychological works.) In any case, eventually we come to perceive human beings having noses of different shapes. We then attend selectively to their noses, and next only to the shapes of these noses, and next only to the types of those shapes, and eventually to a certain

[58] Modrak (1987: 159) agrees that the abstraction operation is the same in the two cases.

[59] See Bäck 1996: 54–78.

[60] A Platonist might disagree: as mentioned in Chap. 2, the later notion of a point-mass is Platonist.

[61] Remember that the *per se* accidents: the *differentiae* and *propria* are in accidental categories.

type of shapes of these noses. We then proceed, by the abstraction contained in the induction process, to the universal, and consider snubness (the snub-nosed) in general.

Yet snubness itself is "not without its matter". [*An.* 429b14] For it is the compound, concavity in a nose. Here 'the nose' serves as the "matter" (sc., the genus), and concavity as the form. Noses, including snub ones, are studied in biology like any other Parts of Animals, whereas concavity is studied in geometry. The natural scientist has added together, or synthesized, the quality with the substance, the form with the matter, snubness with noses, to constitute the compound. The mathematician, has subtracted, or abstracted away, the substance, or matter, so as to arrive at the object from abstraction, concavity all by itself. She attends to the snub, while ignoring the nose.

'The white' can signify, concretely, the compound, the thing that is white or, abstractly, just the *quale* of being white. Likewise 'the snub' can signify, concretely, the thing, the nose, that is snub, or, abstractly, the *quale* snub just by itself. If we take the *quale* snub by itself so as to constitute a subject in its own right, we get something that might be called 'snubness'.[62] Remember that Aristotle has said that, strictly speaking the items in categories other than substance ought to be signified by the abstract terms, like 'snubness' and 'whiteness', and not by the paronymous terms, like 'snub' and 'white'. [*Cat.* 10a27–32]

Here lurks a further distinction. We can consider whiteness or snubness as an *accident of* a substance or as a *subject* in its own right. Taking snubness as "concavity in a nose" [*Metaph.* 1030b31–2] makes it an accident of a substance: for it to be it has to be in a nose. Taking snubness as a subject in its own right means taking it apart from its being an accident of a substance. Here we have only the shape of snubness—what Aristotle calls 'concavity'—without the nose. If we take the standpoint of the natural scientist, we consider the snub as an accident with the addition of its substance the nose: the snub nose. If we take the standpoint of the mathematician, we consider the snub as a subject while subtracting or abstracting from its substance and get just the concavity. Taken as a subject in its own right, concavity is not "in a substance".

Aristotle says that some (*per se*) *quanta*, like lines and presumably numbers,[63] are *quanta* κατ' οὐσίαν while others are *quanta* in mode, like great and small. 'κατ' οὐσίαν' might mean 'in substance'. Then Aristotle would be saying that here the *quanta* are being taken as independent subjects, as if they are substances in their own right.[64] Or (inclusively) it might mean (as well) 'in essence' "because the formula of its essence must contain the words 'a certain quantity'" (Cleary 1995: 148).[65]

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[62] More accurately: the concrete 'snub' taken abstractly, as discussed in Chap. 4.

[63] So Alexander, *in Metaph.* 397, 6–7.

[64] So Ross 1953: 324. Cleary (1995: 147) thus describes numbers as "quasi-independent subjects of predication".

[65] Cleary claims that Aristotle takes both options too.

This agrees with what Aristotle says: Mathematical objects are not perceptible substances, substances in a higher way. [1076b11ff.] Nevertheless, they cannot be "in" substances. [998a7–19; 1076a36–b11] Presumably Aristotle means by 'in' 'in a subject' in the sense of *Categories* 2. If so, then he is saying that mathematical objects are not accidents like the white or the snub either. Yet elsewhere he does say that numbers are "in" the category of quantity. [*Cat*. 4b22; *Metaph*. 1020a13; 1083a4] The distinction given solves the difficulty: taken as an accident, snubness or concavity is in a substance; taken as a subject in its own right, it is not.[66]

For Aristotle no abstraction can be performed on the objects of mathematics—with the possible exception of abstracting more general ones from more particular ones (Reeve 2000: 64). So we might abstract the genus of figure from the species of square and triangle. Still we do not go on to abstract objects on another level that can serve as subjects for another science. In this sense, the induction process ends up with these first principles, what he calls the ultimate abstractions. They are ultimate or last in being the most "prior in account" (λόγῳ): they are simple elements of things.

Since these simple elements serve as subjects in their own right, they do have the structure, perhaps a quasi-structure, of substance. Aristotle does recognize them to have intelligible matter. [*Metaph.* 1036a2–12] For mathematical objects have species, like square and triangle, and genera, like figure. Also, to explain equations like '2+2=4', we need some way to have more than one instance of the number 2. The genus will serve as matter for the differentiation of species, and a species somehow provides matter for the multiplication of its individuals. Reeve (2000: 64) suggests that "…the matter of the intelligible circle is just perceptible matter *considered in a certain way*, and it is in reality, not thought, that the change occurs." Cleary (1995: 481–2) takes Aristotle to say that lines use continuous magnitude as their matter; presumably then numbers would use discrete magnitudes. Mathematical objects are "intelligible objects that are the products of a logical process of subtraction which isolates them along with the primary subject to which they belong without separating them ontologically" (Cleary 1995: 489). Given that perceptible objects have magnitudes, as Aristotle asserts, the intelligible matter is an abstraction from perceptible matter.

If abstraction is an iterated process used in the induction of the more general and universal from the more particular, why then does Aristotle seem to call only the mathematical objects "those from abstraction"? It might be because this is the case that is most in doubt, given his Platonist and Pythagorean heritage. Or (inclusively again), it might be because the mathematical objects are the ultimate *abstracta*. After all, Aristotle dislikes infinite regresses. Mathematical objects are the end results of the entire process of abstraction, beginning with the sense perceptions. As *abstracta*, strictly speaking neither are they themselves in real substances nor are

[66] Thus Cleary (1995: 278–83) says that when Aristotle speaks of mathematical objects being in perceptible substances he means those objects taken as independent substances—and this is a view that he is concerned to refute.

they transcendent substances in their own right. Rather Aristotle has a third option: abstractions with a real basis. [*An*. 403a10–6][67]

7.7 Conclusions

For Aristotle processes of perception yield knowledge of universals. He says that, "the singular is perceived, but perception is of the universal." [*An. Po*. 100a17–b1] Aristotle has in mind a proto-universal. He says that the immediate object of perception is "a confused mass [*Phys*. 184a21–2], and that, in this way, a child first calls all women 'mother' and only later distinguishes them. [184b12–4][68] Our perceptions contain only some of the detail of the actual objects seen. This vague image, if retained in memory, would then agree with other vague perceptions of other individual women. In this way animals too can learn from experience: they can match their present images with their past ones and their concomitant features, as the crow does with the scarecrow image. In the previous chapter, we have seen what this primitive universal amounts to. Certain features of certain sense perceptions have been abstracted from their original contexts, and then made into a generalized image in the imagination: the red shape of the apple; the facial image of a woman; the humanoid figure of a scarecrow. Only for those animals capable of knowledge of universals can the elements and principles of the confused masses of the primitive universals become determinate, recognized and separated out. [184a22–3]

Just as in his discussion of the psychological processes of perception and thought, Aristotle does not give many details of the process whereby we come to grasp the scientific universals, the universals strictly speaking, from sense perceptions and experiences. Nor does he detail and distinguish the various stages too clearly. He does say that the intelligibles, including "those said in abstraction" and all the states and affects of perceptible things, are derived from "the perceived magnitudes". [*An*. 432a3–6] ("The perceived magnitudes", the perceptibles themselves are the "forms" of the things perceived, abstracted from their materials. [429b28–430a1]) He says that the universal is made clear, at least to rational animals, through many perceptions. [*An. Po*. 88a4–14; 81a40–b9] Surely Aristotle is thinking of having these perceptions not piecemeal but in some sort of combination or synthesis. Still, he insists often, these sense perceptions do not suffice for thinking the universal. [87b28ff.] Unlike Plato, Aristotle requires them, as well as requiring that they be remembered accurately. From many memories a single experience is produced.

[67] I leave open here the ontology of mathematical objects. For instance, Lear (1982, 1988: 240) claims that Aristotle thinks that there are actual instances of all mathematical operations: e.g., a circle touching a straight line at a point. Bechler (1995: 183) thinks that mathematics becomes *a priori* for Aristotle. As discussed in Chap. 2, Mueller (1990: 464–5) surveys interpretations of Aristotle's view of mathematical objects.

[68] Although the context is aporetic, cf. too *Metaphysics* 999a26–9, where Aristotle says that we are acquainted with (γνωρίζομεν) singulars only in virtue of their having universal attributes.

[*Metaph.* 980b29–981a1] The memories themselves are constructed from phantasms, themselves constructed by simplifying many perceptions.

We have already seen some of the details in this process in Aristotle's psychological theory. The act, the perceiving, produces an object, the perception (*aesthēma*). The *aesthēma* in turn serves as the object for imagining (*phantasia*), which in turn produces a phantasm. Thus Aristotle claims that a perception or a phantasm can be taken as a picture or as a likeness. [*Mem.* 450b20–7; *Ins.* 461b22–6; cf. Plato, *Soph.* 235d] In effect, he is recognizing two ways of using significative items: as input or as output. The *aesthēma* and the *phantasma* differ in that the latter is the former without its matter. [*An.* 432a9–10] That is, the perception is of an object presently perceived, whereas the phantasm is the perception (or, perhaps, what is remembered of the perception) without being of a present object (Modrak 1987: 158). So for the thinking soul, the phantasm serves as it were as an input, as an object perceived. [*An.* 431a14–5; 431b2–5; *Ins.* 456a25–6]

Experience, the next (or: a later) stage, arises from the repeated patterns of phantasms. Here again, there must be abstraction. Some of the common features of the phantasm are attended to; others ignored. Some different features are overlooked, yet some might be attended to. For instance, Aristotle says, the understanding or grasp (ὑπόληψις) that a certain treatment cured Callias and many others of a certain disease is a matter of experience. [*Metaph.* 981a7–9] That is, the doctor remembers many such cases, and puts them together, so as to have the rule of thumb: she does this when she sees this disease. (By 'this disease' Aristotle must mean 'certain symptoms taken as a totality'.) Now putting all these memories together and grasping their similarity requires that the doctor forget most of the different circumstances peculiar to the individual cases. Here then a process of abstraction has occurred, where only certain features of the individual cases are being considered. For the most part, these features are the common ones. Still, other common features, such as all the patients' speaking Greek, are ignored. Again, some features in which the cases differ may be retained: the treatment may differ according to the weight or age of the patient.

Experience turns into science once real definitions are grasped via apprehending a hierarchy of universals. This structure enables the accidental features to be ruled out and the causes to be grasped. Aristotle has a corresponding hierarchy of sciences, from the most concrete to the most abstract. This hierarchy continues applying the abstraction operation to the objects of the more concrete sciences, just as the process began with the perception of primary substances. The simpler the science, the more precise the knowledge. [1078a9–11] A scientist may study the movements of living things, in biology, which deals with the growth and animal movement; or she may abstract from the animal motions and study terrestrial mechanics; or she may abstract from the celestial and study the permanent, celestial motions of astronomy; or she may abstract from the motions of the substances and study spatial magnitudes in geometry; or she may abstract from the spatial magnitudes and study the pure magnitudes of arithmetic. [*Metaph.* 1078a11–3] Aristotle gives a

similar account for optics, harmonics, and mechanics. [1078a14–7][69] Universals commensurate with each other come to be grouped together at each stage of the hierarchy by abstracting away the additional features. [*An. Po*. 74a35–9]

It is not clear whether Aristotle envisages all these to be hooked up into a single, neat, Porphyrian tree structure, or if he is thinking of the tangled underbrush structure of classification found in his biological works and in the *Categories*. Still, the general recursive structure of abstraction is again clear, with there being "simplest" [1078a13] sciences putting an end to the abstraction process: if not arithmetic, then first philosophy, which unifies the sciences in πρὸς ἕν unity.

We may then return to *Posterior Analytics* I.18. An example will sum up my interpretation of this passage: Once we have conceived of a swan from varied sense perceptions via much abstraction and synthesis, we may consider a swan with respect to its weight, color, and life. *Qua* its weight it belongs to *quantum*; *qua* its color, to *quale*; *qua* living to swan and to substance. Individual abstract objects will arise from individual features of individual swans. From these via induction abstract universal objects arise. In this way "those said by abstraction" do arise by induction, whereby a universal is apprehended from a prior acquaintance of the relevant singulars, and from abstractions, where items that are not separate *in re* are treated as if they were separate. This is how Aristotle views universals.

> There is no clean division between perception (abstraction) and reasoning in the real world. The brittleness of current AI systems attests to this fact. (Brooks 1995: 347)

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[69] Following Ross 1953: 417.

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Part III
METAPHYSICS: Aristotle's Abstract Ontology

Armed with this treatment of abstraction, I now approach Aristotle's metaphysics directly. I hope not to be routed—or, if I am, to make a stand. Success in handling the metaphysical texts via abstraction theory would lend great support and import to my analysis of Aristotle's theory of abstraction.

What problems might be solved? First we need to get clear on what Aristotle is about in his first philosophy. As he describes it, the study of being *qua* being leads to the most universal and most fundamental features of being. This leads him to focus on the general structure of individual substances. At the same time, he considers what types of substances there are and which substances have being in the pre-eminent way. This leads him to theology. Unless we charge him with running together different tasks or make a developmental apology for him, we need to explain the unity of his project.

Second, Aristotle takes great pains to insist on the priority of individuals over universals. He rejects his teacher's theory of Forms. Yet what is his own theory of universals? Has Aristotle managed to show how we come to know universals from individuals? Given that he recognizes real universals, species and genera, and claims that science is of the universal, what ontological commitment to universals does he have? He appeals to abstraction. At this point, I should hope, we are in a good position to assess the details of his answer. The key lies in the relational structure of abstract objects. These have no existence independent from that from which they are abstracted, ultimately, individual substances. Being *relata*, they are "least of all substances" and so are least liable to be considered substances in their own right. Universals end up being aspects of individual substances, while still being able to be considered "as if" they were independent subjects. Indeed, Aristotle's metaphysical vocabulary is overwhelmingly relational: he has such correlates as matter and form, part and whole. I call the prominence of relations in Aristotle's metaphysical theory his "Buddhism"; the reference is to the doctrine of dependent origination. This origination of universals and other abstract objects like numbers makes them depend upon individual substances and avoid being Platonic Forms.

Third, in focussing on the ultimate constituents of individual substances, he ends up concluding that their forms have priority. Yet these forms when defined seem to be universal. The puzzle commonly arises: has Aristotle accounted for what it is to be an *individual* substance? Has he ended up with a Platonism of universals despite his protests? I offer a solution by taking a definition to be a statement about the essence.

Chapter 8
The Subject of *Metaphysics*

> Aristotle's notion of "first philosophy" is the extremist possible application of the qua-operator. (Bechler 1995: 186)

When introducing his conception of first philosophy, Aristotle distinguishes beings *qua* being from beings *qua* quantitative and continuous and from beings *qua* movable. [*Metaph.* 1061a27–b11; 1064a29; 1025a26] The latter are the concerns of geometry and physics respectively. When Aristotle uses expressions like 'the bronze *qua* movable' and 'the bronze *qua* bronze' [*Ph*. 201a28–9]; 'the doctor *qua* house-builder and not *qua* doctor' [191b4–6], he is using expressions that have the same grammatical structure as his 'being *qua* being'.

But in *Metaphysics* VI, Aristotle identifies the science of being *qua* being with theology. [1026a18–9][1] Although Aristotle here again starts off looking for features belonging to things *qua* being, he then seems to fix on immobile, separately existing substance as the only subject proper to his science. Not all things that are are immobile, separately existing substances, as is obvious from sense perception and as he admits. Mathematics, physics, and theology form a triumvirate of theoretical philosophy dividing up substances into the immobile and not separately existing, the mobile and separately existing, and the immobile and separately existing, respectively (Patzig 1979: 33–4). [1026a10–25; 1071b3–5] Aristotle then continues his study of theology in *Metaphysics* XII.

Accordingly scholars have found two different conceptions of first philosophy, "the science of being *qua* being," [1003a20] in Aristotle's *Metaphysics*: the study of the most general features of existence and the study of God. These conceptions may be called the ontological and the theological (Patzig 1979: 33–4). Before one confronts this issue one ought first to try to formulate truth conditions for propositions about being *qua* being.[2] Once these conditions are formulated, the problem of the subject matter of the *Metaphysics* can be resolved. I shall end by sketching out such a resolution.

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[1] Alexander (*in Metaph.* 245, 29–246, 13) like others in the Greek Aristotelian tradition also makes this identification. Also see Aubenque 1962: 381, on two conceptions of theology in Aristotle and their reception by the Greek commentators.

[2] See Bäck 2004 and Appendix.

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There is another, related problem about Aristotle's task in the *Metaphysics* that too has received a good deal of recent attention: the relation of Aristotle's earlier ontological views, especially those about the categories, with his "discovery" of metaphysics. I shall be assuming a unitarian position: Aristotle does not change his mind and attempts to offer a consistent theory throughout his works—unless he himself notes the break, as when he wants to make a "fresh start". Perhaps he fails; perhaps he puts together inconsistent doctrines in the *Metaphysics*. Still I take the unitarian view as the null hypothesis. Aristotle presupposes a lot of technical doctrine from his logical works in his discussions in the *Metaphysics*. At the same time Aristotle imports a lot of doctrine from his scientific treatises. Some—Daniel Graham being an extreme case—find Aristotle's synthesis of these two types of doctrine incoherent, especially in his having both a logical and a hylomorphic view of substance. Yet, I shall try to show that when we apply details of his logical theory of relations and paronymy and his psychological theory of abstraction, we can solve a lot of the puzzles being raised. The interpretation that I offer has a strong resemblance with the Aristotelian philosophy of the ancient and medieval periods. I view this to support it; it is likely that a living philosophical tradition has retained and developed some of the insights of its founder, albeit not in their original, undistorted form.

8.1 Being *Qua* Being

What does Aristotle mean by 'being *qua* being'? I hold that 'being *qua* being' does not refer to anything different from that to which 'being' refers. Instead, by stipulating an abstraction, the '*qua* being' phrase gives a selective focus on certain attributes of being.

I turn to offering truth conditions for propositions about 'being *qua* being'. Now, as truth conditions apply only to statements, we need to consider statements containing 'being *qua* being'. I take the simple case where it serves as the subject term: 'being *qua* being is P'. This is a particular instance of the general form, 'S qua M is P', where 'S' = 'M'. Aristotle has various discussions of the logical properties of such statements, which came to be called 'reduplicative' in the Aristotelian tradition. The general type of reduplicative proposition relevant here is one where the 'M' term gives the reason why S is P: S is P because S is M and every M is P. [*An. Pr.* I.38]

Aristotle also uses such statements and indicates whether they are true or false. For instance:

(1) An isosceles *qua* triangle is equal to two right angles [*An. Po.* 74a36–b4]
(2) A is equal to two right angles [73b30–1]
(3) An isosceles *qua* isosceles is equal to two right angles [74a16–7]
(4) A triangle *qua* isosceles is equal to two right angles [85b9–13]
(5) A triangle *qua* figure is equal to two right angles [73b33–4]

Aristotle seems to want all these statements to be taken universally so as to have the form 'every S qua M is P'. He claims that (1) and (2) are true, and (3) to (5) false. (4) is false because the condition that 'every S is M' fails. (5) is false because the condition that 'every M is P' fails. But why is (3) false?

This difficulty is solved if we recognize that Aristotle has a demonstrative as well as a general sense of 'καθ' αὑτό' (*per se*) and so of 'ᾗ αὐτό' ('*qua* itself'). (3) is true in the general but not in the demonstrative sense. At times Aristotle signals this use explicitly: in particular when he defines the universal (in a special sense) as what holds of its primary subject. [*An. Po*. 73b26–33] Taken in this way S and M have to be commensurately universal.

> And in general, if it does not hold *qua* triangle and yet someone proves it, this would not be a demonstration; and if it does, it is the man who knows a thing as it belongs who knows it better…hence one who knows universally knows it better as it belongs than one who knows it particularly. [*An. Po.* 85b8–14; modified translation]

So there is a more restrictive, demonstrative sense. Note that Aristotle does not say that it is false to make statements like (3), but only that they are not true demonstratively.

Thus Aristotle recognizes both a general and a commensurately universal, demonstrative sense of reduplicative statements. I have offered the following truth conditions[3]:

(8) Every S is P qua M (general) if and only if
(x) ((Sx ⊃ Mx) & (Mx ⊃ Px))[4]
(9) Every S is P qua M (demonstrative) if and only if
(x) ((Sx ⊃ Mx) & (Mx ≡ Px))

Some may want stronger truth conditions. But then the examples in *Prior Analytics* I.38, e.g., do not work. Moreover, they are not needed given we understand the universal quantifier as Aristotle does in *Posterior Analytics* I.4 to hold always, namely, over all instances past, present and future. (where this is the only world possible).

When 'S' = 'M' we have a case which can be expression by 'καθ' αὑτό'. Aristotle himself recognizes the equivalence of S qua S' an12d 'S καθ' αὑτό'. [*An. Po*. 73b27; *Metaph*. 1003a21–2] Then my truth conditions become:

(6) Every S is καθ' αὑτό (general) if and only if
Every S is P qua S (general) if and only if
(x) (Sx ⊃ Px)

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[3] 'Qua' without italics represents the logical connective, of which '*qua*', 'in virtue of' … are instances. See Bäck 1996: 1–83, where other logical types of qua propositions are discussed as well.

[4] Van Rijen (1988) thinks that the second sense of 'καθ' αὑτό' in *Posterior Analytics* I.4 has great importance in Aristotelian philosophy. He offers truth conditions based on it instead: basically, (x) ((Sx ⊃ Px) & (Px ⊃ Mx)), in van Rijen 1993: 479. Like Ross, I do not find much evidence that this second sense plays much of a role in Aristotle nor in later authors, and so do not find his view too compelling. Nor does Aristotle seem to at *Metaphysics* 1030b14–28.

(7) Every S is P καθ' αὑτό (demonstrative) if and only if
Every S is P qua S (demonstrative) if and only if
(x) (Sx ≡ Px)
(where the domain includes every S and P, past, present, and future)

To test these truth conditions, let us consider more examples from other texts. Aristotle says, "a doctor builds a house, not *qua* doctor, but *qua* housebuilder, and turns gray, not *qua* doctor but *qua* dark-haired." [*Phys*. 191b4–6] In the general sense, it is false that a doctor builds a house *qua* doctor, given that every doctor does not build houses, and true that a doctor *qua* housebuilder builds a house. Likewise it is true that a doctor *qua* dark-haired turns gray, given that every dark-haired person turns gray, as Aristotle seems to assume [*An.Pr*.32b16–22], and false that a doctor *qua* doctor turns gray, given that not every doctor turns gray (e.g., a doctor bald or fair from birth). These propositions will hold also in the stronger, demonstrative sense, and so suit the scientific context of the *Physics*. An example like "the bronze is movable not *qua* bronze but *qua* movable," which we may extract with paraphrase from *Physics* 201a25–31, is true demonstratively but not generally, since every bronze thing is movable, but not every movable thing is bronze.[5]

It may be thought that my analysis is silly, since it will follow on (6) that, for any P, when the subject is a proper name, then S is P καθ' αὑτό, since in that case the truth condition is simply 'S is P'.[6] So my analysis makes too many statements truth καθ' αὑτό. First, let me remark that to a modern audience Aristotle seems to make many trivial καθ' αὑτό and '*qua*' statements: 'Callias is Callias καθ' αὑτον [*Metaph.* 1022a26–7];'a doctor doctors *qua* doctor. [*Ph.* 191b6] So the truth conditions have to admit statements that might strike us as trivial. Second, it might be that Aristotle would allow such statements as 'Socrates is white καθ' αὑτον' to be true in some sense: for he allows 'a surface is white' to be true καθ' αὑτήν**,** and surely it is not of the essence of a surface to be white. [*Metaph.* 1022a30–11] Third, Aristotle's account does not apply directly to singular things well anyway. Even if they do have individual essences, as I shall discuss below, still such singular predicates cannot be said of a subject. They are defined in terms of their species, and such definitions yield universal predicates. [*Metaph.* 1020a11–3] So, in this light, if we view a proper name like 'Socrates' as an abbreviation for 'that human being', we can restore universality to the truth condition.[7] Then, 'Socrates is white καθ' αὑτόν'—i.e., 'Socrates *qua* human is white'—is false, since not every human is white. Aristotle says that science has no interest in the individual as such, but only as an instance of a species. [*An. Po*. 87b39–88a5] Thus, given some such maneuver for proper names, I think that the truth conditions are satisfactory.[8]

[5] Also see *Metaph.* 1077a1–b31 for further examples; I shall discuss this text briefly below.

[6] This point was suggested to me by Jonathan Barnes. Other disturbing cases arise in *Metaph.* V.18: 'the surface is white καθ' αὑτήν.

[7] Such a move may be suggested by *Prior Analytics* I.33; see Bäck 1987.

[8] Lear (1982) has offered an analysis of the qua propositions that Aristotle uses in his discussion of mathematics similar to mine, except that he has the stronger '⊢' instead of my '⊃' and does not demand coextension. Cleary (1985: 29, n. 27) also has a critique of Lear's view. There is no reason to adopt the view of Rosen (2012: 70) and others that 'qua' is an intensional operator.

These truth conditions are not especially revealing about what being *qua* being is—that is, on my analysis, what attributes beings have *qua* being. There are surely some terms coextensive with 'being'; Aristotle offers candidates like 'one'. [*Metaph.* 1003b22–1004a6] As Aristotle admits, such candidates have limited interest. What is interesting lies in the further candidates that Aristotle endorses: individual substances and substantial forms, and the unmoved mover. After looking at Aristotle's characterizations of being *qua* being, I shall suggest how these candidates are related.

8.2 Attributes of Being *Qua* Being

On this analysis of reduplicative propositions, for Aristotle 'being' and 'being *qua* being' have the same reference (when *used* in a sentence). 'Being *qua* being' does not name something different from 'being'. Rather, '*qua* being' indicates that the predicates being sought must have a generality applying to all being. In Lear's happy phrase, 'qua' acts as a predicate filter, admitting only the most general attributes (Lear 1982: 168, 1988: 256).[9]

We can see Aristotle following this program in his science of first philosophy. He says:

> There is a science that considers being *qua* being, and the things that belong to this καθ' αύτό It is not the same as any of the particular sciences. For none of the others looks at being *qua* being universally, but, cutting off some part of it, they consider the accident about this, as in the mathematical sciences. But since we seek the first principles and the highest causes, it is clear that they are of some nature καθ' αύτήν. If then those who seek the elements of beings sought these principles, it is necessary that the elements of being also be not *per accidens* (κατὰ συμβέβηκος) but *qua* being. Therefore it is necessary for us to comprehend the first causes of being *qua* being. [*Metaph.* 1003a21–32][10]

What is being asserted is that metaphysics deals with the most general properties of beings; i.e., it treats of the properties that (a) being has *qua* being, in propositions satisfying the truth condition (7). The '*qua* being' phrase is necessary; it is misleading to say that being is the subject of metaphysics.[11] For not all the properties of all existing things are dealt with in first philosophy. '*Qua* being' serves to indicate which properties are to be considered, and which properties are to be filtered out.

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[9] Precursors of Lear's theory include Kirwan 1993: 77; Mansion 1958: 217.

[10] Modified translation. Cf. 1004b4–17, where Aristotle makes it clear that the qua phrases are to be taken demonstratively.

[11] So here we do not have to worry about the homonymy of being as discussed by Owen (1960); Bolton (1995: 427–9); Ward (2008: 171–3). The focal meaning of being becomes relevant, rather, in showing the priority of substance over other "beings".

There is also in the passage quoted above an indication of what '*qua* being' and 'καθ' αὑτό' mean there.[12] Aristotle says that first philosophy looks at being *universally*. Now there is an indication that Aristotle is taking these phrases demonstratively. After all, a science should concern itself with demonstration. So the *Metaphysics* deals with the commensurately universal attributes of being.

Accordingly, first philosophy is not interested in the thing, 'being *qua* being'; it is interested in general features of beings. Indeed, note that Aristotle sometimes says "beings *qua* beings". [*Metaph.* 1003b15–6; 1005a27] The plural suggests that Aristotle does not intend 'being *qua* being' to refer to a singular object.

Still the Greek has a crucial ambiguity as it lacks an indefinite article. We can talk about "a being *qua* being" or 'being *qua* being' in general. In the first case we consider things that exist, pre-eminently the individual substances, *qua* being: we look for their most general features. In this way Aristotle talks about "beings *qua* beings" too. In the second case Aristotle would be taking "being" to signify a general object that can serve as a subject and have existent features.

Aristotle rejects this second way of thinking. For then 'being' would signify a genus more general than any of the categories, which he himself calls the highest genera.[13] However Aristotle denies that there are genera existing beyond and above the categories. [1004a4–5; 1059b24–34] He does recognize a central sense of being, relative to which and from which other things are said to be: what Owen calls the focal meaning of being. [*Metaph.* 1003a33–4] He does say that being is said "not homonymously". Yet it need not follow that thereby it is said strictly synonymously—that would be a false dilemma. [Cf. 1060b31–1061a1] After all, Aristotle goes on to say that like 'healthy' when applied to an animal, walking, and having a certain temperature, 'being' will change its sense when said of substances and qualities.

So in his first philosophy Aristotle is looking for what attributes things have, *qua* being.

Already in *Metaphysics* IV, where Aristotle introduces his science of being *qua* being, he appears to offer different subject matters for that science. Aristotle claims that this science will investigate the one and the same, which hold *qua* being, since they are predicated of all items in all categories. [*Metaph.*1003b35–1004a20] He then adds that it will investigate such items, *and* the notion of substance. [1004a31–b1] Again, when discussing unity and being, it will also investigate their contraries and privations, like plurality, difference and non-being. [1061b11–27] (So too presumably it will investigate accident, given that it is the contrary of substance.) He then proceeds to discuss general axioms like the principle of non-contradiction.

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[12] I have claimed that Aristotle also recognizes an accidental type of 'qua' proposition. As first philosophy is supposed to be a science, we may dismiss the accidental type of qua proposition from consideration. So the choice is between the general and the demonstrative sorts of the essential type of qua proposition.

[13] For Halper (2009) being *qua* being is essence—and that is analogical. For him blindness has an essence as it has a definition. This amounts to endorsing this second way.

Notwithstanding, Aristotle has a consistent, single program for his new science. He is investigating what is common to all beings, to everything that exists. [1061b25–7] All these have attributes like being and unity (later called the transcendentals) and their contraries, albeit in different though related ways. [1053b24–5; 1059b27–8] Moreover, all these obey general axioms like the principle of non-contradiction. [1005b8–11; 1061b17–9] Everything that exists is either a substance or an accident. [1003b6–11; cf. *Phys*. 185a21–31] Ed Halper has suggested that we take *Metaphysics* V also in this way: not so much as a lexicon but as a listing of attributes holding *qua* being.

These attributes, being coextensive with being, will have more generality than the objects of mathematics, which Aristotle calls the ultimate abstractions. How then can Aristotle call the mathematical objects "ultimate"? They are the ultimate or last sort of beings. The attributes coextensive with being, traditionally called the transcendentals, are not strictly synonymous (while still being "not homonymous") but have a *pros hen* equivocity, a focal meaning. So there are no beings more abstract than the objects of mathematics.

Thus far Aristotle has no surprising results. Yet it turns out, he says, that everything that exists is either a substance or an accident that depends for its existence on a substance's providing a substratum in which it may be. So everything that exists in an accidental category exists in virtue of having some relation to substance. Indeed, Aristotle claims that in the strict sense no item in an accidental category is:

> And so one might raise the question whether 'to walk' and 'to be healthy' and 'to sit' signify in each case something that is, and similarly in any other case of this sort; for none of them is either self-subsistent or capable of being separated from substance, but rather, if anything, it is that which walks or is seated or is healthy that is an existent thing. Now these are seen to be more real because there is something definite which underlies them; and this is the substance or individual, which is implied in such a predicate; for 'good' and 'sitting' are not used without this. Clearly then it is in virtue of this category that each of the others *is*. Therefore that which is primarily and *is* simply (not is something) must be substance. [*Metaph.* 1028a20–31]

Only an individual substance, like Socrates, *is* or exists strictly, without qualification. Items in accidental categories like 'the white' and 'the snub' do not exist apart from substance except as abstractions. 'The white' does not exist, strictly speaking; rather, the thing that is white, Socrates, exists and has the attribute of being white. Thus, being a substance belongs to being *qua* being. For something is, in the strict sense, if and only if it is a being, namely, a substance.

Hence "what is being is just the question what is substance." [*Metaph.* 1028b4] So Aristotle's investigation of substance can be seen as an interesting development of his program of finding features common to all beings. It has turned out that x is a being if and only if x is a substance. Attributes, like whiteness and even rationality, are not beings strictly but attributes of beings.[14] Items in the accidental categories do

[14] By 'attribute' here I mean to include accidental as well as essential ones like rationality, which at least at times Aristotle calls a quality. See Bäck 2000: 151–8.

not have being in their own right, or *per se*, but only insofar as they are, or exist, in substances. (Above I have claimed that strictly those items must be named abstractly: qualities and not *qualia*.)

Still we do seem to say that accidental "things" do exist: this white thing and that rational one. Expressions like 'the white' are incomplete and cannot be defined by themselves; those like 'the swan' are complete and definable. 'The white' and 'the snub' are not without qualification; they do exist as white *things* and snub *things*, that is, only as accidents of substance; likewise their paronyms, whiteness and snubness, exist only insofar as substances have them. Thus, since Aristotle links being with being able to exist on their own (καθ' αὑτό) and to be defined by themselves, items in non-substantial categories are beings, secondarily, only given their being in substance.[15] And apparently such a status does not satisfy Aristotle that they are, strictly speaking:

> For as 'is' is predicable of all things, not however in the same sense, but of one sort of thing primarily and of others in a secondary way, so too the 'what' belongs simply to substance, but in a limited way to the other categories. [*Metaph.* 1030a21–3]

Since all that is, in any category is in virtue of having some relation to substance (even if that relation is not one of constituting but is πρός ἕν or ἀπο τινός), being a substance belongs to being *qua* being. Because of the centrality of substance for something to be, Aristotle says, "what is being is just the question what is substance." [*Metaph.* 1028b4] Given Aristotle's account of focal meaning, it has turned out that x is a being only if x is a substance. Items in non-substantial categories are beings, secondarily, only given their being in substance.

Still an accident is not a substance. So how is it true that being *qua* being is substance? First, as just stated, the presence of a substance is a necessary condition and cause for an accident to be. Second, every being is a substance or accident, *qua* being (in conformity with the truth conditions that I have proposed). [*Phys*. 185a20–6; 204a2034][16] Aristotle recognizes such a claim to hold essentially or *per se*, (in the second sense of 'καθ' αὑτό'). [186b19–26; *An. Po*. 73a37–b3]

So, in *Metaphysics* IV, Aristotle offers both transcendental and categorical items as proper subjects for first philosophy. The categorical substance is not a feature of all beings in the way that the transcendental, unity, is: the term 'substance' applies to only one category of things that are in the same way, while the transcendental term 'one' applies to all things in all categories, albeit in different ways.[17] Still, yet again, substance provides the focus for the application of the transcendental terms: substances have being in their own right; quantities have being as being in substances. For a quality like whiteness to be a single thing, a countable this-here white, requires it to exist in a substance.

The objects of mathematics are not beings in their own right. These *quanta* and *qualia* like two and triangle can serve as subjects in their own right. In mathematics

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[15] Obviously the account of focal meaning plays a pivotal role here. See Owens 1951: 116.

[16] Simplicius, *in Phys*. 471, 19–20: everything real is either a substance or an accident.

[17] On the sameness of 'being' and 'one', see Alexander (ps.), *In. Ar. Metaph.*, 249.1; 259.5.

they are treated as if they are independent subjects, quasi-substances. Yet remember that items like triangle and two and the white are paronyms: strictly the items in the categories are twoness and triangularity. Two and triangle and the white signify something, namely, some substance, having twoness or triangularly or whiteness. The objects of mathematics are the ultimate abstractions but not the ultimate beings.

8.3 God and Substance

It has been a puzzle how Aristotle's two characterizations of first philosophy are related.[18] Not only does Aristotle say that first philosophy deals with being *qua* being, but also that it deals with substance, especially with the divine substance that is immobile and separately existent.[19] I shall use the analysis that I have given for 'being *qua* being' to show how these two characterizations fit together.

In *Metaphysics* VI, Aristotle identifies the science of being *qua* being with theology. [1026a18–9; also 1064a28–b6][20] Although Aristotle here again starts off looking for features belong to things *qua* being, he then seems to fix on immobile, separately existing substance as the only subject proper to his science. Not all things that are are immobile, separately existing substances, as he makes clear. Mathematics, physics, and theology form a triumvirate of theoretical philosophy dividing up substances into the immobile and not separately existing, the mobile and separately existing, and the immobile and separately existing, respectively (Patzig 1979: 33–4). [1026a10–25; 1071b3–5] Aristotle then continues his study of theology in *Metaphysics* XII.

'Being *qua* being' is not literally a name of God. If we identify being *qua* being with the prime unmoved mover or God, we make God into an object like a number: not really a substance or subject in its own right, but rather an aspect of being that is treated thus. However Aristotle seems to treat God as a substance that is really separate and not merely quasi-separate—and not to identify it with a thing named 'being *qua* being'. To be sure, he does say that God is a cause and first principle of all. [983a8–9] Yet, at the same time, God is a substance in the full sense. [1073a5–7] God is the ultimate cause and an ultimate being but not an ultimate abstraction. So we need another account of why Aristotle ends up talking about God in his study of being *qua* being.

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[18] See Ross 1953: 252. The history of this controversy is summarized by Owens (1982). Another survey is by Reale (1980: 138ff. and Appendix C). Also Hahn (1979: 80–1) epitomizes the views of the Greek commentators and Latin medievals. Likewise, Verbeke 1981: 115–27; Menn (forthcoming).

[19] Merlan (1968: 185–7, 1953: 138–41) states the problem well, although I disagree with his conclusion (Merlan 1968: 190). See Frede 1987: 84 for a critique of Merlan.

[20] Alexander, *in Metaph.* 245, 29–246, 13, like others in the Greek Aristotelian tradition also makes this identification. Also see Aubenque 1962: 381 on two conceptions of theology in Aristotle and their reception by the Greek commentators.

Aristotle thinks that first philosophy should consider the nature of the objects of mathematics: are they perceptible things or is there something intermediate between them and Forms? [*Metaph*. 1059b15–21; cf. VII.2] To some extent this question constitutes part of his general question, whether there are imperceptible, immobile substances; the other candidates are Forms and gods. [1069a32–6] Yet how does this inquiry hold, *qua* being?

Aristotle is taking all three of these types as candidates for principles and causes of all beings. Then all beings will have relationships to them. Hence the question about the reality of mathematical objects holds, *qua* being.

So Aristotle's ontological program is remaining consistent, in focussing on substance and its principles and causes. Yet if the study of being *qua* being turns into the study of the divine, into theology, will this too remain consistent?

The problem is that it does not appear that conclusions reached about immobile, separately existing substance will hold *qua* being. What holds of the unmoved mover, like never changing, does not hold for all beings. So, it seems, Aristotle has two, conflicting views of first philosophy: the ontological, where the concern is with claims true *qua* being, and so, it turns out, of substance, and the theological, where the study of being *qua* being is the study of the divine only. On the theological view, 'being *qua* being' appears to be just another name for God. But on that approach Aristotle has no unified conception of first philosophy.

Yet, even in *Metaphysics* XII, Aristotle insists that the science of being *qua* deals with substance in general, not just with separately existing, eternal, immobile substance. [1069a18–20][21] That is one of the kinds of substance, and might be the subject of a special science. [1069a30–b1] Here Aristotle, in beginning his study of theology, seems to view first philosophy in line with its ontological description: first philosophy is not to be restricted to theology. But why is theology included in first philosophy, whereas physics, the study of movable, perishable substances is not? This problem looks even more serious if we recall that Aristotle gives a certain amount of astronomical theory in *Metaphysics* XII, and that astronomy studies eternal, mobile substances.

First, the explanation about why mathematical objects are discussed in first philosophy applies here too. First philosophy studies the causes for all beings. If there are gods serving as first causes, these hold as principles and causes for all beings. Hence we can talk about them *qua* being.

Second, my analysis of being *qua* being explains why first philosophy would focus on theological objects more than on mathematical ones. The beings in the world, Aristotle says, are primarily individual substances, and derivatively quantities, qualities, etc. Items in the other categories have a profound dependence upon

[21] Note that the sort of account that I am suggesting, by linking the talk of substance and being in various books of the *Metaphysics*, assumes a homogenous approach to first philosophy by Aristotle. Such an approach is in contrast to a developmental view like Jaeger's (or even Owen's—see Owen 1960: 163–4), where Aristotle is said to have different views of first philosophy in *Metaphysics* IV and XIII. But, as Aubenque (1962: 392–3) has argued, the ontological and theological views are consistently mingled by Aristotle, even in *Metaphysics* IV; e.g., 1010a25–32; 1012b29–31.

items in the category of substance. Although everything that exists is a composite of a certain substance with particular qualities, relations, quantities, etc., it is primarily an individual substance. Since everything that is is a substance, being *qua* being is substance, first and foremost.

Aristotle wants true universal predications in the sciences. In discussing κατὰ παντός, Aristotle has indicated that he wants his true universal predications to hold past, present, and future, i.e., sempiternally. [*An. Po*. 73a28–30; cf. 95a10–4; 96b3] However, most individual substances come to be and pass away, although their species apparently do not for Aristotle. [*Gen. Cor*. 338b16–7; *Metaph.* 1039b24–5; 1043b14–6] Due to the permanence of species, there can be physics, biology, and the other sciences studying perishable individuals. Yet the instances of these species are unstable, and the claims of a science like physics are hypothetical: 'every woman, when she exists, is able to move'; 'every rock, when dropped from a height, falls'. [*An. Po.* I.8] The claims may be true in every instance, but their truth will be conditioned on the existence of the instances. Still, sciences are about the individuals ultimately, not about their species. Species, or forms, do not move since they are unchangeable. Aristotle, when he asks, 'what is being?', seems to want scientific answers that are both permanent and true of primary substances. In physics he is forced to disregard the individuality in order to get the permanence. Yet, Aristotle insists on the primacy of individual substances among the things that are. In discussing what being is "scientifically," he would thus be inclined to look for individual substances that are what they are permanently.[22] Aristotle holds that there is no demonstration or definition of an everyday perceptible individual substance. [*An. Po.* 75b24–6; 87b1–3] This is so, he says, because they are not permanent,

> …because they have matter whose nature is such that they are capable both of being and of not being; for which reason all the individual instances of them are destructible. If then demonstration is of necessary truths and definition involves knowledge, and if, just as knowledge cannot be sometimes knowledge and sometimes ignorance, but the state which varies thus is opinion, so too demonstration and definition cannot vary thus, but it is opinion that deals with that which can be otherwise than as it is, clearly there can neither be definition nor demonstration of sensible individuals. [*Metaph.* 1039b29–1040a2; also 1039b29–1040a2]

Instead he seeks a permanent, individual substance, a divine one. Induction leads to God; metaphysics to theology.

So Aristotle's scientific method and ontology provide different criteria for what is the ultimate subject, for what *is* in the primary sense. When combined, these criteria demand an individual, primary substance that is definable and capable of demonstration. Further, it must be what it is permanently, and so must be immobile and unchangeable. Mathematical objects fulfill many of these criteria, as they are individual, unchangeable, definable, demonstrable, and exist always necessarily.

[22] Irwin (1977: 210–3) has pointed out that first philosophy is not scientific in the strict sense of the *Posterior Analytics*, as it does not use demonstration or have a restricted subject matter. Also see Owen 1960: 178. (Of course I am presupposing a good deal in this sketch of Aristotelian science. But still see *Metaphysics I* 1027a32–4; *Posterior Analytics* 75b33–6; 87b33–88a11; 100a15–b5; Ross 1949: 533.)

Yet Aristotle also wishes subjects of his science of first philosophy to exist as substances, independently and separately. For he claims that substance is primary, because it does not exist in another and persists when its individual accidents change. [*Cat.* 2a11–3] As he concludes that mathematical objects do not have a separate and independent existence, these will not provide the exemplary instances of being, as they are not strictly primary substances. Rather, a being or individual substance, which exists always, independently and separately, and whose existence and nature may be defined and demonstrated, would be the one that would preeminently exemplify the claim that being *qua* being is substance. A god, an unmoved mover, may be defined and have its characteristics demonstrated. Moreover it is likely that for Aristotle the definition of its essence, i.e., the formula of its form or species, gives a unique description of it.[23] Because of his criteria for what a being strictly is, Aristotle's "discovery of metaphysics" culminates in his theology. In ending up with theology, Aristotle has singled out the most perfect instance of a being.[24]

This view of the *Metaphysics* even agrees with common practice. Physicists intend to study physical objects in general. However in practice they deal with objects of special sorts only. When, e.g., physicists do experiments about the rate of descent of an object down an inclined plane, they tend to use unusual objects, like specially made balls and surfaces. In theory, any case of an object moving down a slope would do. But throwing a frog down a hill has its distractions. Laboratory equipment is constructed so as to provide objects with the fewest possible distractions, with as few complicating factors as possible. Aristotle's God would be such an object for one studying first philosophy.

Aristotle's use of the singular term 'being' in 'being *qua* being' may mislead us into thinking that there is a unique object for first philosophy. But, as I have noted, occasionally he uses the plural, 'beings *qua* beings'. Each science then picks out and deals with a particular aspect of beings, of what exists. [*Metaph.* 1061a28–b17] That aspect tends to be more purely expressed by some beings rather than by others. Thus physicists construct laboratories; geometers use diagrams. Metaphysicians study God.

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[23] I find it unclear whether or not Aristotle holds for the uniqueness—as Aquinas did later when he held that every angel is a separate species. Intelligible matter makes it possible for there to be more than one god satisfying the same definition, but apparently not in fact. Likewise Aristotle admits that there can be more than one world, except that all the perceptible matter has been used up. [*Cael.* I.8–9]

[24] On this view, see Ross 1953: lxxviii–ix: "…if there is an unchangeable substance, the study of it will be first philosophy and universal just because it is first. In studying the primary kind of being, metaphysics studies being as such." Also Owens 1982: 17–80; Reale 1980: 172.; Halper 2009: 7, 1987: 56. In concentrating on the primary instance of being, the universality of the science of being *qua* being, in the original sense of 'universal', is thereby weakened. Aristotle seems to be aware of this problem; compare *Metaphysics* 1003a24–6 & 1003b21–2 with 1026a29–32.

An account similar to mine could be given from the perspective of cause. Aristotle identifies what is, in a primary way, with what has causal power: first philosophy considers first principles and causes. See Patzig 1979: 41; Frede (1987: 83, 88) also accepts Patzig's account, although he would stress explanation more than cause.

Indeed, Aristotle had a precedent for using a paradigm case of special objects in a general study. Like the Pythagoreans, Plato, in describing the study of the mathematical sciences, urges the prospective philosopher to study the purest examples of each science. [*Resp.* 529d][25] For Aristotle, the unmoved mover is the purest example of a being, and so would be the paradigm case to study. Yet we do not have direct access to knowledge of the unmoved mover by sense perception. So its study, though lucid in itself, may be obscure to us. Aristotle appears willing to accept Plato's advice that, as "the stars in the heavens, like the drawings of Daedalus, are the finest and most exact of material things," we should study them in order to raise ourselves up to the contemplation of the purely intelligible and immaterial. Hence *Metaphysics* XII ends with a discussion of astronomical theory.

It may not be going too far to say that first philosophy, culminating in theology, deals with the same things as mathematics and physics, but with different aspects of them (Routila 1969: 118–9; Reale 1980: 168; Alexander, *in Metaph.* 259, 19–22). [*Metaph.* 1061b4–10; 1061b21–7] Aristotle is careful not to admit the existence of things that we cannot know via sense perception. To be sure, an unmoved mover is not perceptible, in the sense that we cannot perceive it directly. Yet we can gain knowledge of it indirectly by sense perception, just as we can know of souls, numbers, relations—and even individual substances. For it is a principle and cause for everything that exists perceptibly. [*Metaph.* 1063b36–7; 1064a28–b1] We see its effects: the movements of physical objects. Knowing God does not require Aristotle to invent a new faculty of knowledge nor to move into a new realm of things.

To conclude: I have attempted to provide the logical support for this claim:

> In any case, being *qua* being is not a kind of being at all. To suppose that is to misunderstand the logic of the expression "being *qua* being". (Kosman 1987: 168)

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[25] I owe this comparison to Alex Mourelatos. Also see Alexander, *in Metaph.* 251, 29–34.

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Chapter 9
Aristotle's Buddhism

On my view, Aristotle has a relational metaphysics: he has a relational analysis and a substance ontology. He imputes a relational structure to the constituents of substances existing *in re*. Having this, the constituents cannot exist in their own right. What exists thus is the whole complex, rather like the Buddhist doctrine of dependent origination. Accidents and even universal substances have some relational features too. Individual substances alone do not have a relational structure. This gives them primacy of being.

I find it striking how much of Aristotle's Metaphysical vocabulary has a relational structure. The form is the form of some matter; a cause is a cause of the caused; a principle is a principle of something; a predicate is a predicate of a subject; an actuality is the actuality of some potentiality; even an essence is the essence of some being. Again, the five so-called predicables of *Topics* I.5 all have this structure: the species is a species of a genus; an accident is an accident of a substance etc.[1] All such statements exhibit the type of conversion taken by Aristotle in the *Categories* to be characteristic of *relata*: the form is the form of some matter; therefore matter is matter for some form etc. So these Metaphysical terms have all the formal features of *relata*. They are said relative to their correlatives; they have the correlatives mentioned in their definitions; they have the conversion typical of *relata*. [*Cat*. 6b28–32]

The accidents other than the *relata* in the categories have a relational structure too, although only partly so. This yellowness is the yellowness of a banana. The triangularity is the triangularity of the pyramid. Some of these are hard to state given our current vocabulary: being in the market is the being in the market of Socrates. Yet Aristotle himself notes this—and recommends making up terms for them. He says also that things in the other categories, like quantities or qualities, have their being through being "in" or "of" substances. [*Metaph*. 1028a18–9; *Cat*. 2a34–5] Still he concludes them not to be relations as they have no correlatives and their definitions (strictly, the definitions of their abstract paronyms like whiteness and

[1] I find it ironic for them to have the name 'predicable' at all. For Aristotle does not recognize them in his list of predications ("categories").

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being three cubits) make no reference to others. Moreover, the conversion typical of *relata* does not work for them. The yellowness may be the yellowness of the banana, but the banana is not the banana of or for yellowness.

Now Aristotle holds that a *relatum* is "least of all a substance". [1088a29–35; quoted in Chap. 10] A *relatum* does not provide a subject persisting through gradual change. It may be spoken of as if it were a subject independent in its own right, just as we talk about parents and children. Still it has the least danger of actually being supposed to be a real thing in its own right.

Through the constituents of substances distinguished in his metaphysics, like the essences and forms, having relational features, they too avoid such dangers, the dangers of a Platonism. Aristotle may talk about such constituents as if they were independent subjects. Yet being relational, they have little danger of being thought to be real things in their own right, just like *relata*. This explains why Aristotle appears so confident that he has avoided Platonism, even though he ends up saying that what it is to be an individual substance is primarily its form and essence.

Of the objects in the categories only individual substances seem completely bereft of a relational structure: Socrates is not a Socrates *of* anything. Likewise, although with more problems and caveats, this holds for universal substances: The dog or lion (the species) is not the dog or lion *of* something. This appears to have importance as a criterion of substancehood for Aristotle. Indeed, we have seen him worrying over the relational character of some secondary substances, especially the parts of animals: as a head is a head of something, is not a head a *relatum* and not a substance?

To be sure, Aristotle does say that universal substances are said *of* individual ones. Hence they too, tinged a bit with this relational character, have no existence independent from the individuals under them. Aristotle does though allow for them to be subjects for everything else but individual substances. [*Cat*. 2b17–9]

Even so, with substances there may be thought to be a relational structure: the species dog is a species *of* or *for* some individual dogs; the individual Socrates is an individual *of* the species man. However here we have left terms signifying items in the categories and returned to Aristotle's Metaphysical vocabulary of 'species' and 'individual': the relational structure comes from terms like 'species' and not from terms naming substances. The introduction of these terms introduces the relational structure.

What would Aristotle consider such items like "accident" and "species" to be? He does not put them themselves in the categories, although he does put the things that are species and accidents into the categories. Still he certainly talks about them a lot. We can think of them as 'second intentions', as the medievals put it.

To be sure, Aristotle does not distinguish first and second intentions much.[2] Indeed even to make this distinction seems anachronistic. Yet, on the other hand, it can be said that, being a pioneer, he is groping towards making it—and that this later distinction in the Aristotelian tradition arose as a way of clarifying his thought. This

[2] Still cf. Metaphysics 1040b16–1040b27; Simplicius, *in Phys*. 463, 7–9 on 'principle'.

lack of clarity makes his remarks entangled: sometimes he is discussing formal features of substance and accident, matter and form etc. *simpliciter*; other times he is discussing their material features, of this substance and that accident, of the matter and form of an individual (this-here) substance. I shall try to unravel his discussions.

Given Aristotle's penchant for applying his theory of categories in his ontological studies, would he not have noted the relational structure of his Metaphysical vocabulary? Indeed, as he himself suggests, the fact that an individual substance is an ultimate subject having no taint of the relational strengthens its claim of being basic: "it is that of which all else is predicated." [*Metaph.* 1029a8–9] Likewise, Plato says, "some beings are by themselves (καθ' αὑτά), while others are said always in relation to one another (πρὸς ἄλλα)." [255c14–5; cf. *Phlbs.* 51c][3]

Thus what have the relational structure in Aristotle's metaphysics are not the objects existing primarily: these are the individual substances. Rather what have the relational structure are the conceptions used in his theory about the nature of these individual substances. What is signified by 'accident' and 'substance', 'potentiality and actuality' etc. are not relations, i.e., items in the category of relation or their *relata*, the concrete paronyms derived therefrom. Potentiality does not exist *in re*, except as a mode, a formal way, of existing for things that do exist *in re*. Call those things that have the formal structure of relations while not "being in" the category of relation "relational".[4] Aside from *relata*, items in the accidental[5] categories are relational to a lesser extent, as they do not have correlatives.

When I speak of Aristotle's Buddhism, I mean his reliance on this relational structure, rather like the Buddhist doctrine of dependent origination. Items in such a relationship do not come to be or exist independently in their own right. Untangling this relational structure helps in understanding how primary substances alone have being in the full sense. Even if Aristotle recognizes substances to be primarily their forms, he is not forced thereby to acknowledge the independent existence of forms or of universals. Forms, like other *abstracta*, have a relational structure. Abstraction makes it possible for the substantial forms to have their primary status while denying them being in their own right.

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[3] The distinction is between what is complete and what is incomplete. Cf. Brown 1986: 68–9. See Owen 1957: 172–3 for a fuller discussion of this distinction and its later history in the early Academy. Cf. Frede 1967: 16–29. Reeve 1985: 54–5, surveys different interpretations of '*καθ' αὑτό*' and 'πρὸς ἄλλα', and finds two main camps: (1) the distinction amounts to that between a one-place and a two-place predicate [Cornford, Malcolm, Vlastos] (2) "the complement of the verb 'to be' either does not import something different from the subject, or does import something different from the subject [Owen, Frede, Heinaman, Reeve]." See too Bostock 1984, nn. 2 & 20, on the secondary literature.

[4] Take 'relational' along the lines of Barwise and Moss 1996: 12: A set R is a relation if every element of R is an ordered pair. Relational structures are "pairs (A,R), such that A is a set, and B is a relation on R." A function (or map) is "a set f of ordered pairs with the property that if <a,b> and <a,c> belong to f, then b = c." "For any sets c and d, there is a set → d of all functions from c to d."

[5] As discussed in Chap. 3, there is a problem with categories like position, action and passion. These seem fully relational. Indeed some commentators subsume them under relation.

Likewise, as discussed in Chap. 4, Aristotle considers the objects of science like 2, triangle, the snub, and the concave not as really independent things but as things treated as if they are subjects in their own right. What is essential to concavity or to snubness need not be essential to the individual noses from which these qualities have been abstracted. Aristotle goes so far as to maintain that lines and points are not perceptible objects, even though they are abstracted from perceptible objects.

So I suggest that Aristotle's ontology has a relational structure. It has a lot of pairs of terms describing certain aspects of individual things, the singular things that are. Take these terms to signify correlatives. Each correlative can be taken *as if* it were an independent subject. These independent subjects can have their own essential attributes, proper to them and not necessarily belonging to their bases, the singular things from which they are abstracted. They can have differences of priority relative to each other, just as a father has causal and temporal priority to his son. These differences lend a certain asymmetry to these correlatives. This asymmetry grounds the priority of substance, individual and God. Nevertheless having these independent subjects makes no ontological commitment to a Platonism.

In this chapter I shall give some examples of how this relational structure underlies and illuminates Aristotle's ontology.

9.1 Substance and Accident

Although Aristotle holds 'being in' not to be in the category of relation, still it is a relational, two-place predicate of inherence, between an *inhaerens* and an *inhaesum*.[6] Substance and accident have the conversion characteristic of relation: a substance is a substance for an accident; an accident is an accident of a substance. After all, Aristotle has defined a substance correlatively as what persists while changing its accidents. [*Cat*. 4a1–01] Let us investigate their relational features.

An individual substance is correlated with its individual accidents only in certain respects. Given that it has them, it has them in a hypothetical necessity. While it has them it is necessary that it have them (Bäck 1995). [*Int*. 19a23–7; *Phys*. II.9] But it need not have those particular ones ever. Still for this particular accident to exist, the correlative substance must exist.

What has these individual accidents strictly is not the substance simply but that substance *qua* having that accident. A wing is not the wing of the bird simply but of the bird *qua* winged; a slave is a slave of Xanthippe *qua* mistress. [*Cat*. 7a28–b10] Aspects like the bird *qua* winged and Xanthippe *qua* mistress are accidental to their substances. The substances themselves, simply, are not *relata*. These aspects are. They have essential relations to their correlatives and may have essential attributes distinctly on their own. Aristotle accounts for the objects of the sciences in this way.

[6] I generally accept the Owen-Frede account of an accident being in a subject where an accident is not a part of its definition and cannot exist independently of it. See Owen 1965; Frede 1987.

Aristotle says that individual substances alone persist through changes of its contrary accidents. [*Cat*. 4a10–21; *Phys*. I.7] Offhand this seems silly. Aristotle himself says that slaves and fathers are *relata*. Now a slave can go to market; a father can gain weight. Are not then these *relata* persisting through changes in place and in *quanta*? Not strictly speaking. The father does not gain weight *qua* father but *qua* material substance and living organism, as Aristotle tends to put it. What does change in place and weight then is the human substance, who happens to be a father. This seems not so silly. In our terms, a father or a slave is a biological aspect or a social role. Social roles themselves do not gain weight or change location. *Relata* like slaves and fathers change only *per accidens*. In this way Aristotle says that a person cannot be friends with a slave *qua* slave but only *qua* human being. [*Eth. Nic*. 1161b2–6]

Furthermore, 'slave' and 'father' are concrete paronyms, derived from the relations of enslavement and begetting. These paronyms can be treated as if they are independent subjects, although in fact they are not. Taken concretely, 'slave' means 'the thing that has been enslaved'; its real, ultimate subject is a human substance with the accident of slavery. It is not the slave who changes "his" location; it is the human being who is the slave.

Substances like human beings have such accidents like changing location and their weight. When Aristotle speaks of substance persisting through the change, what he says specifically is that substances alone can receive contraries, like black and white, good and bad, sitting and standing. [*Cat*. 4a19–21] These are not contraries of substance (Aristotle says at 3b24–9 that substances and quantities have no contraries). Rather they are contraries of accidents of the substance. As Alexander observes, "…opposites are together by nature: for *per se relata* cannot be defined except through each other: nor is their being without the other." [Alexander, *in Top*. 440, 7–8]

Why can't we say the same about the slave or the father—that they too can receive contraries of their accidents? To repeat, Aristotle rules this out because strictly *relata* have no accidents; their substances have them. A *relatum* like father might be said to have accidents because it is an accident of a substance having those other accidents. Yet this is *not* an accident *per se* but an accident *per accidens*—what Aristotle calls a being *per accidens* (Bäck 2000: 65–74; Bowin 2008: 65). [*Metaph*. V.7] So with a *relatum* there is nothing—no-thing, no substratum—to receive accidents. Aristotle's use of 'accident' in two senses, the *per se* and the *per accidens* sense, obscures his position.

A substance can have primacy and priority over its correlative accidents.[7] Just as a father, a *relatum*, is prior in time and in causality to his child, so too a substance can have causal and temporal priority over its accidents. Unlike a *relatum*, a substance can be prior in formula also: it is mentioned in the definition of its accident but not *vice versa*. ('Accident' here must be construed here as the concrete paronym like 'the white', and not the abstract one like 'whiteness', which does not have a

[7] Aristotle takes what has primacy to have priority. Cf. Cat. 2b3–6; Metaph. 1019a1–4; Peramatzis 2011.

substance in its definition.) Aristotle claims also that substance is prior to accident in knowledge too. Yet, as he admits at 1029b3–12, in the psychological process whereby we come to know, the accidents come before the substances, in the various modes of priority. It is only in demonstrative knowledge from principles evident in themselves that substances have priority in knowledge. We know what a thing is, its definition, when we know its substance, not when we know its quantity or quality. [*Metaph*. 1028a36–b2]

Aristotle says also that a substance can exist without any of its accidents, while they cannot exist without their substance (Fine 1984: 31–88, 1985; Morrison 1985: 161). [*Metaph*. 1028a33–4] How then are substance and accident correlatives? Again, offhand this seems silly too. How can substances, physical objects, exist without having any shape, color, or weight? But remember Aristotle's insistence on the primacy of the individual over the universal. A substance can exist without any one of its *individual* accidents, although it must have some individual accidents or other. Moreover, the universal accidents depend upon the individual ones for their existence. So substance has this sort of priority too. [1019a1–4; *Cat*. 14a29–30]

Still it seems reasonable to insist that the universal attributes of having shape, color, weight are *propria* of material substances. [Cf. *Cat*. 11b38–12a2] So then doesn't this mean that individual substances do not exist independently from these universal accidents?

No. Recall the doctrine of paronymy. Strictly the items in the other categories are signified by abstract terms: qualities, quantities, actions, positions.[8] Accidents like "being in this-here place" and "this-here triangularity" do not exist except in substances as their ultimate subjects. Universals like "triangularity" and "whiteness" do not exist except as being said of and being in substances as their ultimate subjects. Rather their concrete paronyms, like "the triangle" and "the white", do. Worrying about whether "this-here triangle" or "the white" can exist independently from their substances is an ill-formed question: these complex paronyms are themselves compounds of individual substances with their accidents.

On account of an individual substance needing to have accidents of certain types, Aristotle speaks of its "*per se* accidents" (Bäck 2000: 154). The substantial ones will be features not included in the definition of the essence but commensurately universal with and following necessarily from some constituent of the essence. [*An. Po*. I.5] In this way a human being has *per se* accidents like risibility and having a shape.

However, in other cases, these *per se* accidents will be necessary features of accidents of the substance, as the objects of the sciences tend to be items in accidental categories. Sometimes the essential features of the accident belong to its subject as well; sometimes they do not. For instance, this triangle, an accidental shape of a substance, has the *per se* accident, the necessary feature, of having length; so too does its substance. However, it has also the essential and necessary feature of being composed of straight lines having no width, even though, so Aristotle says anyway, the substance having that shape at some time does not have

[8] See Chaps. 3 and 4 for the complexities for the *relata*.

such lines. [997b34–998a6; 1077b34–1078a9] (It has also formal features like being abstracted from perceptible matter and being a *quale*, unlike its substance.)

To be sure, Aristotle makes all this hard to see: he has an obscure terminology for distinguishing the concrete and the abstract paronyms. He uses 'accident' to denote the same relationship on different levels.[9] But still making all this clear, especially in natural language, is quite hard to do for items in all the categories. Try to do it yourself.

I find this account more adequate than its competitors. Burnyeat (1979: 4–5) discusses how the claim of ontological independence of individual substances over all else is restricted to individual accidents but does not hold for universal accidents; alternatively that universal substances can exist without having a particular kind of accident. However Aristotle seems to be making a claim of priority stronger than this. Lynne Spellman (1995: 86) suggests that the substance is prior because it is in the definition of the accident but not *vice versa*. However substances do not appear in the definitions of accidents strictly, namely, the abstract paronyms like whiteness. Corkum (2008: 77) says that a primary substance is neither said of nor in an accident but not *vice versa*. This is fine—except that he thinks that the existing accidents are the abstract and not the concrete paronyms: he gives 'generosity' and 'risibility' as instances of "non-substantial individuals". However, when these exist by being in a subject, they become the concrete paronyms, 'the generous' and 'the risible'.

Thus Aristotle says that substances are the causes of all things in the other categories, because when they are eliminated so is everything else: "Without substance nothing else can exist" ((Ps.) Alexander, *in Metaph*. 685, 30–2; 685, 9–10; 533, 1–2). [1071a35] Although accidents like whiteness are independent from substance in their definitions, when they come to be, like the white, they are not separable from substances. The definitions of the concrete paronyms reflect this. [1077b1–11]

The case of universals in the category of substance, the secondary substances, has more complexity. These appear as constituents in definitions giving the formulae of the essences of individual, primary substances. As such they serve as parts of the individual substance that are their wholes. Aristotle says that such wholes are prior in respect of existence to these parts. [1034b30–2] Yet these parts are prior in respect of the formula, the definition. [1035b13–4]

So universal substances, like goat the species and animal the genus, do not exist except insofar as they are said of individual substances—this amounts to: being their constituents or aspects, as they are said essentially. Here though Aristotle recognizes no paronyms: there are not two separate items, goathood and goat, where the latter is understood as a thing having goathood. Having paronyms here would require goat the substance to be a complex of an accident being "in" a substance. This would make a substance into an accident and require there to be a second substance besides the substance goat—hence an infinite regress. So Aristotle says that universal essences like being a goat or being an animal are the same as their substances. [1032a4–6; 1031b11–4] Still 'goathood' in the sense of 'what it is to be a

[9] Cf. the use of 'accident' in Metaphysics V.7.

goat' can be distinguished from 'goat' "in account", as Aristotle himself does in his Metaphysical discussions. (In virtue of this special relation of essence to thing, secondary substances present special difficulties, as discussed in the last chapter.)

Existence always requires the presence of an individual substance either via being that very thing or via having some relationship to it. Hence individual substance is primary and prior in being, in existence, to all else: to the accidents, both universal and individual, as for them to exist, the abstract paronym has to *be in* a substance, so as to become the concrete paronym; to the secondary substances as they have to be *said of* the primary ones, which are alone "ontologically independent"; i.e., they are subjects able to exist on their own. At 1028a32–3 Aristotle has said that substance is prior to accidents in definition, knowledge and time. There he does not distinguish individual and universal substances. As we shall see, the universal ones turn out to be prior as some parts are prior to their wholes and so as formal causes. Still they remain abstract aspects of individual beings and so are posterior in respect of existence.

9.2 Parts and Wholes

In distinguishing wholes from totalities or sums, Aristotle is working out puzzles raised by Plato (Koslicki 2008: 122). [*Tht.* 204a11; 204e8–10] Socrates gets Theaetetus to say that a whole arises out of its parts but still differs from its parts. Wholes are not sums. The parts of a sum are still present as its elements, whereas the parts of a whole no longer are distinct: an animal is a whole composed of parts but is not merely the sum of its parts. [204a7–9] But then Socrates gets Theaetetus to agree that the whole and the sum are the same, since the parts are parts of the whole as well as of the sum. [205a1–7] Socrates goes on to make Theaetetus conclude that the letters are the only parts that the syllable has. But then, given that there is no account of the letters since they are simple, there will be no account of the syllable. [205a11–c2] Still we ought to have clearer knowledge of the elements than of their compound. [206b6–9] Again, in the dialectical exercise of the *Parmenides*, it is argued both that the one is not a whole and does not have parts, for then it would be many, and that the one has parts since it is one being, i.e., it is both being and one, which are parts of a whole. [137d; 142d1–5; cf. *Phys*. 185b11–6]

Subsequently, to allow for compound unities that are both one and many in different ways, Aristotle recognized both sorts of parts: his totalities are compounds that are just sums of their parts; his wholes proper are organic unities that are more than the sums of their parts. Wholes have a definite structure; totalities do not. Both sorts of wholes and parts have all the relational features.

Aristotle has an elaborate theory of parts.[10] He distinguishes structured, determinate wholes from unstructured, indeterminate totalities. He makes this distinction

[10] Some senses of parts that he distinguishes concern only *quanta*, and I leave them aside here. [Metaph. 1023b12–5; 1023b32–4; 1052b17–22; 1052b31–5] See Bäck 2010. I shall focus on

for *quanta* like lines and numbers as well as for substances. When he says that lines and numbers have parts, he is taking them as mathematical objects—*as if* they existed independently in their own right. As quasi-substances they then have some of the features of substance. So it is not surprising that he applies the same distinctions to them both. As for substances, Aristotle wants to take such abstract items as matter, form, and universals as parts of the whole, the individual substance. In addition, a substance has material parts, and its definition, the formula of its essence, has parts too. All these different sorts of parts make for a complex theory of substance.

Aristotle says that some quantitative wholes have their parts in a definite order. Some of these are continuous, like lines, planes, and solids, which have positional order. Others are discrete, like numbers, verbal utterances (λόγοι), and temporal sequences. [*Cat*. 5a15–37] Other quantitative wholes have their parts in no definite order. Such things are totalities or sums (πάντα). Here when the parts are transposed the whole remains the same. Thus times, numbers and statements (in Greek perhaps!) can be called totalities but not wholes, except metaphorically. Aristotle claims this perhaps because such totalities have parts only potentially, via an arbitrary division. [1024a3–6] If we consider a number to be composed of units, the order in which those units are taken does not matter. He admits that times and verbal utterances have a certain order but no position: the parts do not exist together at the same time. [*Cat*. 5a24–37] These things are one *qua* being indivisible in their species or form. [1016a21]

Some substances are wholes along the same lines. The structure of a substance is its form; what instantiates that structure is its matter. Likewise words have letters as their material parts but are not merely heaps, not merely the sum of their parts. The structure of a word causes the letters to have a certain order. This structure is not itself a part in the way that the letters are parts, but still is a constituent or causal principle of the word. [*Phys*. 195a16; *Metaph*. 1013b17] For, if that which gives the letters their structure were a part of the same type, then yet another structure would be needed in order to give a structure to that first structure and the letters: an infinite regress, like the Third Man argument. To avoid the regress, Aristotle appeals to his doctrine of wholes. [*Metaph* 1041b19–22]

Again like quantities, other substances are totalities composed of homogeneous parts of similar material and have names that are mass terms, like 'wine', 'flesh' and 'rice'. Here the inference that the whole is made of certain material from the part's being made of it holds, and *vice versa*, as with a liter of wine: there is a liter of wine if and only if the drops of that liter are wine. This inference does not hold for material wholes. These are typically signified by count nouns and have not homogeneous but rather heterogeneous continuous parts with a definite structure: if a portion of this goat is flesh, it does not follow that this goat is flesh; a part of a syllable is not a syllable. [*Metaph.* 1014a26–31] Again only wholes, not totalities, can suffer mutilation. Here a part is removed while the substance is preserved. Such a part must not be merely accidental but a functional part of the whole, and typically an extremity

substances and on his distinction between structured wholes and unstructured totalities. Koslicki (2008: 122–5) champions some of Aristotle's views on parts today.

that cannot grow back. So a man is mutilated if he loses his hand, but not if he has his head shaved. [*Metaph.*V.27] Hence Aristotle proposes that the definition of such a whole differs from that of its parts if the parts and the whole are not synonymous—as with the syllable and its letters. [*Top.* 150b19–21] When they are synonyms, they are totalities and share the name and definition: just as the heap of sand is "sand", so too for the grain in the heap.[11]

Aristotle proposes that such material parts differ from the whole when it is possible for the parts to exist without the whole. [*Top*. 150a20–1; Alexander, *in Top*. 486, 22–4] The parts of totalities can exist without the totality, as a drop of wine still remains the substance wine when separated from the whole liter; the parts of wholes cannot, *qua* parts of the whole, as a detached hand is not a hand. Still note that, when the whole does not exist, the parts still can, although as something else. This becomes important in the next chapter when considering parts of animals like their heads. These parts, once severed, still exist as individual substances but of a different sort.

Aristotle uses parts and wholes also in his analysis of the constituents of an individual substance, its matter and form. Aristotle allows the thing that is composed of or is to be divided into parts to be either the form or what has the form. A case of the latter is the bronze sphere, which has the bronze, its matter, and the sphere, its form, as parts. Aristotle does not give here an example of parts of a form, but presumably these, *or at least some of these*, appear in its definition. E.g., 'snubness' is defined as 'concavity in a nose'; here the concavity and the nose would be parts of snubness. [Cf. 1034b32–1035b1] Similarly, the constituents in the account (λόγος) of what a thing is are its parts. Here the genus will be a part of its species, as animal is part of the species goat. [1023b17–25][12] Aristotle distinguishes such senses of 'whole' likewise in *Metaphysics* V.26.[13] So then the parts of what has the form are the parts of the individual substance: its matter and its form. Its form has the parts signified by the formula of its essence, namely its definition. Perhaps the form has other parts as well. This issue (to be discussed in the last chapter) concerns whether Aristotle holds an individual substance has a universal or an individual form. If the latter, then not all parts of the form are universal or are stated in its definition.

In either case, parts of its form given in its definition will be universal. Yet an individual substance has other universal parts, its universal accidental features. Some of these, its *propria*, belong to it necessarily, as breathing to a goat; others, its common accidents, belong to it contingently, as blackness to a goat.

The parts of the form given in its definition are not material parts but elements of the formula of the essence. [1030a7–20] Here the genus and *differentia* are part of the species: rational and animal are parts of the species man. Such parts are prior to

[11] Simplicius, *in Phys*. 551, 32–3: "Also every genus is predicated synonymously of all the species, but the whole only of the homoiomeres, and of those not in virtue of being a whole."

[12] Aristotle does distinguish these two cases. Perhaps the difference with the prior sense comes from 'nose' not being strictly a constituent, the genus or *differentia*, of the definition of 'snubness'.

[13] He has more extensive discussions of these distinctions of wholes also when he discusses 'one' in V.6 and X.1.

the definition, while the material parts are not prior but posterior to it. [1035b3ff.] These formal parts then have a logical priority to the individual substances that they constitute. Still they have not ontological independence but dependence as they cannot exist on their own. Their relational structure underscores this dependence.

The formal parts of an animal exist *in re* only as actualities of that substance and cannot exist separately in their own right. *Differentiae* like the rational, the perceptible, and the mobile, do not exist on their own but only as aspects of individual substances. Again these *differentiae* are concrete paronyms, themselves composed of a substance combined with an attribute, typically an accidental characteristic. Essential parts like genera and species similarly are parts of individual substances and are said of them: again a relational dependence.

As for the parts of the individual substance Aristotle holds that perceptible substances have their matter and form as their parts. [1034b34–1035a27] Thus the bronze statue is composed of the bronze and its shape, and a woman of her body and her soul. At least at times Aristotle recognizes intelligible matter as well, and then would have the same analysis for the circles and numbers of mathematics (Frede and Patzig 1988: 195–6). [1036a2–5; 1036b33; 1038a3–9; 1035b1][14]

Individual substances are the wholes of their parts, matter and form. Both the matter and form of an individual substance themselves can be analyzed as wholes in different ways. The form is a whole constituted by the components of its definition in a certain order or structure. [*Metaph.* 1030b28–1031a1; *Int*. 21a15–7] Similarly, the matter of an individual substance like a goat has material parts in a certain order: its head, legs, heart and lungs. These parts are wholes in their own right and are themselves structured wholes: in this way the head has eyes, horns and nose as its parts. Yet ultimately we get to more basic parts of the goat that are unstructured wholes or totalities: its flesh and bones. [*Metaph.* 1070a19–20; 1035b26–7; 1036b3–4] In turn these dissolve into elements and ultimate matter. Likewise the formal parts may themselves be wholes: an animal is a perceptible mobile substance, and we continue to get parts of these parts until we reach simple elements without parts. [*An. Po*. I.19–21]

Unlike the formal parts, for Aristotle the material parts of substances seem able to exist separately and actually as substances in their own right: heads and feet and animals and the handles of amphorae persist through change and have careers of their own, independently of their wholes. Considered *qua* parts of those substances, they too cannot exist *in re* apart from them. But they can when they have a form of their own. Likewise the forms of individual substances cannot exist apart from them *qua* their forms. Still they can exist apart potentially as when the form or a constituent of it is reproduced: the shape in the mind of the sculptor or the form of the living goat is reproduced, albeit not in all its singularity, in the sculpture or in the offspring. But then they still have matter, albeit different matter. This avoids Platonism as for them to exist apart actually they must do so as constituents of another individual substance.

[14] However Simplicius suggests that the whole is the totality of its parts for intelligible substances having no partitioning while it is not that totality for corporeal things. [*in Phys*. 560, 32–561, 10]

Both the material and the formal parts of individual substances form parts of structured wholes. These parts can be considered subjects in their own right, with distinctive features. Hence the *secundum quid ad simpliciter* inference to their wholes does not hold. This means that the parts of substances can have attributes different from the substances themselves. For instance, what is true of Socrates' hand need not be true of Socrates and *vice versa*.

Aristotle runs the discussion of universals and the constituents of a definition together with the discussion of parts in tandem perhaps because in both cases as such, sc., under that actual description, *qua* parts, they cannot exist separately and independently, but then only potentially. When they do exist independently, they do so only by becoming some other actual thing or its constituents, with only the new individual substance being real. So too universals constitute the reality of substances but do not exist independently as separate Platonic substances. [*Phys.* 184a25–6; 187b15–6] If a universal continues to exist separately from the substance of which it is a part, it would have to exist as a part of another substance.

Aristotle admits that in a general sense accidents might be said to be parts of their substances. [*Phys.* 210a34–b5; Simplicius, *in Phys.* 552, 18ff.] Still, in a stricter sense, he holds that an accident is not a part of its substance. Aristotle says that an accident "…is in something not as a part, and cannot exist separately from what it is in." [*Cat.* 1a24–5] How then do accidents differ from parts, strictly speaking? Accidents cannot exist apart from their substances. In contrast parts, at least the material ones, can exist apart from their wholes, even if they no longer will be called "the parts of" that substance nor function as its parts. Thus a jar of wine is a whole, having the jar and its liquid contents as its parts. Aristotle remarks that when the wine is separated from the jar, they are not parts of the whole. Still, of course, they continue to exist as a jar and as wine.[15] This reading agrees with what Aristotle says about the parts of animals to be discussed in the next chapter. Again the formal parts, as such, cannot exist apart, but can potentially when they are reproduced.

As parts and wholes are correlatives, they have the formal features of relations. *Qua* parts and *qua* wholes they cannot exist without each other. However, the things that serve as their subjects and *substrata* can exist without each other. Thus both the matter and the form of the bronze sphere cease to exist as its matter and form when it does. Yet the matter can exist before and after as a hunk of bronze with another shape; the universal form can exist before in the mind of the artist and later in other instances as well as in potentiality.

It is not by coincidence that Aristotle brings up the paradigm of letters and words at the end of his account of substance (Harte 2002: 133; Bostock 1994: 244–7. Frede and Patzig 1988: 319–22). [*Metaph.* 1041b11–33] Aside from being his reply to Plato's use of the example in the *Sophist*, Aristotle is applying his account of parts and wholes to substances. Aristotle concludes his account of what it is to be an individual substance by taking it to be a structured whole. He insists that this whole

[15] Harte 2002: 279. "…the identification of this wooden object as a chair leg is in some way dependent on the role it could play in the constitution of a chair." Here there is an ontological and not an epistemological dependence.

requires a cause for its structure and unity. He finds it in the form, which he identifies with the essence. Just as the letters of a syllable need a cause for their being in a definite order, so too an individual substance needs a cause for its parts to be ordered as they are. [1041b11–27] The formal constituents, biped and animal, and the material components, flesh, bones and sinews, each have a cause ordering them into a whole: the form of the individual substance. [1045a10] The form may be the cause of an individual substance. Still it is not a substance. Thinking of the form of an individual substance as a part makes it relational and unable to exist apart from that substance.

9.3 Universal and Particular

As with 'being in' Aristotle holds 'being said of' not to be in the category of relation. Still it too is a relational, two-place predicate of inherence, between an *inhaerens* and an *inhaesum*. 'Universal' and 'particular' have the conversion characteristic of relations.

Plato probably started the fashion of thinking of a universal as a whole, with the individuals participating in it as its parts (Harte 2002: 132). [*Tht.* 203c5–6a; 203e3–4; *Prm.* 157d8][16] Likewise Aristotle views a universal as having a relation to its instances as a whole to its parts: the universal is of a whole (καθ' ὅλου) and the individuals, *qua* instances of a universal, are particulars, literally, things in virtue of the part (κατὰ μέρος). Here the relational structure appears clearly: a particular is a particular of some universal; a universal is a universal for some particular. Aristotle uses these terms also to characterize quantified propositions with 'every' and 'some', where the part-whole relation is obvious in terms of the extensions of the subject term.[17]

The universal and the particular have complex relations of part and whole (Bäck 2010). A universal is abstracted from its particulars; a particular is one of the things belonging to the universal. Universals are parts in the sense that they are parts of their particulars: they are their universal aspects or constituents. A modern approximation: a universal is part of the content or intension of the particular; the particular is part of the extension of the universal. On the other hand, a particular is a whole constituted by these universals in a certain structure or order (perhaps only partly, as above). Again a universal is a whole whose parts are its particulars. In modern terms, this amounts to taking a universal as a fusion of its particulars. Here I focus

[16] However Fine (1993: 21, n. 6) says that Plato did not use 'universal' and 'particular' thus and that Aristotle invented these uses of these terms.

[17] Offhand 'universal' and 'individual' (ἄτομον) or 'singular' ('καθ' ἕκαστον) do not seem relational: they do not fit well into Aristotle's conversion scheme: *'a singular is a singular of some universal'; 'an individual is an individual of some universal'. Here the English may obscure. Or, rather, Aristotle might be using 'singular' to emphasize the primacy of individual substances over universals. 'Individual' has a more complicated history as it is tied to Plato's account of division: an individual is something that cannot be differentiated further by more universals.

on the parts signified in the definition of a universal and a universal as a part or *abstractum* from its particulars.

A universal is not a mere totality but a whole, composed of the parts given in its definition. It has a structure, given by the formula of its essence, sc., the definition. As Aristotle says in discussing wholes and parts of the forms of substances, the constituents of the definition must be in a definite order: not *'animal rational' but 'rational animal'. [*Top*. 150b22–6] The constituents of the latter, Aristotle insists, need the form of the individual substance to cause them to have this order. [*Metaph*. 1041b11–2]

Moreover, as universals come on different levels of generality, the less general ones can be taken as particulars of the more general ones. We have seen Aristotle constructing this hierarchy thus at the end of the *Posterior Analytics*. As instanced in the antepredicamental rule, Aristotle sees the predication of a species of a genus and that of an individual of a species to be of the same logical type.[18] Accordingly, he likely sees the relation of individuals to their species and of species to their genera to have the same structure, of part and whole.

Predicating a universal attribute of a primary substance produces a relation of abstraction. Its other features are abstracted away from. Xanthippe can be considered *qua* human, *qua* female, *qua* moving, *qua* mother—and as such her hair color or preference in music is irrelevant. And Aristotle talks in this way. The essential attributes of a primary substance have the special place of being necessary for its existing: if it loses any of them it ceases to exist. In contrast it can continue to exist with the exchange of its accidental attributes. So certain universal attributes stand as necessary conditions for the existence of the individual substance.

Nevertheless Aristotle denies clearly that universals are substances:

> For it seems impossible that any universal name should be the name of a substance. [*Metaph*. 1038b8–9]
>
> … it is plain that no universal attribute [literally: none of those subsisting universally] is a substance. [1038b34–5]

To be sure, substances like Socrates have many universal attributes, both essential and accidental, said of them—even as constituents of their definitions, the formulae of their essences. However, when we speak of a universal, we have cut off a part of the being of individual substances and treated it "as if" it were an independent subject. Such subjects are not themselves substances primarily, but only quasi-independent aspects of individuals: Socrates *qua* animal; Xanthippe *qua* rational. We have moved away from the substances to its parts, to relational subjects, sometimes intrinsic, sometimes extrinsic. But even their intrinsic parts, the species and genera and *differentiae*, are not substances strictly in the full sense:

> Clearly, then, no universal term is the name of a substance, and no substance is composed of substances. [1041a3–5]

[18] Bäck 2000: 178–85. Frege objects to this strenuously, as it confuses the UF and UO relations.

Aristotle does call species and genera, like goat and animal, "substances" but only secondarily so. As discussed further in the next chapter, he means by this that they can serve as abstract subjects and quasi-substances but cannot exist independently, in their own right.

If universals, the species and genera, were substances and at the same time constituents of those under them, then there would be substances of substances. Aristotle clearly rejects the conclusion. He says that a Third Man paradox follows. [1039a2–3] The paradox comes from a substance serving as a principle of unity and persistence for its attributes: if the individual and the species were both substances, then a third substance would arise as a substratum unifying them both (Irwin 1988: 268). *Ad infinitum*. Hence no universal is a substance strictly: existing independently and persisting through time and change: the part would have replaced the whole.

Still Aristotle goes on to admit that universals are "principles and causes" of substances. [982a4–6; 998a20–3; 1042a4–63] So universals essential to substances—the species and genera in the category of substance and their *differentiae*—are principles and causes of individual substances. These universals are not such substances. Hence some principles and causes of individual substances are not individual substances. Yet neither are they common accidents. Rather they are intrinsically relational: essential, universal aspects abstracted from individual substances in the mode of "as if". Their existence depends upon the actual existence of individual substances.

9.4 Matter and Form

> …at any rate if matter is never *per se* but is always with some form: for both man and fig come to be from seed… [Simplicius, *in Phys*. 814, 6–8.]

Substance itself has a relational structure, of matter and form. Neither matter nor form can exist by itself: always, the matter is the matter for or with some form; a form is the form of or for some matter. [*Phys*. 196b8–9] If the individual substance, say, a plant or a bronze statue, perishes, Aristotle holds neither its matter nor its form to perish in certain respects. The matter continues to persist without that actualizing form; the form itself, at any rate insofar as it is universal, continues to exist, as Aristotle holds that forms, or species (ἴδη), always have instantiations. Yet, strictly speaking, *its* matter, sc., the matter insofar as it is en-formed as that individual, and *its* form, that form insofar as it is in that matter, perish together. As Aristotle says, human matter *qua* corrupted belongs to the corpse (and not to the human being). [1045a1–5]

The matter continuing to persist after the destruction of the composite substance, and the form existing before it, do not exist by themselves self-sufficiently. The matter still has a form, some other form, although perhaps one not at the same level of complexity. A corpse still has a shape and has flesh, bones and sinews, albeit de-composing, non-functioning ones. As Aristotle says, many of these forms and these substances are nameless: ordinarily we have little interest in naming them

(outside of forensics, metaphysics etc.). [1033a13–5] The form existing beforehand does so in an actually existing substance: the form of the statue in the mind of Phideas the sculptor; the form of man that will come to be Socrates in the seed, an actual part of the body of his father Sophroniscus. [*Metaph*. VII.7–9] This form has the accidents of the actual Socrates only potentially. [1034b7–19] However the bronze, *qua* the matter of this statue or the form, *qua* the form of Socrates, can cease to be.

To say that the universal species exists always just means that in the past and in the future, relative to the present now, there will always be individuals having that form. [*Gen. Cor*. 338b16–7; *Metaph*. 1047b3–5] For forms do not exist by themselves *in re* ever. (We might accept this doctrine even today, if we allow for possible individuals in this world, or a domain of all possible worlds.)

If we speak strictly, the form and matter of an individual substance have the structure of *relata*. When named strictly they have a co-dependent existence only; likewise: the wing and the winged perish together, but not the wing and the bird. This is exactly the same distinction that I shall use in Chap. 10 to explain how Aristotle can assert that parts of animals are substances, and yet, when detached and existing on their own while not functioning as hands, hands are hands in name only.[19]

Although the constituents of a substance, its matter and form, have a relational structure, they are not *relata* in a category. Moreover, they are neither accidents of the substance nor "in" it in the way that an accident is "in" a substance.[20] At the same time they are not strictly speaking essential, as they are not in the category of substance and are not "said of" the substance as a constituent of its definition or as a *proprium* following from it. This holds both formally and materially: Socrates is neither matter nor form; Socrates is neither a soul nor a body, although his substance has these constituents.

What I have just said looks preposterous. To be sure, Socrates is not a soul although he is animate. But surely Socrates is a body: body is a genus of substance, and Socrates is a rational animal, which is an animate body capable of perception and locomotion. I agree. The obscurities come, once again, from keeping the paronyms straight. Elements of the form are, strictly, the abstract paronyms: rationality, being animate, being a body (corporeity). Socrates is neither rationality nor corporeity. Rather he is rational and a body: something, namely, an individual substance, having rationality and corporeity. Aristotle himself admits that sometimes it is not clear whether a name signifies the form or the composite substance. [1043a29–35]

[19] This, perhaps, is the point that Howard Robinson (1983: 129) is trying to make—obscurely! (Nussbaum 1984: 207)—about the relation of body and soul, the matter and form of a human being: "it is not the man who is the sailor who stands to the boat as form to matter, but the man *qua* sailor. The individual substance, the man, can exist without a boat, but the man *qua* sailor exists as such only from his relation to the boat."

[20] Because they are parts.

I admit that Aristotle does not distinguish the paronyms clearly in many passages. Yet our texts consist of compressed notes. The main alternative has been to take Aristotle to hold that what it is to be an individual substance, its quiddity, consists in a cluster of universal features. As I discuss further in the last chapter, this violates Aristotle's central *dicta*: that individuals substances are real primarily, that they are identical to their essences, and that no universal names such a substance.

These constituents, the form and the (generic) matter of the individual substance, are "essential" in the sense that, were the substance to lose them, it would cease to exist, although it can lose or change its particular matter and have its form more or less actualized. They may then be considered to be relational in a non-accidental, constitutive sense—what were later called *intrinsic* relations. In contrast, the substance survives while losing or changing its particular (*extrinsic*) categorial relations like being on the left or being a slave or even being composed of this particular matter. Aristotle himself makes such a distinction in his discussion of parts and wholes. Parts of a totality serve as its constituents or intrinsic "relations"; parts of a heap do not and are merely "extrinsic".

Although its form and matter are intrinsic to the individual substance, still they are not stated in the definition, the formula of its essence. Aristotle says that the soul is the form of a human being, and the body is the matter of the primary substance; man is the compound of both taken universally. [1037a5–7] Nevertheless, 'soul' does not appear in the definition. However, 'rational', a paronym of rationality, a quality of that soul, does. In the definition, 'rational' is a universal term predicated of 'human being', itself a universal. This has great importance for Aristotle's account of the essence of an individual substance. For the present, note that, although the soul is the form, only the concrete paronym ('rational') of a universal quality of that form ('rationality') appears in the definition of human being. This suggests that, while the definition states some necessary features of the form of an individual substance, it does not have the form as one of its constituents. Again, Aristotle says that the matter cannot be predicated of the substance, but only something derivative: not 'wood' but 'wooden'; not 'that' but 'thaten'. [1043a14–21; 1049a18–22; (ps.) Alexander, *in Metaph*., 503, 34–9].

What about Aristotle's references to an "ultimate" or prime matter? [E.g., 1029a20–1]? When we abstract away from all structures, including having spatial dimensions, we get to a prime, ultimate matter. We can understand his talk of prime matter in various ways: (1) either it is the ultimate stuff underlying any possible change, with itself having no properties. In reality we never can get to this ideal limit, but always have more or less proximate and ultimate matters, all of which having some form and structure (Reeve 2000: 122).[21] Or (2) Prime matter has a basic structure, of, say, occupying space or at the least being a ground able to connect various accidents. This amounts to something like the notion of

[21] Aristotle recognizes no prime matter: so too Charlton 1970; Cohen 1996: 55–100.

signate matter that Aquinas (thinks that he has) inherited from Avicenna *et al*. Or (3) This matter, the ultimate substratum, is the substance of an individual.[22]

I reject the last option as an interpretation of Aristotle, as he rejects it himself in Metaphysics Z.3. [1029a26–7][23] Aristotle requires substances to be individual and definite. [1029a27–8] He says that things having unity are underlying things with a determinate. Yet prime matter is just stuff stripped of all determinate attributes belonging to the categories.

Aristotle does suggest that the substance *might* be predicated of the matter. After all we do say things like 'this is Socrates'. However such predications run afoul of his doctrine of unnatural predication, where a substance term cannot be predicated. [*An. Po*. 83a14–7] Moreover, as he suggests at *Metaphysics* 1029a20–6, in such statements 'this' cannot signify the matter as it is too indefinite to serve as a subject. Likely, one is pointing at the original substance with its range of attributes.[24] Likewise the form as form cannot serve as a subject: 'being human is Socrates' or '(the species) man is Socrates' or 'the soul is Socrates' makes little sense. Again, the matter is not predicated of the substance: At best we can use a derivative term: Socrates is not this but this-en, just as the table is not wood but wooden. [1049a27–30] So then Socrates is not soul but ensouled or animate; not body but corporeal.[25]

To be sure Aristotle does say that the form of man is primarily the *differentia*. [*Metaph*. 1038a19–20; 1043a19–20; cf.1037a5] So what it is to be a human being is to be rational. Still again it does not follow that Socrates is the *differentia*; Socrates is not rationality. Rationality is a quality, albeit an essential one. [*Cat*. 3a21–2; 9b335–6] Rather Socrates is the paronym, a thing, a substance, having rationality: Socrates is rational. Likewise for his corporeity: Socrates is a body.

The second option has the problem that it makes an individual substance depend on something that is not an individual substance. This signate matter has some attributes like corporeity or three-dimensionality. So it looks like a quasi-substance. Aristotle does speak of these as quantities which can be stripped away from the matter. [*Metaph*. 1029a14–9]

Still, Aristotle detests infinite regresses. Moreover the ancient tradition does not take prime matter as an ideal limit—we should give some weight to this tradition. Anyway talking of ideal limits sounds anachronistic. So the first option has its problems too.

Once again, the solution lies in thinking of prime matter not as a substantive thing but as something abstract. Here it is being treated *as if* it were a subject in its

[22] Lewis (1991) at times comes dangerously close to this position, and says (279–81) that the end product ends up being something with three dimensions. Charlton (1970: 138) and Schofield (1972: 97–101) do not. Still Lewis (1991: 151) ends up saying that Aristotle makes forms the primary substances. Cf. Loux 1991: 12, n.4; Inciarte 2005 on Lewis 1991: 196ff., especially 197, n. 45.

[23] Despite the efforts of Joan Kung et al., Aristotle rejects the claim that the substance is not predicated of matter in *Metaphysics* VII.3. See Bäck 2000: 87–96.

[24] Owens (1981: 35–40) suggests: not 'the matter is a stone' but perhaps 'the matter is lapidized'.

[25] So too Lorenz (2006: 151, n. 3) suggests that Aristotle thinks of the "parts of the souls" as aspects—to avoid there being more than one soul.

own right. This is precisely how Aristotle treats concrete accidental paronyms in his sciences.

Moreover, once we speak precisely, no matter can exist without its correlative form. It's just that a chunk of matter comes to have a sequence of forms, and forms are instanced in a succession of different chunks of matter. Prime matter considered as signate matter properly is such an abstraction: thinking of the individual substance without its form.

Likewise the form is an aspect of the individual substance. Its particular manifestations change—for instance, how actual it is; how effective it is in preserving and developing the structure of the individual. Some of its features, just as some features of the matter, remain constant and essential to the individual: for an animal, being perceptive and alive; occupying space and being composed of certain sorts of materials.

Aristotle has then a world of individual substances of varying complexity, each of which having a structure of matter and form. The matter and the form, at different levels of generality, can be treated abstractly, as if they were subjects in their own right. Aristotle would not find this strange to do in his science of being *qua* being, as he has asserted already that the other sciences do it. When we look at the matter, it resolves itself into a relational complex of a more basic, less complex matter and form. When we look at the form, it resolves into simpler forms making it up: generally the genus and the *differentia*. When a form is treated as if it were a subject in its own right, it acquires quasi-substantial features. It then too requires some sort of matter in itself: the genus provides that, as it can then become differentiated. The genus then becomes the abstract, logical matter. When taken as a thing in its own right, the genus needs to have the substantial structure of matter and form too. Its genus in turn becomes the matter. Eventually we get to the limit here: We end up with the ten highest genera, and, above them, murkily, with transcendentals like being and one.

When we get to the "ultimate abstractions", the objects of mathematics, Aristotle is wont to talk of intelligible matter. Now these objects are not the highest genera. Mathematical objects are *quanta* or *qualia*, and these, or rather their abstract paronyms, the quantities, belong to the category of quantity or quality, a highest genus. (What is the relation of the genus as logical matter to intelligible matter? We have very little text to go on.)

9.5 Potentiality and Actuality

> … it is not the wood qua wood that is actually a table, but the wood qua table. (Cohen 2009)

Potentiality and actuality are correlatives too.[26] Potentiality is a state of a presently existing substance, its actuality. Aristotle identifies potentiality with the matter and the actuality with the form. [*Metaph.* 1045a23–5] The matter is potentially an indi-

[26] Here I take 'potentiality' in a general sense, as in *Metaphysics* V.12; IX.1: not that of motion but perhaps of change taken broadly. So too Frede 1994: 184; Beere 2009: 55. Kosman (1984: 128) recognizes two different senses.

vidual, a this-here; the form works on the matter so as to make it this actual one. [1042a27–8; 1043b10–8] On account of this asymmetry, the actuality has priority over its correlative potentiality (Witt 2003: 13; Yu 2003: 161). [1050a2–3]

Aristotle says that "the substance or form is actuality." [1050b2–3] This claim seems to hold in many ways. On the one hand, an actual substance is prior to potential substances—and indeed to all else: we have already seen how he takes a substance to be prior to its accidents and also the individual to be prior to the universal. Here he is focusing on the relation between potential and actual individuals. Even items in the accidental categories and their paronyms generally have actuality prior to potentiality. The artificial cases work thus: someone having the potential to be a builder comes to be one by being trained by an actual builder; even the potential for there being the art of building requires a prior, actual presence of building: the art exists beforehand in the soul of other actual builders. As for the natural cases, Aristotle does say that the potential exists before the actuality: a stone does not have actually to fall in order to have the potential to fall. [*Eth. Nic*. 1103a26–8] Still once again the potential is there because individuals of that kind have actually acted thus in the past and the presently existing ones actually have such a nature.[27]

Animate individual substances have such priority too. For something to have the potential to be a human being requires there to have been an actual human being (rather, an actual mating pair) existing beforehand with the form present in the seed.[28] That actual form causes the materials of the embryo to develop their potentialities. Thus, in a way, through the presence of the form, the mature adult is prior to the embryo in substance even if the boy is prior in time. [1050a4–7] The adult state serves as the final cause (τέλος) towards which the embryo naturally develops. The actual presence of the form in the embryo makes this happen: it moves and organizes the potential in the embryo's human body so as to actualize it.

Accordingly Aristotle identifies the form of an individual substance with its actuality and its matter with potentiality. The activity of such a form is not like the activity of building, which produces an object external to and different from the builder. Rather here the activity lies in the agent, just as with activities like seeing and thinking. [1050a31–4] The actual existence of an individual subject consists in the activity of the form upon its matter.

Aristotle takes the unmoved mover as the prime case of an individual substance in the state of actuality. Here the form has no change from potentiality to actuality. [1072b7–8] It just is and acts, in the full, second sense of actuality. [1072a24–6] As the first unmoved mover has priority over the other, Aristotle tends to focus on that one. Once again, this actual cause is an individual substance, considered here in one of its aspects, *qua* causing motion.

As with the proximate matter and the form, a potentiality and its actuality are abstractions; they are one and the same thing: "The potential and the actual are

[27] We might dispute this. Still Aristotle assumes a correspondence between what we can know in the past and what is possible, as is evidenced in his principle of plenitude.

[28] Spontaneous generation will present a problem, the same as the one about the potentiality of the rock to fall.

somehow one." [1045b20–1] "Somehow"—with respect to what exists; they still differ in account. When taken as separate subjects, they may have different attributes, formal and material.

The form can exist before in a potential state as a seed or, in the case of artificial substances, as a thought in the mind of the artist. Yet even then it does not exist separately but as an aspect of another individual substance. We may speak of a form changing from potentiality to actuality, but do so in abstraction from those individual substances.

Potentialities and actualities are aspects of individual substances taken as if they were separate subjects. That Aristotle views them thus can be seen from his insistence that we should stick to the potentialities of actually existing subjects, not those of potentially or possibly existing subjects (Waterlow [Broadie] 1982: 28–30; Cooper 1987: 253–4; Charles 1988). [*An*. 412b25; *Metaph*. 1046a4–29][29] For, if their subjects did not exist, they would have nothing of which to be aspects. Thus Aristotle says that only the seed (sperm) actually put in the right sort of material and environment is a human being—not the materials by themselves or even the seed by itself. [1049a1–18] When he talks of a potentiality being a change in something, he requires an actually existing thing.

Individuals have universal aspects too. These may be abstracted and considered separately, as if they are separate subjects. Thus (ps.) Alexander says that "… mathematical things are not in actuality and *per se*, but are in potency and by abstraction…" [*in Metaph*. 740, 13–5] The actual things are the individual substances with their attributes. Still their universal attributes have the potential to be abstracted.[30] Even mathematical objects can be so abstracted:

> By thinking about the straight physical object insofar as it is straight, the mathematician realizes a potentiality in thought that is not realized concretely. (Modrak 2001: 121)

Aristotle says that the mathematician puts aside the particular perceptible qualities and focuses on what is left. [1061a29–33] "Obviously, therefore, the potentially existing relations are discovered by being brought to actuality." [1051a29–30] By excluding the other aspects and material conditions of the individual substance, Aristotle seems to believe that the resulting *abstracta* have been purified of their material imperfections: "…the physical edge, even though itself is not perfectly straight, is straight (not crooked), and for this reason it can serve as the basis for the geometer's thought" (Modrak 2001: 120). This means that the ideal, universal mathematical properties are attributes of actual individual substances. It is as if they are there seen through a dirty glass, a screen of impure matter. Once the glass is cleaned, the properties appear perfectly. Above I have suggested that perhaps Aristotle thinks that perfect types of lines can be obtained by abstracting away from differing individual properties of width and straightness. (How plausible it is to take point masses, frictionless surfaces and imaginary numbers as real attributes? At any rate Aristotle

[29] Some complications arise in the modal syllogistic.

[30] From this Kosman (1984: 123) claims that the *kinesis-energeia* distinction is the key to understanding Aristotle's ontology.

would not have any problem explaining how mathematical laws of nature apply to the individuals in nature.)

> But it is clear that in some way knowledge is of not-being and the universal, namely universal knowledge in potency, and in another way it is not of the universal but of the particular, namely (knowledge) in actuality. [(Ps.) Alexander, *in Metaph*. 792, 13–6]

9.6 Cause and Effect

> …in everything the essence is identical with the cause of its being. [*An*. 415b12–3]

Aristotle starts *Metaphysics* VI by saying that first philosophy seeks "the principles and causes of beings." He starts *Metaphysics* IV by saying that first philosophy considers being *qua* being and what belongs to it *per se*. These two descriptions of first philosophy agree. Considering beings *qua* being isolates certain general aspects or features of them, their principles and causes. These aspects have a relational structure, partly revealed in the relation of cause and effect.

A cause of something need not be of the same species or type as what it causes. The baker of a cake is a human being and not a cake. Sometimes cause and effect belong to the same species: "man begets man". [*Part. An*. 640b25] Still a cake does not beget a cake, even though the form of the cake exists beforehand in the mind of the baker. In later terms, there are both eminent and formal causes.

More to the point here is that, as Aristotle says explicitly about fathers in the *Categories*, strictly an individual human substance like Sophroniscus does not beget anyone (Lewis 1991: 204–5). Rather Sophroniscus *qua* begetter begets Socrates *qua* begotten. [Cf. *Phys*. 194b30–1] Likewise, strictly human beings do not build houses.

> A doctor builds a house, not *qua* doctor, but *qua* housebuilder, and turns gray, not *qua* doctor but *qua* gray-haired. On the other hand, he doctors or fails to doctor, *qua* doctor. [*Phys*. 191b4–6]

Aristotle wants causes and effects to be correlatives. But substances are not correlatives of anything, but are primary and basic. Nor is it necessary for them to be causes. So it is not surprising that Aristotle wants causes to be aspects of substances, typically located in the accidental categories. After all, he has the categories of action and passion.

So causes and likewise principles of substances tend not to be substances. Rather they are certain aspects of substances, just as accidents and even certain substances can also serve as parts of other substances like animals. Sometimes these causal aspects are *relata* in the category of relation proper. In line with his theory of relations, discussed in Chap. 3, Aristotle says so explicitly for fathers and masters. More generally, this seems to hold for all efficient or agent causes. Strictly, cause and effect are simultaneous, although the thing serving as the cause often preexists the thing that is its effect.

Again, material causes are aspects of things that are substances in their own right. The bronze ingot is the matter for the bronze sphere; the earth or καταμήνιον

the matter for a plant or animal. Ingots, clods of earth and pools of καταμήνιον are substances too, although often we do not give them names. [1033a13–5] The language here contains ambiguities: the bronze can be taken abstractly, as the mere matter from the sphere or concretely as a bronze ingot, having a form of its own. So too for the clods and pools. The material causes strictly are not these substances but their abstract aspects in causal relations.

Formal and final causes are such aspects too. The form contained in potency in the seed, the idea in the mind of the artist, the intention of the agent are all in substances in various ways: the father has gonads having sperm containing other forms in potency; an artist or agent has ideas in her mind that she tries to actualize. When the formal or final cause is a constituent of the definition of the substance, its abstract character becomes yet more apparent. The constituent, taken as if it were a subject in its own right, serves as the cause: Aristotle gives such examples as the rationality of a human being; being healthy; inviting someone to dinner. [*Phys*. II.3]

Aristotle has the form providing unity for the material constituents through its causing them to have a certain ordering. [*Metaph*. 1043b10–2] The form causes the material components, animal and biped, to constitute the substance man. As the form is a cause for the order of those constituents and not a constituent itself, it occasions no Bradleyan infinite regress through it itself needing to be connected to the other constituents. More generally, this holds because a cause *qua* cause is relational and relations do not exist *in re* as independent things needing to be connected up.[31]

Many causes and principles are aspects or constituents of things. A cause of a substance need not be a substance. What about Aristotle's gods though? Even for these prime movers it helps to make a distinction: like any other mover, a god does not move a celestial sphere *per se*, *qua* substance, but *qua* mover. [*Phys*. 201a28–9] (This point becomes important in later theologies.) In addition it has the motion of thought, where it thinks itself. [*Metaph*. XII.9] Somehow that intellectual activity produces, *per accidens*, the movement of the first heavens. Although the motion of a god may be most important and evident to us, it is not so in itself or in the divine nature.

How can Aristotle say that substance is primarily the form and secondarily the compound of form and matter, where the form is not a substance?—because, as he states at the start of the *Metaphysics*, first philosophy seeks the principles (beginnings) and causes. The form, or essence, has primacy as a cause. The same can be said of parent vis à vis child in the category of relation. It makes the thing "what it is"—i.e. gives it its whatness or quiddity. In contrast the matter gives it its thatness, or existence, but is secondary, as potentiality is to actuality. In general, Aristotle concludes, substance is the cause of the being of accidents; soul and body and *noûs* are causes of substances. [1071a1–3] Still being causes, *qua* causes, does not make them substances.

Aristotle insists that the causes of individual substances are individual. Still they are the same in their "universal account". [1071a28–9] Different individuals have different

[31] Cf. Bäck 2003.

causes. Still they are the same "by analogy", through having the same structure. So too, (ps.) Alexander says, this occurrence of the word 'goat' and that one have different causes: different individual (token) letters make up each occurrence, and each one comes about from a individual act of writing. Each one has its own form, the structure and arrangement of the letters. Yet these causes are of the same type. [*in Metaph*. 684, 14–9] Science becomes possible because of this brute fact, the resemblance of different individuals. We can apprehend their similarity and make the induction: the process is dialectical and hence not without error (Alexander, *in Top*. 122, 18–24).

9.7 Asymmetry in Aristotle's Ontology

> …the relative is least of all a substance and a real thing. [*Metaph*. 1088a29]

Let us take stock.

Aristotle has announced that he has a science of being *qua* being along the lines of his other sciences. They cut off pieces of being via abstraction. They treat the items so abstracted as if they were independent subjects, while *in re* they are not. Aristotle now does this in his *Metaphysics* now for beings, preeminently the primary substances, abstracted into items holding *qua* being. Items holding *qua* being are the general features, the principles, causes, and constituents, of reality. Such are essences, forms, materials, causes, actualities, universals. All these items have a relational structure. They have no danger of existing independently *in re*, because they are abstractions and, more fundamentally, because they are relational. In this way there can be a science of universals with an ontology of individuals. Like the other sciences, first philosophy considers the general features of the individuals.

As with the *relata* themselves, like parent and child, such correlatives as actuality and potentiality, matter and form, have relations of causality and priority. A parent is the cause of her child. There an actual human being, Xanthippe, is begetting a potential human being, in her reproductive activity or, as Aristotle would say, *qua* parent. This parent has a causal priority over another human being, *qua* child. The priority of correlatives need not assume a simple, single pattern: Xanthippe the baker is prior to her cake differently than Xanthippe the parent is to her child.

Aristotle's Metaphysical constituents have similar features. They have their correlative and also relations of causal primacy. An actual thing is the cause of a potential thing only after it has realized its own potential so as to become actual. The matter is the cause of the essence or form being able to exist in the world, while the matter itself exists only while itself having some form. The form organizes the matter so as to bring the potential substance to actuality. The simple constituents of the formula of the essence are prior to the complex *definiendum* in definition or account, while the *definiendum* is prior in the order of knowledge and perhaps also in the order of existence.

As with the *relata* of the categories, substance, actuality, cause, form, and whole and part can have priority over their correlatives. So too a parent has causal and

temporal priority over the child. Priority and posteriority give an asymmetry to Aristotle's ontology.

Aristotle departs from a Buddhism of dependent origination first via stressing such asymmetry. Substance and accident may have a relational structure. Still substance has causal primacy. The form or essence has priority over the matter. More than that, substances exist apart from *simple* accidents, abstract paronyms like whiteness, triangularity, and, yes, even ones like rationality: for any of these to exist they must become constituents of *complexes,* concrete paronyms like the white, the triangle, the rational. He has not a co-dependent origination of substance and accident but an origination dependent on one of the things in the relationship for the existence of the other. So too for him the universal depends on the singular. How Aristotle can retain the singularity while allowing for the universality of science remains the main puzzle to be solved.

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Chapter 10
Parts of Animals

In order to illustrate how Aristotle uses this relational structure in his metaphysics, let me return to the puzzle about the parts of animals. Its solution gives a clear instance of how the relational structure of abstract objects applies to Aristotle's metaphysics of substance. A finger or a head has a career as a substance growing, persisting and decaying through time. When it comes to function actually as a part of the animal constituted in part by it, it assumes the characteristic of a *relatum*, a quasi-substance whose existence is tied to the existence of its correlative, that animal. Such a functional part of an animal is abstracted from the career of the substance, the hunk of material enformed so as to have the function as its final and formal cause.

10.1 Parts of Substances

> The body we are told to pick out as the material constituent of the animal depends for its very identity on its being alive, informed by psuche. (Ackrill 1973: 126)

In the *Categories* Aristotle uses parts of animals like heads in examples of *relata*, as in 'the head is a head of the headed'. Accordingly, Aristotle is worried whether parts of animals like heads and wings satisfy the definition that he has given for the *relatum*, that "[their] being is the same as being somehow related to something [8a32]," and so fall into the category of *relata*. For "the head is a head of the headed." [7a16–7] Aristotle admits such statements convert relationally. [7a15–25] Now Aristotle says in the *Categories* also that parts of animals are substances, and denies that substances are *relata*.[1] I claim that the same duality appears in the *Metaphysics*. On the one hand, the existence of a head is tied to the torso: a severed head is a head in name only. On the other hand, Aristotle continues to say that parts of animals are

[1] On some interpretations, Plato, like Plotinus later, might have a different view. Evangeliou 1988: 162 "Unlike Aristotle, Plotinus is prepared to accept that in some cases substances may be regarded as relatives. These cases are specified parts, causes, principles and elements." Cf. *Enneads* VI. 3.

A. Bäck, *Aristotle's Theory of Abstraction*, The New Synthese Historical Library 73,
DOI 10.1007/978-3-319-04759-1_10,

substances. The ancient commentators explain this doctrine by talking of 'heads *qua* heads' and 'heads *qua relata*'.[2] Once fortified, this interpretation works, and gives some insight into how Aristotle handles abstractions.

What, strictly speaking, is "the head", the first *relatum* in 'the head is a head of the headed'? Is it a primary substance: this head? In many examples of *relata* in *Categories* 7, clearly the first *relatum* signified in a relational statement is not a substance: the half, the slave. But *can* it be a substance? Aristotle seems to deny that individual parts of animals are *relata*. But, on the other hand, he insists that such parts of animals do not have their existence apart from the things of which they are the hands or heads: once severed from the animal, they are hands and heads "in name only", just as a corpse is called a man. Then it seems to follow that parts of animals are *relata*. After all, they are mentioned in relational statements, where the relation itself is 'being a head of', 'being a wing of' etc.—and their correlatives are things like "the headed" and "the winged", and not substances like animals, birds, and insects. Furthermore, their being seems to lie just in their "being somehow related to something". Hence they would be *relata*.

If we apply Aristotle's own schema for signifying *relata* strictly to the first *relatum* mentioned in the statement, 'the head is a head of an animal', we should then qualify the expression signifying the substance, so as to get something like 'this head *qua* actual part of the headed' to serve as the *relatum*. Let us see whether this schema solves the *aporia*.

Overtly, Aristotle presents only a partial solution to this *aporia*:

> It is a problem whether (as one would think) no substance is spoken of as a relative, or whether this is possible with regard to some secondary substances. In the case of primary substances it is true; neither wholes nor parts are spoken of in relation to anything. An individual man is not called someone's individual man, nor an individual ox someone's individual ox. Similarly with parts; an individual hand is not called someone's individual hand (but someone's hand), and an individual head is not called someone's individual head (but someone's head). Similarly with secondary substances, at any rate most of them. For example, a man is not called someone's man nor an ox someone's ox nor a log someone's log (but it is called someone's property). With such cases, then, it is obvious that they are not relatives, but with some secondary substances there is room for dispute. For example, a head is called someone's head and a hand is called someone's hand, and so on; so that these would seem to be relatives. [*Cat.* 8a13–29]

Substances like animals, taken both as primary and as secondary, present no difficulty. As their definitions do not refer to another, they are not *relata*. For a dog is not a dog of something, nor is animal the genus an animal of something (—nor of someone, if we remember that being a possession is an accident and not the sense intended; cf. 8a24.[3]).

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[2] Likewise Ammonius (*in Cat.* 6, 11–2) says that 'το πρός τι' is said in two ways: as objects absolutely or *per se*, and as needing a σχέσις.

[3] Ackrill (1963: 101) comments, not too plausibly, that, even if possession be taken as a relation, it still does not apply to individual substances: we say "Callias' ox" and not "Callias' this ox"—why not 'this ox of Callias'?.

Aristotle wants the same reasoning to apply to the parts of these animals, like heads and wings. Individual parts, like 'this head', work similarly: this head is not this head of Socrates, we might say.[4] At best it is "a head" of Socrates, where 'a head' would signify the species of head common to this head and that head. On this account though the secondary substances, the species and genera of the parts of animals, still remain a problem: why are they not *relata*? Aristotle himself admits that the case of the genera and species of parts of substances like animals [and artifacts] has greater difficulty. Is head the species a *relatum* through making reference to another in its definition? Even so, in this case too, Aristotle suggests that it is possible to know that this thing is "a head" without knowing its correlative "determinately", that is, without knowing whose head it is:

> But as for a head or a hand or any such substance, it is possible to know it—what it itself is—definitely [determinately], without necessarily knowing definitely that in relation to which it is spoken of. For whose this head is, or whose hand, it is not necessary to know definitely. So these would not be relatives. And if they are not relatives it would be true to say that no substance is a relative. [*Cat*. 8b15–21]

Aristotle's main point is that we can know "determinately" (in the sense discussed in Chap. 3) that something is a hand or a head without knowing "determinately" whose hand or head it is. So their essences, what they are, seem independent of their supposed correlatives. Hence they are not *relata*, as reference to their correlatives, the particular ones, does not appear in their definitions.[5] I can certainly know that this object before me ("a head") is an individual head without knowing whose head it is. As Simplicius *et al*. say, if someone is all covered up except for her hand (or head), I can know this hand (or head) determinately, as an individual hand (or head), without knowing determinately whose hand (or head) it is (Simplicius, *in Cat*. 200, 7–9; Ammonius, *in Cat*. 79,18–9). This amounts to knowing that the part is an individual substance without knowing the individual substance whose part it is.[6] For instance, I may see a head and infer the present existence of the thing, the animal, having that head. But, if the animal were cremated and the head preserved, or, say, if the head were cloned without ever being attached to a body, the head would exist now while the thing having the head would not. So the supposed *relata* need not exist simultaneously. Moreover, I would not know the particular thing that is "the headed" just from seeing the head (especially if the head was one of the three heads of Cerberus). So we need not know the correlative "determinately" when we know

[4] Or we might not. Saying "this head is this head of Socrates" does sound ungrammatical. Yet this may be an accidental feature of natural language. Cf. 'this head is the head of Socrates', where 'the head of Socrates' functions as a definite description. My solution will apply to individual parts too, and so this point will become moot.

[5] Or perhaps: "accounts" (λόγοι), as strictly speaking individuals do not have definitions. Cf. 8b16–7 & Ammonius, *in Cat*. 20, 14–21. Sedley (2000: 11–25) claims that the rule of cognitive symmetry [his name for the conversion of *relata*] rules out parts of secondary substances as relatives. I don't see how so, so long as we allow for the correlative to be taken on this level of generality too.

[6] So Simplicius (*in Cat*. 200, 35–6), following *Metaph*. 1020b32–1021a3, says that the determinate thing is the individual substance.

the head to be a head "determinately".[7] Just imagine Empedocles' spontaneously generated animal parts (or the modern equivalent: cloned heads from stem cells): here there can be heads, even functioning ones, without the whole animal. Hence individual parts of animals like heads are substances and not *relata*.

Aristotle admits also that this reason is not decisive. And it is not. First, while it has some plausibility for showing, once again, that individual parts of animals are not *relata*, it does not suffice for showing that a species or genus of these parts (which also may be called "a head") is not a *relatum*. In the sense defined above the determinacy criterion does apply to them. Talking generally of heads or parts, we do suppose the correlative headed things, or animals, on the same level of generality. Otherwise why would we bother to call these things 'heads' and 'parts' at all? Second, the same reasoning would knock many avowed *relata* out of the category of *relatum*. For instance, I can know "determinately" that this number, or this number insofar as it is a half, is a half of some other individual number that is its double without knowing that number "determinately", because I have not yet determined its double through calculation (Ackrill 1963: 102). So, on the same grounds for rejecting that head the individual is a *relatum*, we would have to exclude halves, both the individual and, *a fortiori*, the universal ones, from *relata*. Aristotle denies this. [8b6–7] Still, given that we "know" the general truth that every integer has a double, why can't we know "determinately" that this-here number has a double that is "that-there number" without knowing the latter "determinately"? Moreover, if I do have to know just what number that-there one is, the case of individual parts of substances does not now look so obvious either: to know that this-here thing is "an individual head", why do I not have to know that the individual animal or torso whose head it is? After all, even if Aristotle succeeds in showing individual parts of substances not to be *relata*, still he has also admitted that being a wing, and likewise being a head etc. are relations. He has said that his "conversion" works for cases like 'the wing is a wing of something'—and so too 'the head is a head of something—once the other *relatum* is named properly: the winged or the headed. [7a16–7] How can Aristotle maintain that head the species is not a relative? For the second, more general "a head" here, which constitutes the relation, may well name a type of heads, namely the secondary substance.

On the other hand, as Aristotle takes this "a head" to be a head not of "animals" but of "the headed", as with the rudder and the ruddered, how can it be the head that

[7] The commentators' example, 'the parent is the parent of a child' may present the counterexample that one *relatum* can be known determinately without the other. For, if I see a girl, I know that she is an individual child without knowing who her parents are. However, terms like 'child' may be ambiguous: for it need not be a relational accident of a human being to have parents, given that by necessity animals are generated. Moreover it may be accidental to the parent to have begotten a child, but not to the child to have had parents, perhaps even the particular ones that she did. So Kripke (1980: 47, 111–3) says today. However Aristotle seems to mean only that becoming a parent is accidental to the begetting animal and that being a parent is simultaneous with there being a child.

is the secondary substance for individual heads?[8] But if it isn't the secondary substance, what is it? If 'being a head', and not just 'a head' signifies the relation, why then is the essence of the secondary substance, the head, what it is to be a head, a relation? Moreover, Aristotle continues to name the first *relatum* 'head', a name of a primary substance. But is that *relatum* identical to the primary substance, the part of the animal? He has stated that such an individual hand or head is not a relative, and *probably* neither are the secondary substances, hand and head in general. So why does it seem to appear as a relation?

Despite all this, elsewhere Aristotle holds that parts of substances, the individuals and their genera and species, are substances.

> We need not be disturbed by any fear that we may be forced to say that the parts of a substance, being in a subject (the whole substance), are not substances. For when we spoke of things in a subject we did not mean things belonging in something as parts. [*Cat*. 3a29–32; cf. 2a14–6; 8b20–1; *Metaph*. 1028b9][9]

After all, parts like heads persist through time while receiving contraries like hairiness and baldness, and so satisfy the main criterion for being a substance. [3b10–1] Likewise their species and genera do so secondarily: it is the same species that admits of hairiness and baldness. So 'head' (etc.) seems to signify both a substance and a *relatum*.

Aristotle maintains both positions in the *Metaphysics* as well (if we do not suppose Aristotle to have changed his mind there).[10] He admits that parts of substances have their wholes enter into their very definitions:

> And further if the parts are prior to the whole, and the acute angle is a part of the right angle and the finger a part of the animal, the acute angle will be prior to the right angle and the finger to the man. But the latter are thought to be prior; for in formula the parts are explained by reference to them, and in virtue also of their power of existing apart from the parts the wholes are prior. [*Metaph*. 1034b28–32]
>
> The circle and the semicircle also are in a like relation; for the semicircle is defined by the circle; and so is the finger by the whole body, for a finger is such and such a part of a man. [*Metaph*. 1035b9–11]

Aristotle seems to be speaking here of universal parts, like the species head. For he is speaking of definitions. He is saying that the very definition of a part of a substance like a finger makes reference to the substance of which it is a part. Now this very feature looks very much like his main criterion for being a *relatum*: the very

[8] Sorabji (2002: ix) says that the conversion requirement seems already to have ruled out parts of animals from being *relata*: "For although a hand is said to be the hand of a person or animal, a person or animal is not said to be the person or animal of a hand." True, but the problem remains once we name the *relata* strictly: the head and the headed.

[9] So too Ammonius, *in Cat*. 77, 6–7. Simplicius (*in Cat*. 200, 37–201, 2) explains why species and genera of parts are substances: either because their individuals are or because of the definition of relation.

[10] Deveraux (1992: 120) agrees that in the *Categories* parts of animals are substances but claims that Aristotle changed his mind in the *Metaphysics*. Likewise Lloyd 1992: 159.

being of a finger involves reference to another. Hence the universal parts of animals seem to be *relata* (Philoponus, *in Cat.* 114, 19–21).

Moreover, Aristotle says often that strictly a hand or finger is not a hand or finger when cut off, since it no longer functions as a hand or finger. E.g.:

> So also no hand of bronze or wood or constituted in any but the appropriate way can possibly be a hand in more than name. For like a physician in a painting, or like a flute in a sculpture, it will be unable to perform its function. Precisely in the same way no part of a dead body, such I mean as its eye or its hand, is really an eye or a hand. [*Part. An.* 640b35–641a5; cf. *Metaph.* 1035b23–5; 1036b30–2; *An.* 412b19–22; *Gen. Corr.* 321b29–30; *Gen. An.* 734b24–31; **Meteor.* 390a10–5; *Pol.* 1253a20–5]

He even calls a dead, severed hand a homonym in the way that a picture of a dog shares the name of 'dog' with a living dog.[11] Ackrill (1973: 125–7) has called this "the homonymy principle": a functioning part and a non-functioning part of an animal are homonyms.[12]

Aristotle might be saying that a severed hand or head is a primary substance, a hunk of flesh, bones and sinew, but no longer a hand. Then to be a hand etc. is to be the hand of some animal. Hence the species hand seems to be is a universal *relatum*, and even an individual hand, when named strictly, would be a *relatum*. This view agrees with what he says about corpses: we can call a dead man a corpse, but not strictly speaking. For a corpse is not alive and so is not an animal.[13] To call a corpse a human being is to speak metaphorically, to name it *per accidens* from what it once was but is no longer.

That is, such items as severed hands are still substances but not *qua* a hand of Socrates, or *qua* a hand in actuality now. Aristotle says that defining parts well requires mentioning their function (ἔργον). [1035b16–8][14] At best severed, dysfunctional parts would be like something dead, what was once a human substance but is no longer. The description of 'hand' or 'head' that once applied *per se* applies now only *per accidens*.[15]

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[11] Cf. Shields 1999: 30–5.

[12] Cf. Williams 1982: 113.

[13] *On Interpretation* 21a18–24: "Now it is true to speak of the particular case also without qualification, e.g., to say that some man is a man or that some white man is a white man. Not always, but when some opposite belongs in what is added, and from it a contradiction follows, it will not be true but false, e.g., to say that a dead man is a man, but, when it does not belong in it, it is true." Cf. *Parts of Animals* 640b33–5: "And yet a dead body has exactly the same configuration as a living one; but for all that is not a man." Aristotle does admit [*Gen. Cor.* 322a19] that at least in ordinary speech there is more of a tendency to speak of some parts of a corpse, like flesh, rather than others, like hands.

[14] This text has a significant mss. variation.

[15] Philoponus (*in Cat.* 125, 16–126, 17) distinguishes the universal from the individual substance here, and claims that the type of conversion special to *relata* does not hold for the latter. Likewise, Simplicius (*in Cat.* 188, 3–7; 199, 2–4; 199, 21–31) citing Boethos, suggests too that 'hand' has two senses, and, (172, 27–36) suggests that secondary substances are not *relata per se* but only *per accidens*. A head in general may said to be a head of an animal, but still this head is not said to be this head of Socrates. This agrees with this solution, since the individual is *in re* whereas the universal is *in se*.

Thus Aristotle says:

> For they [the parts] cannot even exist [be] if severed from the whole; for it is not a finger in any state that is the finger of a living thing, but the dead finger is a finger only homonymously. [1035b23–5][16]

This passage does not say explicitly that parts of animals like fingers and heads are no longer substances too. It just says that for them to exist they must be part of the whole animal, the individual substance: more precisely, for them to exist *as what*?—as parts. Aristotle says only that a severed finger is not strictly a finger. So it might exist, as a hunk of flesh, bones and sinews, but not as a hand. Likewise, Aristotle says that a dead man is not a man. Yet he need not thereby be saying that a corpse is not a primary substance. He can be saying that it has lost its "essence", namely, its essence *as* a finger or head or human being. Still, it will have another "essence", *as* a corpse etc., just as a bronze statue when melted down, while no longer representing Heracles, still has a form, a shape, and is an individual substance, a hunk of bronze. Moreover, nothing in the definition of a primary substance prevents its existence from depending on the existence of others. After all, substances have causes too.

On the other hand, Aristotle continues to maintain the view that these parts of animals are substances. He says that they are commonly (endoxically) agreed to be substances. [1042a6; 24] Moreover, at *Metaphysics* 1028b8–12 Aristotle wonders whether parts of substances are indeed substances. He includes other parts of animals and parts of the heavens, like the stars. Now he does seem to admit that stars are substances; so too then for parts of animals? At the least, in both cases, we can talk "as if" these are substances, with sufficient unity so as to constitute independent subjects. For Aristotle has sciences of stars and of the parts of animals. In *Metaphysics* H Aristotle distinguishes the matter of a substance from its form. The matter of the house consists in the boards and bricks. [1043a8–9; 1043a14–6] Now these are the parts of a house, which serve as its matter (*Phys*. 200a24–9; *Part. An*. 640b17–23; 668a9–13; *Gen. An*. 741a10–3 & II.6; *Metaph*. 1023a31–b1; 1035a1; (Ps.) Alexander, *in Metaph*. 503, 1–2).[17] Aristotle also mentions the hand and the foot, parts of animals. For he considers a human being to have as its parts not only flesh and bones, but also heart and brain. [1070a19–20; 1035b26–7; 1036b3–4; *Gen. An*. 715a9] He says that their being will be defined by many qualities of the mixing of matter like hardness and softness. [1042b15–31] Here Aristotle does not define heads and hands as part of animals but as substances having a certain form and matter, just like the parts of houses.[18]

Indeed, the passage about the dysfunctional finger no longer being a finger occurs in a context where it is not clear that Aristotle is discussing substances as opposed to accidents. After all, in *Metaphysics* VII Aristotle has already focused

[16] See Wedin 2000: 28–41 for an extended discussion of this passage and on the doctrine of parts as matter.

[17] Cf. *Part. An*. 641a5–18; 646b11–26 on the similarity of parts of a house and parts of an animal.

[18] Bostock 1994: 257: "…Aristotle apparently implies that a hand or a foot is to be defined not by its function (as one might have expected) but by the way its ingredients are held together."

exclusively on substances, objects having being preeminently, and is now considering what it is to be a substance. In this chapter, he is discussing how the parts of a definition state the formula of the essence and in what ways the matter has to be included in that formula. Why is Aristotle discussing fingers anyway?—because in some cases when something composite is being defined, reference must be made to its parts. He is asking whether fingers etc. enter into the definition of the animal. [1034b29][19] Hence this passage does not show decisively that Aristotle has abandoned his earlier doctrine that parts of animals are substances.

So in the *Metaphysics* as in the *Categories*, Aristotle has two treatments of the parts of animals: on the one hand, he considers them as parts; on the other, he considers them as substances in their own right, serving also as the parts from which substances of greater complexity are composed.[20] Considered as parts, items like heads are *relata*; considered as persisting objects, they are substances. So Aristotle need not have changed his mind. But is this position consistent? How to understand it?[21]

10.2 On the Generation of *Relata*

What would be lost if Aristotle would just admit that parts of animals are *relata*? — Much of his scientific theory about motion and the generation of animals.

In general, *relata* are accidents. Accidents come to be in substances as their subjects and also pass out of them with those substances persisting and these accidents perishing. The thing, ultimately the substance, having the relation can change its relations without itself changing at all. To use Simplicius' example, the one on the right can cease to be on the right and come to be on the left without itself moving at all, even *per accidens*, with the one formerly on the left doing the moving. Now in this process the *relatum*, the one on the right (2a),[22] ceases to exist, and two new *relata* come to exist. Also in this process, one spatial relation (1) has ceased to exist and another such relation has begun to exist. However, "properly", the thing, the substance, that has the *relatum* of being on the left (at first) as an accident, Coriscus,

[19] When Aristotle says, 1035b27–30: "But man and horse and terms which are thus applied to individuals, but universally, are not substance [*ousia*] but something composed of this particular formula and this particular matter treated as universal; but when we come to the individual, Socrates is composed of ultimate individual matter; and similarly in all other cases," he need not be denying that the species horse and the individual Socrates are substances. He does say, 1035b29–30, that secondary substances, like man and horse, are not "*ousia*". But it is not clear that '*ousia*' here means 'substance'. Remember that the compound substance is composed of matter and form, which is the essence. Thus man and horse could be secondary substances but just not essences of substances.

[20] The "from which" suggests that these parts are the material cause for animals.

[21] It's instructive to look at G. E. Moore, *Principia Ethica* §32 for some of the same puzzles and doctrines about parts and wholes.

[22] See "*Relata* as Paronyms" section for an explanation of these numbers.

say, does not move and does not change at all *per se*, although it does change its relation of position to the other thing and so does change *per accidens*.[23] Aristotle requires a "proper" change or generation to involve a gradual process of coming to be and passing away from one contrary to another with an underlying substratum providing the continuity. [*Phys*. 226a10–1; 227a7–10][24] For him a substance may switch but not "change" its relations; perhaps it "exchanges" them but does so, without a gradual process from one contrary to another. Apparently it also does so instantaneously: Aristotle says that one substance is not more or less of a substance than another. [*Cat*. 2b21–4] It does not become a substance gradually. In contrast, the substance itself does move or change "properly", in a gradual process, albeit still only *per accidens*, when it takes on more weight or changes its color.[25] It itself does not change *per se*.[26]

For Aristotle the *relatum* itself does not come to be in a gradual process, as a human embryo grows, or as some surface is gradually whitened, or as something becomes heavier. So, unlike substances and even unlike other accidents, *relata* do not have a "proper" generation etc. Indeed, Aristotle goes so far as to say that they do not come to be at all:

> Since, then, relatives are neither themselves alterations nor the subjects of alterations or of becoming or in fact of any change whatever, it is evident that neither states nor the processes of losing and acquiring states are alterations, though it may be true that their becoming or perishing, like that of form and shape, necessarily involves the alteration of certain other things, e.g. hot and cold or dry and wet elements or the elements, whatever they may be, on which the states primarily depend. [*Phys*. 246b10–17; cf. 247b3–4]

[23] Simplicius, *in Phys*. 810, 10–1: "…change *per accidens* is in all ten genera: for through the essence being the one moved and all the others being accidental to the essence, we can say that each of them moves when the essence that is the subject for them moves."

[24] As Simplicius (*in Phys*. 395, 25–33; cf. 408, 3–5; 417, 9–10; 801, 3–9) says, in *Physics* III Aristotle does not yet distinguish motion and change. Indeed he says, 201a8–9, that there as are as many kinds of motions as there are kinds of beings. In *Physics* V he takes change to be of the substance and motion to be of the quantity, quality and place. So Aristotle has a general and a strict conception of 'motion', the latter being expressed mostly in *Physics* III and the latter in *Physics* V. E.g. at 200b32–4 Aristotle talks about motion in virtue of substance, but here he would be meaning 'change' and not 'motion' strictly. Accordingly it might mean that he means by saying substances do not "change" at all only that they do not "move" in the strict sense, but still change *per se* in virtue of coming to be and passing away.

[25] As such changes (later called 'Cambridge changes' as discussed below) are a type of *per accidens* change, it is not clear how distinctive they are in Aristotle's theory. We might say that such changes differ from other *per accidens* changes in that the latter sometimes result in a *per se* change of the substance while the former (for Aristotle who doesn't know much about the curvature of space etc.) never do. E.g., if I increase the volume of a balloon or the mass of a dog, at some point the dog or balloon ceases to be (pops). However, nothing happens to the balloon or dog *per se* if I move objects around them.

[26] Simplicius, *in Phys*. 413, 26–9: "For what is in actuality, so long as it holds thus, would not be said to move in virtue of that. E.g., a man, so long as he be a man, would not be moving in virtue of humanity, nor, if he were white in actuality, so long as he be white, does he move in virtue of whiteness."

Relata do not then undergo alteration, a process of gradual change.[27] Still, Aristotle does say also that they do not "change" at all (literally: "nor any change of them"). Simplicius understands Aristotle to mean that they do not change *per se* but do *per accidens*. [*in Phys*. 837, 5–18] Thus a parent can run from place to place, but does not change *per se*, *qua* parent, as Aristotle recognizes no gradual process of coming to be a parent. Also necessary material conditions for the existence of the accident may undergo a process or alteration: a balloon may rise because the air in it becomes hotter.

Again in the *Metaphysics* Aristotle says:

> A sign that the relative is least of all a substance and a real thing is the fact that it alone has no proper generation or destruction or movement, as in quantity there is increase and diminution, in quality alteration, in place locomotion, in substance simple generation and destruction. The relative has no proper change; for, without changing, a thing will be now greater and now less or equal, if that with which it is compared has changed in quantity. [1088a29–35]

Once again, Aristotle is claiming that there is no coming to be or passing away as well as no change of a *relatum*.[28] However, the Oxford translation has a point of adding "proper" to "generation" and to "change" here. For surely Coriscus became a parent, became perceived, became enslaved, and can cease being these things.[29] Before these things happened to Coriscus, they did not exist; afterwards they did. So *relata* like parents and relations like parenting do begin and cease existing. Aristotle means to say that the *relata* themselves do not start existing via a gradual process.

Now Aristotle holds the following views about motion and change. Motion is a perfecting, a process whereby something potential comes to be actual with an underlying substratum persisting. [*Phys*. III.1; I.7] Motion itself has the conversion proper to *relata* (so too for change, alteration, excess…): motion is the motion of the movable; the movable is moved by a motion. [200b28–33] Again the very definition of motion involves reference to another, as it is a motion from one thing in act to another.[30] So motion itself is a relation, as it satisfies the definition and criterion of

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[27] So Aristotle asserts. Quoting Alexander, Simplicius (*in Phys*. 409, 27–32) says that there is no motion for *relata*: when one changes, the other does not change at all. On the face of it this seems implausible: just when does a thing on the right cease to be on the right and begin to be on the left of the other moving things? Such questions motivated the medieval exposition of '*incipit*' and '*desinit*', and later on the infinitesimal calculus, starting with the Mertonian calculators. See the articles in Kretzmann 1982.

[28] Although Aristotle says that only the *relatum* has no generation or alteration, it might be that the same holds for agent and patient. Cf. *Physics* 225b13–6. Aristotle might be considering action and passion to fall under relation; cf. "the one hitting hits the one being hit". Cf. 200b28–31. Note that motion itself is a relation in that it has the conversion typical for *relata* and has the definition of being from or of one thing relative to another. Cf. 200b31–3 & n. 50.

[29] *Physics* 201a8–9. Thus Simplicius (*in Phys*. 834, 17–9, 836, 6–7) says *re* the similar passage at *Physics* 225b10–16, with Alexander (834, 24–7 [cf. 835, 10]) that Aristotle is not denying change (μεταβολή) but only motion in substances and *relata*. He suggests (835, 12–20) that 'change' at 225a12 & 13 be understood in the sense of 'move' and not 'change' generally.

[30] Like knowledge etc. the particular motions need not be relations, even though the more general types are.

a relation.[31] Likewise for change. Aristotle recognizes four types of change: of substance, *quale*, *quantum*, and place. He calls them respectively: generation and corruption; alteration; increase and decrease; transfer. [*Metaph*. 1069b9–13]

Above I have noted that Aristotle insists upon subjects being named accurately: strictly it is not "Coriscus" but "the doctor" who heals—i.e. Coriscus *qua* doctor. [*Phys*. 191b4–5] Likewise "the builder builds *qua* builder" —and not *qua* doctor. [195b23–5] For Aristotle this insistence is no fleeting fancy. For he distinguishes essential from accidental causes. Polyclitus is an accidental cause of the sculpture; the sculptor, who happens to be Polyclitus, is the essential cause. [195a32–5; Cf. *Metaph*. 1013b34–1014a6] After all, a cause is a cause of the caused. Likewise something moves not *qua* itself, that is, *qua* being a certain substance, but *qua* movable. [201a27–9] Aristotle himself gives the conversion special to *relata* for the movable: a mover is a mover of the movable, and the movable is movable by the mover. [200b31–2] (He could have done so also for 'motion is motion of the movable'.) Still Aristotle does not make motion a relation proper, as there are motions or changes in all the categories: substantial change, change in place, qualitative change etc. Likewise in relation itself there can be a change from what is potentially say a parent to what is actually a parent. Nevertheless, on account of the relational structure of motion relations appear centrally in every type of motion. (So too potentiality and actuality have a relational structure: an actuality is an actuality of a potential; a potential is a potential for an actuality.)

Most actions have *relata* as their proper subjects. Still, some types of motions might not be relations. At any rate, Aristotle does say this explicitly about perception and knowledge: they are relations, while their instances, like grammar, are not relations but qualities. [*Cat*. 11a20–36] Still it seems that, like grammar, even if some species of motion are not relations, their genera will be relations.

When Aristotle gives the definition of motion, he indicates not only once again that it is a relation but that the proper subject of motion is not the substance but a *relatum* of that substance:

> It is the fulfillment of what is potential when it is already fulfilled and operates not as [*qua*] itself but as movable that is motion. What I mean by 'as' is this: bronze is potentially a statue. But it is not the fulfillment of bronze as bronze which is motion. For to be bronze and to be a certain potentiality are not the same. [*Phys*. 201a27–32]

The lump of bronze, the substance, is potentially a statue, and its coming to be a statue is a motion. But this actualization, Aristotle says, is not of the bronze *qua* bronze but of the bronze *qua* movable. Now 'movable' is a *relatum*. Just as Aristotle

[31] Alexander, as reported by Simplicius (*in Phys*. 395, 13–396, 8) says that in the *Categories* Aristotle takes motion as a *quantum* and the things that are in motion as *relata*, while in the *Physics* he takes it always as a *quantum* as it is continuous. (However Simplicius (437, 31–3) reports Alexander taking motion as a relative.) Yet Simplicius, (*in Phys*. 401, 13) and Alexander (*apud* Simplicius 403, 17–8) say that motion is a species of *relatum*, even though motions are homonyms. This conflicts with *Categories* 15a13–4 where Aristotle says that there are six species of motion, including change in place. Aristotle does say that place is a continuous *quantum* but not the motion from one place to another. At *Metaphysics* 1020a28–32 Aristotle says that motion is a *quantum per accidens* because that through which something is moved is a *quantum* (*per se*).

uses 'the bird *qua* winged' to signify the correlative of the *relatum* 'wing', so too he is using 'the bronze *qua* movable' to signify a *relatum* that is an accident of the bronze. This suggests that the proper subject for every motion will be a *relatum*, given in the general formula, 'the substance *qua* movable'. After all, clearly *relata* themselves can serve as subjects, at least *per accidens*, for changes: a father remains a father while moving from place to place or gaining weight. Simplicius says, "Now the subjects from which and into which there are changes are either contraries or intermediates." [*in Phys*. 820, 13–5] Such subjects cannot be substances, as substances have no contraries. [*Cat*. 3b24–5] Rather, they are *relata*.

Moreover Aristotle insists that the bronze *qua* bronze and the bronze *qua* movable are not the same. 'The bronze *qua* bronze' amounts to 'the bronze without qualification', namely the bronze substance, the lump. When we are considering the substance as actualizing its potential, we are not considering the bronze *qua* bronze but a *relatum* of that substance. Actuality and potentiality here concern the *relata*. I shall suggest that Aristotle holds a similar view about the parts of animals actualizing their potentials, in the motion of growth: strictly what is being actualized so as to function as a hand is a *relatum* of hand the substance.

Likewise types of motions are relations having the characteristic definition and conversion: e.g., whitening is the whitening of the whitened. Again this amounts to the whitening itself being a relation with the change from one color to another being in the category of quality. The proper subject for whitening will again be a *relatum*, the substance *qua* being whitened.

Aristotle says also that *relata* like heat and the heated and father and son involve the actualization of some capacity. [*Metaph*. 1021a14–25] Like exchanging positions, such actualizations for him involve no gradual process.[32] What is being heated is, say, the bronze, the substance. But again strictly it is the bronze *qua* being heated, or just 'the heated', that serves as the *relatum*. So then some types of motions, like qualitative change and locomotion, are gradual, while others, like fathering, are not. Whitening is a gradual process; enslavement is not but an exchange of one condition for another. Heating can indeed be taken (more by us than by Aristotle who lacked thermo-meters) gradually when construed quantitatively. Yet construed qualitatively as a feel, heating seems to be instantaneous for Aristotle as indeed it was for Plato. [*Phd*. 103d5–12] The substance, the material substratum, changes gradually, *per accidens*, while its *relatum* does not, *per se*.

The (*per se*) motion of a substance involves generation and corruption, its coming to be and passing away, with its matter serving as substratum.[33] The (*per se*)

[32] Such actualizations involve what Sorabji (2002: ix; 2005) calls "Cambridge changes", which I discuss below. Cf. Fleet 2002: 76. Sorabji refers to *Physics* 225b11–3 and *Metaphysics* 1088a30–5 and admits that Aristotle "concludes that relative change is not genuine change." The case becomes complicated by the fact that Aristotle admits "change" strictly speaking only in place, quality and quantity, and hence not change in position—at *Categories* 6b12 he says that position (like being on the left?) is a relative.

[33] Ross (1936: 616, 535) claims that at 225b5–9 Aristotle gives a "fresh classification" of change in terms of the categories and that there change in virtue of the substance is generation and corruption but not motion. This claim conflicts with *Physics* III.1 etc., but Aristotle does say this flatly at

motion of an accident takes the substance as its basic or ultimate substratum while also actualizing one of its potentialities: the rock, the substance, can be in this place and then comes to be in that place via locomotion, change of place. [*Gen. Cor*. 319a11–4; 319b33–4] The rock itself does not change; only its place does.[34] Sometimes the substratum for an accidental change is another accident: strictly, the surface of the rock, and not the rock, can come to be red, a *quale*, where the surface is an accident, another *quale*, of the rock. Aristotle requires all motions to involve a transformation from potency to actuality. However only certain types of accidents can "change" in a gradual process: (some of?) those in the categories of *quantum*, *quale*, and place. [*Gen. Cor*. 319b31–3] Aristotle is claiming that *relata* do not "move" in the way that those accidents do nor in the way that substances do.

To sum up the discussion so far: Aristotle recognizes *per se* motion both for substances and for accidents. Such substantial motions involve generation and corruption of the substances themselves. With *per se* motions of accidents, the substance itself does not change, and (typically?) one of its accidents serves as the subject for the change. If we stick to the process of actualization, of the coming to be of the new accident, its proper subject is a *relatum*.

Let me note here, for the sake of the metaphysics to come, that all these relations, including perception, knowledge and abstraction, are *relata* accidental or "extrinsic" to the substances involved. The substance does not change when one of its *relata*, say, 'the one on the left', ceases to be by no longer being on the left. Moreover, as discussed in Chap. 9, Aristotle recognizes that substances themselves have a "relational" structure, with many of the formal features of *relata*. However these relational structures are not accidental and do not belong to the category of *relata*. Rather, they are constituents of the substance, its "intrinsic" relations. Aristotle marks the distinction by marking off two types of parts, the heaps and the totalities: the parts of totalities have intrinsic relations while those of heaps do not.

Aside from these strict, *per se* motions Aristotle recognizes motions *per accidens*. Something has a motion *per accidens* when it has an accidental relationship to something else having that motion *per se*.[35] So Coriscus the substance goes into the room *per accidens* because there is a change from one place of Coriscus to another, a change from one of his accidents to another. Coriscus the substance does not change *per se* in this process. [225b16–33] The red thing goes into the room *per accidens* because it is an accident of a substance, say, this rock, which has the accident first of having this place and then of having that one.

225b10–11. So commentators have distinguished a general and a special sense of 'motion' for Aristotle.

[34] *However, Simplicius (*in Phys. *557,22) says that the body is in place* per se*, whereas whiteness and heat are in body* per accidens. *On my view the body is in place not* per se *but only* qua *having a place*.

[35] Aristotle seems to recognize three types of such accidental relationships; cf. *Metaphysics* 1017a8–22: an accident to a substance; a substance to an accident; one accident to another accident of the same thing. Cf. Bäck 2000: 62–74.

Aristotle allows also for change in virtue of a part. [*Phys*. 224a23–6; 224b15–7; 226a19–21] Thus, he says, the body comes to be healthy without qualification because a part of it, its eye or chest, comes to be healthy.[36] Aristotle seems to imply in this example that a part of the body, the eye or chest, is the *proper subject* for the process of coming to be healthy. As health for him is a quality, this is qualitative change. [*Cat*. 8b35–7; cf. 4b13–6] There are two qualitative conditions, sickness and health, and a part of the body is the subject serving as the substratum persisting through the change. Aristotle says such a change of the part is also a change of the whole without qualification. When his eye gets healed, Coriscus gets healed.

For this to work Aristotle has to be recognizing parts of animals to be subjects for change distinct from their wholes. At the same time he is maintaining also the status of parts of animals as substances. First, Aristotle denies that substances undergo the motion (of change) as they have no contrary to change into. [225b10–1; *Cat*. 3b24–7] This point holds equally well for parts and wholes of animals: just as 'not-dog' is not a proper contrary for 'dog'; so too 'not-head' is not a proper contrary from 'head'. Second, Aristotle holds that parts of animals, flesh and heads, like their wholes, have matter and form. [*Gen. Cor*. 321b19–22] Moreover they can grow in quantity. [321b31–2] But *relata* cannot grow *per se* in quantity: surely not the double and the half; yet also so for parents and slaves: they grow *qua* substances and not *qua* parent or *qua* slave. If they change at all, it is *per accidens*. Third, and above all, Aristotle goes into great detail how the parts of animals come to be and pass away. [*Gen. An*. II.1; *Gen. Cor*. 321b28–32] But he has reserved such processes for substances alone.

In short: parts of animals can serve as proper subjects for change; *relata* cannot serve as proper subjects for change; therefore parts of animals are not *relata*. Only substances can undergo generation and corruption; part of animals can undergo generation and corruption; therefore parts of animals are substances.

Sorabji thinks that Aristotle excludes parts of animals from being *relata* by having his second definition of *relata*, "holding somehow relative to another", involve Cambridge change (known traditionally as 'extrinsic accident'). A Cambridge change does not affect the substances involved; like Cambridge properties such as 'being identical to itself', it is often taken as merely nominal.[37] "The distinctive

[36] What Rosen (2012: 67) calls part-wise change. Ross (1936: 614–5) says that, e.g., what is growing white "…may be said *per partem* to be moving towards being coloured since white is a part (or rather a species) of colour…" He notes that Aristotle does not discuss change in virtue of a part much. Small wonder as Aristotle holds also that such inferences often commit the fallacy of *secundum quid ad simpliciter*. E.g., an Ethiopian is white in respect of his teeth; therefore an Ethiopian is white. We can easily transform this example, via the Ethiopian's using Crest Whitening Strips®, into: 'The Ethiopian is becoming whiter in virtue of her teeth; therefore the Ethiopian (or her body) is becoming whiter.' So for Aristotle to defend the claim that change in virtue of the part is said without qualification of the whole would require him to discuss the fallacy of *secundum quid ad simpliciter*—as he does elsewhere. See Bäck 1996: 54–83.

[37] The name of 'Cambridge change' came about, "since it keeps on occurring in Cambridge philosophers of the great days, like Russell and McTaggart" (Geach 1969: 71–72). Cf. Sorabji 2005: 80–1.

feature of such change is that what is relatively disposed, for example, what is to the right of something, can cease to be to the right without undergoing any change itself, just through the thing on the left moving."[38] Such a *relatum* must change when its correlative changes; indeed both *relata* cease to exist on account of the movement, which brings forth new *relata*. Yet the thing, the substance, having the *relatum* as its accident, need not change when the "correlative" changes.

Sorabji says though that all this does not solve the problem:

> Aristotle's belief that his stricter definition of relatives as involving Cambridge Change will exclude hands from being relatives is puzzling in more than one way. It is puzzling not only because hands should already been ruled out by the reciprocity requirement, but also because it is not clear that hands would be ruled out by the new requirement concerning definite knowledge. Aristotle says in many works that a hand is not a hand in the proper sense unless it is playing its part in a living organism. On this view, it would not be possible to have definite knowledge that something was a hand without knowing that it was the hand of a living organism. Had Aristotle not yet thought of this functional view at the time he wrote the *Categories*? (Sorabji 2002: x)

Sorabji is claiming that the conversion distinctive of *relata* (what he calls "the reciprocity requirement") by itself rules out parts of animals from being *relata*. He goes on to claim that, if we accept the view in the *Metaphysics*, where a head that no longer functions as a head is no longer a head, Aristotle can no longer rule out parts of animals from being *relata*. For its being a head etc. is tied to its relation to the functioning animal. At best we should then attribute a developmental view to Aristotle, from the *Categories* to the *Metaphysics*.

Yet Sorabji's remarks are puzzling too. First, as noted above, items like heads can serve as *relata*, and do have the conversion distinctive of *relata* when named strictly. The conversion criterion would rule parts of animals from being *relata* only by naming their correlates imprecisely, e.g., as 'the head is a head of an animal'—not 'of the headed' as Aristotle himself wants at 7a16–7.

Second, as Sorabji himself states, the *relata* themselves, named strictly (2a), cannot undergo Cambridge change, at least relative to the relation defining them.[39] Hence Simplicius says: "For what is on the right [goes] to [being] on the left as from one subject to another." [*in Phys*. 836, 29–30; cf.. 834, 24–5] The original *relatum*, the one on the right, just disappears, and a new one, the one on the left, appears. Rather, only the subjects or substances in which these *relata* exist, can switch or exchange (not 'change' in a gradual process) their relations, like being half the

[38] Sorabji (2002: ix) notes that "…the idea of Cambridge Change is already found in Pluto's *Theaetetus* (154b-155d), where Plato says that Socrates can become shorter than Theaetetus without undergoing any change himself, by Theaetetus becoming taller."

[39] Cf. *Physics* 246b12–7 on why relations cannot undergo change. Like *relata*, form and shape do not change or alter themselves but only when something else does, sc., *per accidens*. Actually the situation becomes more complex. If we treat *relata* as subjects in their own right (2bii) then they can serve subjects for Cambridge changes too. As I discuss further in Chap. 4, the slave *qua* slave does not change when he changes his position or skin color or weight; such changes are *per accidens*. Are then all *per accidens* changes Cambridge changes? At any rate I take it that Sorabji, like Aristotle in this passage, is thinking rather of the substance being the thing undergoing the changes (2bi).

weight of another or being on the left, without themselves changing at all. Thus Simplicius says, "For the *relatum* is not a subject; for when e.g. the one on the right moves also the relation [ὀχέσις] moves and both *relata* change." [835,21] The presence of a Cambridge change may be a criterion that the attribute of the substance that is being switched or exchanged is a *relatum*. Still, what undergoes a Cambridge change is not one of the *relata* in question but rather (at least) one of their subjects.

Given the distinctions made above, let me work through what happens when something (A) is on the left at rest while something else (B) on the right moves to its left. (1) The *relata* themselves, the one on the left and the one on the right, disappear and are exchanged for two new individual *relata* of the same name but now belonging to the other substance. For B now is on the left and A on the right. Remember that being on the left (etc.) is a relation and so for Aristotle does not admit of gradual change. (2) The subjects for these *relata* are themselves *relata*: 'A *qua* movable' and 'B *qua* movable'. Both persist while switching being on the left and being on the right. A *qua* movable does not move in place, while B *qua* movable does move in place and does so *per se*. Here A *qua* movable has a Cambridge change: while not changing itself at all it switches from left to right. (3) The substances A and B exchange *relata*, but only B moves in place. For the substances all this happens *per accidens* and not *per se*.

Geach's doctrine of Cambridge change does not help much here but bewilders, as it does not address what subjects must be presupposed for changes in *relata*. All this seems far away from Aristotle's remarks about parts of animals.

In any case, Sorabji has the position that there is no solution to making all of Aristotle's remarks on *relata* consistent—that Aristotle's condition that *relata* be known "determinately" does not help. Yet let us see if it does.

10.3 Parts of Animals as *Relata*

> For it is not a hand in *any* state that is a part of man, but the hand which can fulfill its work, which must therefore be alive; if it is not alive it is not a part. [*Metaph.* 1036b30–2]

I proposed above that the *relata*, strictly speaking, are always paronyms derived from the relation. Moreover correlatives must be named determinately, with the same mode of generality.[40] What Aristotle does not address much in the *Categories*, as he himself perhaps remarks at 8b21–4, is the requirement that the correlatives must have the same mode, of actuality and potentiality and of time. If we do this, we can solve the problem about the individual parts of animals.

The schema for naming *relata* strictly, following Aristotle's use of '*qua*', suggests that hands and heads and wings, which are the substances, are not the *relata* without qualification. Rather, they are the *relata* only insofar as they are in the

[40] Bodéüs (2001: 122–8, 130–1) seems to endorse such an account.

relation of being a part of an animal, functioning in some mode or other. Ordinary language does not distinguish clearly between the head that is the substance and that aspect of the head that serves as the *relatum*.

The things that are called parts of animals like "heads" are substances. As their being is not the same as being somehow related to something [8a39–b1], they are not *relata*. A head can take on contrary accidents and can still exist when the headed animal perishes, although not *as a part of* that animal, as a head *of* that animal.[41] So too, Aristotle says, the eyes develop quite late and change their color. [*Gen. An.* 779a27–8; 744b11–27] Eyes, as substances themselves, have their own career and exist even when they do not function as eyes or perhaps even when they are not parts of an animal. In contrast, a master ceases to exist *per se*, *qua* master, when she no longer has a slave, although its substance, the woman, now slaveless, still continues to exist.

Aristotle does say, repeatedly, that parts of animals, when no longer functioning as parts, are no longer parts, strictly speaking. Does this mean that Aristotle has abandoned or corrected his view in the *Categories* that parts of animals etc. are substances—instead being some sort of relational thing?[42] Rather, Aristotle is not saying that fingers and heads are no longer individual substances but that they are no longer in the relation of being that part. Non-functioning parts of substances like animals do not cease being substances but do cease being parts of their wholes. The finger ceases to be *qua* functioning finger but not without qualification. So, just as the lump of bronze is no longer the status of Heracles but still is a substance, so too the severed finger no longer is a functioning finger of Socrates but still is a substance. Note that, as the bird *qua* winged is strictly what has the wing, it is precisely the finger *qua* finger that is part of the human being, or better, of the human being *qua* having fingers, or "the fingered". Parts of animals can be both substances and *relata*, but not strictly in the same respect. As in the *Categories* passage, the vocabulary obscures the point: 'finger' can be taken as the substance or as the *relatum*. Moreover finger the substance has various modes: the functioning actual mode, which itself can be split into first and second actuality, the potentially functioning but not actually functioning mode, the formerly functioning mode, the temporarily non-functioning mode etc. The "parts of animals" that Aristotle recognizes as substances are the things that persist through these changes of coming to be and passing away, that can function actually or only potentially, and that can take on various accidents like relations. He himself says that things like flesh, wine, and man exist in act and in potency at different times. [*Metaph.* 1070a3–7] When such things exist in potency they do not function as flesh, wine, or man; when they exist in act, they do. This agrees with Aristotle's *dictum*, that substances are not elements of *relata*,

[41] That is, it can take on Cambridge changes without being affected, while *relata*, when named strictly, cannot. Sorabji (2005, 2002: ix) says that *relata* share with substances the ability to take on Cambridge changes. Cf. *Physics* 225b10–4.

[42] Devereaux (1992: 120) agrees that Aristotle holds in the *Categories* that parts of substances are substances but changes his mind in the *Metaphysics*. If so, why doesn't Aristotle say so—"make a fresh start"?

nor *relata* elements of substances. [*Metaph* 1070b2–3] The actual part *qua* actual seems to be relational, while the thing that is the part, when not functioning as that part (as it normally does in the continuous body of the whole) is the part in potency. The latter exists as proximate matter—which can be a substance in its own right.

Let us return to 'the head is a head of the headed'. The first 'head' names an individual substance, but in the relation is being taken not as a substance but as a *relatum*. The second 'head' signifies the relation of 'being a head of'. This is not a *relatum*. Rather, it is the relation from which the paronyms, the *relata*, are derived. Aristotle's terminology obscures this distinction: 'a head' signifies the relation, a relational essence, when it is put into predicative position ('is a head of') just as 'dog' signifies a substantial essence, when it is put thus, ('being dog'; 'is dog').

Aristotle does not recognize relations like 'being the head of'—namely, the essences of *relata*—to exist *in re* independently, just as he does not recognize essences of substances, like being a dog or doghood, nor those of quality, like bravery, to exist *in re*, although they are constituents of what exist *in re*. Strictly, the items in the accidental categories are the qualities and relations, not the *qualia* and *relata*. [10a27–b7; cf. 6b11–4; *Top*. 144a20–2][43] Because relations are accidents, they do not exist independently. Rather their paronyms, the *relata*, exist because they have become substantives through "being in" a subject.[44]

All *relata* strictly speaking will be paronyms named from the relation. But once so named they signify these substantives: the things, (often immediately but always ultimately[45]) the substances, having that relation: complexes of substance with accident. These things, like heads, are substances apart from being in that relation, but not *qua relatum* but *qua* substance.

Heads are parts of their wholes, the headed animals. Indeed, Aristotle calls parts like heads the matter of the animals. Then these parts would be the matter proximate to their wholes. They themselves are composed of flesh, bones and sinews. Heads etc. serving as parts, as the material constituents of animals, are *relata*; as composed of the fleshy stuff, they are substances. When a head or finger ceases to perform its function as a part, it ceases to be a head in one sense, although it does not cease

[43] Cf. Bäck 2000: 224–8; Ackrill 1963: 98. De Haas (1997) may be making a similar move when he says that a *differentia* like 'rational' does not name any item in a category. Likewise Morrison (1992: 20–1) says that the taxonomic model that takes the categories to classify all beings is dubious, since not all beings and terms are classified. Still, Morrison (39) admits that what does not fit into a category cannot count as beings. Like Pellegrin, Morrison (36) claims that Aristotle is not much concerned with taxonomy. He agrees that the *differentia* may belong to any category, and, further may be the *differentia* of one thing while being the species or genus of another (1993: 150).

[44] As Luna (1987) points out, Simplicius et al. have a neo-Platonist reading that *relata* are *relata* solely by participating in the relation. But this makes relations more real than *relata* and is not Aristotelian. Cf. Fleet 2002: n. 3. I agree, so long as the reason is that the reality of *relata* depends on being in a substance as well as having the relation.

[45] That is, sometimes the immediate subject for a *relatum* is an item in a non-substantial category, as a number, a *quantum*, is for 'half' and 'double'. In such cases, ultimately we still get a substance as a subject, as the number is "in" the substance as its subject. In the case of a head, it would seem that the substance is its immediate (unmediated) subject.

being a substance. So too the bricks and boards of a house do not cease to exist as substances when the house is dismantled. Still they cease to function as parts of a house.

Aristotle's account becomes complicated though because the fully actualized form of the animal serves as the final cause for the part's natural development (Charles 1991). Wholes like man and right angle are prior to their parts, fingers and acute angles, because the whole can exist separately from those particular parts and because the parts are explained by reference of the wholes. But again, what is being explained is the development of the substances that are the parts into becoming fully actualized parts of the whole. Moreover, *contra* Empedocles, Aristotle holds that the parts of animals are generated naturally[46] from the seed as constituting part of the organism. [*Part. An*. 640a20–6] Notwithstanding, the natural history of these parts differs from that of their wholes.

Indeed, Aristotle holds that *relata* are "least of all substances" because they do not come to be in a gradual process. [*Metaph*. 1088a23] This holds even for the relations of perception and knowledge (Burnyeat 1996: 154). View the fully actualized part as the *relatum* that immediately ceases to be upon the perishing of its correlative, the living, functioning animal. Still, the substance that has developed into that fully actual part, say the embryonic head, has its own career and need not cease to be—although it should no longer continue being named by a name like 'head' that connotes a fully actualized part of an animal. We often speak of dead heads and corpses as "heads" and "dogs"—but for Aristotle not strictly. These things were once heads and dogs; now they are things that were once fully actual dogs and heads.

The names for parts of animals thus have a certain ambiguity. They can be taken to signify fully actualized, functioning parts of the whole organisms, or substances that have the potential for such functioning and at times come to actualize that potential. Aristotle recognizes such ambiguities. Indeed, he criticizes his predecessors for not marking them. [*An*. 425b26–426a6] In his biological works, he regularly describes as "parts" and as "eyes", "hands" etc. those portions of the embryo and child that have the capacity to develop the actual functions of those parts but do not have them yet. Puppies are born blind and unable to reproduce, and yet have "eyes" and "genitals". Still, as such parts, while not yet functioning, develop for the sake of what they would become, their being and becoming is tied to the whole animal, but as their final cause, not because they are *relata* (Lennox 1997). In short, these developing organs are the substances; these substances when actualized are the parts.[47] However, in the respect that these substances are fully actualized, they constitute parts of the animal body. This respect, taken "as if" it is a subject in its own right, is a *relatum*. The hand is a hand of a body; the body is a body for the hand. Thus *qua* part, the hand is not a substance in its own right, although parts of

[46] Excepting monstrosities and spontaneities.

[47] Commenting on *Physics* 224b28, Simplicius (*in Phys*. 810, 25–8) goes so far as to suggest Socrates can be said to move "always" as the body and matter that for a time constitute Socrates are always moving.

animals are substances in their own right.[48] Indeed the second sense of *relata* in *Metaphysics* V concerns the actualization of some capacity.[49]

Given Aristotle's predilection for substances that are fully actualized in every way, we can see why he would hold that substances in the strict sense must have their abilities functioning in order to remain being substances and that a head no longer functioning is no longer a head strictly speaking, that is, in actuality. When Aristotle defines a finger as a certain part of a man, he is defining the actualized finger, a part of the matter of the man. [*Metaph*. 1035b9–19] When Aristotle says that the whole animal is prior to some of its parts, like eyes, and simultaneous with others, like heart and brain, he is comparing animal the substance with the fully actualized parts. [1035b22–7] A puppy is functioning as a living dog before it can see; its eyes have not developed yet so as actually to see. (Strictly though the dog *qua* seeing, not the dog the substance, is the correlative for the actually seeing eyes.)

So Aristotle's own account of potentiality suggests that he supports a distinction between a part of an animal *qua* actual, functioning *part of* the animal, and here as a correlative, and a part of an animal *qua* a substance in its own right, having the presently unactualized potential to be a functioning part of the animal. (Take the actuality here in the sense of first actuality in *De Anima* II.1.) He speaks of a potentiality as a starting point of change, which can be in the same thing, but in this case, in it only "*qua* other". [1046a10–1; V.12] An animal may move itself in order to get food. A physician can heal herself, but she heals *qua* physician and is healed *qua* patient.[50] Above all, Aristotle speaks of the generation and corruption of parts of animals. Now Aristotle takes such coming to be and passing away as a hallmark of substances—and indeed the process of generation is moving from potentiality to actuality. He states explicitly that semen and embryos are alive, although as plants and not yet as animals (Whiting 1992: 90) [*Gen. An.* 736a32–b8].

So then, to solve the puzzle about parts of animals we must stipulate that correlative *relata* must be known "determinately", both so as to know their correlatives, stated strictly, on the same level of generality, plus their logical subjects and so as to know them on the same mode of actuality and potentiality. That the "determinately" carries this modal weight has support from what Aristotle says about the correlatives, perceptible and perception. They do exist simultaneously if both are taken actually, but not if the perceptible is taken potentially, as a substance that can be perceived and the perception is taken actually, as an actual perception of it. [8a11–2][51]

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[48] Thus Frede and Patzig (1988: 169–70) describe parts and wholes as *relata*.

[49] The later discussion of relations retains the classification of *Metaphysics* V, but with some Stoic influence. Szlezák (1972: 113) claims that Boethos had a threefold categorization of σχέσις: (i) in itself and *per se* (ii) towards something else (the category of relation) (iii) of something else towards it (the category of having). Cf. Simplicius, *in Cat*. 334, 15ff.; 373, 7–32; 61, 10; 22, 19; Mignucci 1988: 129–31.

[50] Ackrill (1973: 125) considers such a solution but then rejects it.

[51] Discussed in the next chapter.

Aristotle has to apply these same conditions of modality to all *relata* to avoid obvious counterexamples. The modality conditions here not only concern the scale of potentiality and actuality but also have a temporal dimension. E.g., in ordinary language we will say that I have a father, even when my father is dead. For Aristotle to hold that, for correlatives like father and son to exist simultaneously, they too must be taken with the same temporal and modal determinant: say, to be an actual father now there must actually be a son now; to be an actual father in the past there must actually be a son in the past; to be a potential father in the future there must be a potential son in the future.

Ordinary language, from which Aristotle begins, does not mark such ambiguities well. Accordingly the complexities involving the relational character of parts of animals become masked. For the head that has its capacities functioning fully now is the head that is the *relatum*. In the case of animal parts, (Indo-European) natural languages use the same term also to signify an individual substance as well as the relation of 'being a head of'. In the case of parts of artificial objects like houses we tend to conflate these uses less: the brick is not "a brick of the house" in as strong a way as the head is "a head of an animal".[52] The functioning of bricks seems tied to the actualization of a particular house less than the functions of a head or an eye to a particular animal.

The actualized part, the substance actualized now in this function, is the first *relatum* expressed in 'the head is a head of the headed'. The head that is the primary substance is the material portion of an organism that normally has the capacity to function as a head and in its normal course of development comes to do so.[53] The species and genera to which this "head" belongs are likewise secondary substances. Yet since the embryonic or ill or injured head is "forward-looking" to its future actualization, its inability to function any more through being severed from the body makes it, in most contexts, "a head" in name only. [*Part. An*. 645b14–20; *Gen. An*. 779a27–b6][54] Still, for the "head" in the sense of the portion of flesh and bone that in its history comes to function as a head, that fully actualized functioning is an accident.[55] For, Aristotle admits, its development may be in vain; the young animal

[52] Cf. Aristotle's use of 'thaten' and 'wooden' at *Metaph*. 1032a15–9; 1049a18–22; (ps.) Alexander, *in Metaph*., 503, 34–9.

[53] Ammonius (*in Cat*. 78, 8–9) says that something's being a head is not characterized by the σχέσις that it has from its relation to the headed. Likewise Simplicius (*in Cat*. 197, 4–11; 198, 34–5) says that no substance or part is a *relatum*. Still a head as a part has its being relative to the whole; He goes on to assert (204, 4–5 199, 2–3) that a hand does not have its being in another *qua* hand—but presumably qua something else.

[54] Aristotle notes, 1033a13–5, that often we have no names for these other stages of such non-functioning parts. See Lloyd 1992: 162.

[55] My account may allay the complaint of Sorabji (1974: 50): "Aristotle thus gives to the heart or eye a treatment that would be more appropriate for a scrap of paper used as a bookmarker. The scrap becomes bookmarker, when so used, and ceases to be a bookmarker, when discarded. When it lies in the wastepaper basket, there is nothing distinctive to connect it, rather than thousands of other objects, with bookmarking; its use alone made it a bookmarker. Contrast the severed hand or eye. This still has a distinctive structure to connect it with its former activities, and so it should still

may die. Then it still had a head although not a fully actualized one.[56] Likewise, although human beings might be said to actualize their capacities for the sake of flourishing as rational beings (*eudaimonia*), that flourishing is accidental and indeed never comes to pass in most of us. Accordingly, Aristotle makes the moral and intellectual virtues accidental qualities. [*Cat*. 8b32–5]

Thus a head as part of an animal is a *relatum*. Consider the data from Aristotle: No substance is [composed] out of substances. [*Metaph*. 1041a4–5] Animals are composed of their functioning parts. Therefore those parts are not substances. "Head" the *relatum* thus becomes a certain aspect of head the substance.[57] It is that substance insofar as it is considered as having its animal capacities fully actualized now, while not being considered in other respects.[58] So for head *qua* this *relatum*, its hair color or dandruff is not considered; those pertain to the head *per se*, the substance.

What about those parts that are purportedly secondary substances, like head the species? We have three apparent options: either (1) parts of animals that are species, like 'head' or 'finger' in general, are *relata* and not substances, or (2) they are secondary substances that are *relata* only *qua* being connected to a torso, as opposed to *qua* being of this shape or *qua* being of this material or *qua* being edible. The first option presents no obvious absurdity. For Aristotle doesn't have a neat Porphyrian tree structure. E.g., he says, the individuals or *infima species* of knowledge are in the category of quality while their species and genera are in the category of *relatum*. [*Cat*. 11a20–36][59] So perhaps individual heads are substances and universal heads *relata.* Or, perhaps, we should adopt a third option: (3) that the species and genera of parts of substances are both substances and *relata*.

Indeed, note, in favor of the first option, that Aristotle explicitly takes "rudders" as *relata*. Now a rudder is a part of a boat, and a boat, like the bronze sphere of *Metaphysics* Z, is a substance. So then what about parts of substances like rudders? If we apply the criterion being discussed, we find the rudder works just like the head. We can know that this object is a rudder without knowing that boat of which it is the rudder. Thus far rudders, namely individual rudders, are not *relata*. However, to say that this thing is, actually, a rudder, namely, belongs to the species of rudders,

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pace Aristotle) qualify as a hand or eye in the primary sense." On my account it is still is one in the primary sense: as a substance.

[56] This point works better with 'genitals'.

[57] Simplicius, *in Cat*. 188, 3–6; *Enneads* 6.3.28.5–8; Sorabji 2005: 79.

[58] Another way to express my position is that substances can be *per accidens* in another category. Thus Morrison (1992: 26–7) says that some items can be accidentally in a category: e.g., 'white is large' accidentally [5b4]; 'the man is a boxer'. [10b1–3]. Likewise so too Syranius says (*in Cat*. 199, 25–6; 199, 3) that a hand is a substance *per se* and a *relatum per accidens.*

[59] Likewise at *Metaphysics* 1021b4–6 Aristotle says that sometimes something is called a *relatum* because its genus is, as is medicine since knowledge is a *relatum*. Or again, 1021b6–8, something is called relative because they are the properties of the *relata* "in virtue of those having [the *relatum*]; like equality because of the equal and similarity because of the similar." However, I am going to adopt my second option, which Aristotle proceeds to recognize at 1021b8–11, that even a substance can be a *relatum per accidens*, if it happens to have a relation.

requires that there is a boat of which it is a rudder, although on this level of generality it is not determined just which boat that is. Likewise, to call this hunk of protoplasm a head, or even this hunk of bronze a (human) statue (ἀνδρείκελον), implies that there is something whose head it is or someone being represented. Thus the species of rudders and statues and heads look to belong to the category of *relatum* as stated in their very definition.

However Aristotle seems to deny this in the *Categories*. Further, the same account as for individual parts explains why they are not: a head (in general), considered in its fully actualized state only, is a *relatum*, while it in itself is a substance. Note that "states" are accidents, *qualia*. In ordinary speech we do presume that heads are functioning parts of animals just by calling them "heads"; we look towards their functioning fully as heads. Yet Aristotle requires finer distinctions than the *hoi polloi* provide. The third option that the generic parts are both substances and *relata* expresses this distinction, just not finely but imprecisely: if taken precisely without qualification, it leads to contradiction. So the second option remains.

What then about the relation, as in the second "head" in the *dictum* 'the head is a head of the headed (animal)'? It signifies a part-whole relation, not the secondary substance (Caujolle-Zaslaavsky 1980: 190–1). As parts and wholes are correlatives, their existence should not signal the existence of something substantial able to exist without reference to another.[60]

> Further, there are the properties in virtue of which the things that have them are called relative, e.g. equality is relative because the equal is, and likeness because the like is. Other things are relative by accident, e.g. a man is relative because he happens to be double of something and double is a relative term; or the white is relative, if the same thing happens to be double and white. [*Metaph.* 1021b6–11]

The second 'head' is the relation, not the *relatum* or the secondary substance. Again the language confuses. Aristotle does say that the matter from which a substance comes has the name only homonymously. So the bricks and timbers are not a house; and the materials that come to constitute an animal are not hands and heads. [1032b26–1033a1; 1034a34–1034b2] That is, ordinarily we call something a hand only if it is a functioning hand:

> …it is called its part when it fulfills its work. It will do its work and be called a part of a man when it is disposed by nature: when it is not but is, e.g., inanimate it neither does its work nor is called a part. [Ps.-Alexander, *in Metaph.* 514, 36–39][61]

[60] Still, 'part' and 'whole' do not signify *relata*, as they are terms like 'genus' and 'species', later called second intentions. Relational conversion holds for them nonetheless: a part is a part of a whole; a whole is a whole of parts.

[61] Later on (ps.-) Alexander (*in Metaph.* 534, 27–33) will say: "…also the parts of animals, hand and feet, which seem to be substances most of all—it is evident from these [remarks] that they are not substances but potencies. For that in virtue of which it fulfills the work of each in virtue of that very substance belongs to substance, but the hand, when separated from the whole, does not fulfill the work of it *qua* hand, while being *per se*. For a hand cannot be the case in such a condition, but in fulfilling what follows such a condition that has a function."

"In the notion of 'hand' or 'head' it is already implied that these parts fulfill a certain function in a living organism" (Morales 1994: 264).

Aristotle holds that an accident is not a part of its substance. Aristotle says that an accident "…is in something not as a part, and cannot exist separately from what it is in." [*Cat*. 1a24–5] Simplicius quotes Alexander who takes this to imply that what is in a subject is an accident and is not part of the compound. [*in Phys*. 552, 18–24] How then do accidents differ from parts, strictly speaking? Perhaps parts can exist apart from their wholes, even if they no longer will be named called "the parts of" that substance. Thus a jar of wine is a whole, having the jar and its liquid contents as its parts. Aristotle remarks that when the wine is separated from the jar, they are not parts of the whole. Still, of course, the two continue to exist, as jar and as wine. This reading would agree with what Aristotle says about the parts of animals. On the other hand, Aristotle does admit that at least in some sense white is in body and man as parts—perhaps not in a strict sense. [*Phys*. 210a34–b5]

Therefore particular parts of animals, which Aristotle says are primary substances, are not, strictly speaking, *relata*. Rather, to speak precisely, in the way that Aristotle does himself at times, the torso of Coriscus is a *relatum* only *qua* headed, but not *qua* itself (*per se*). Consequently, once we work out the hints given in the text, it looks as if both *relata*, in all cases, belong to the category of relation, strictly speaking. For terms like 'the ruddered' or the winged' are paronyms of the relation terms 'being a rudder of' and 'being a wing of'. Likewise, the finger is a finger of the fingered. Even the first 'finger' signifies, strictly speaking, the finger *qua* finger, i.e., being a finger of something, even though the finger is a substance. Perhaps we should have thought so all along. For, after all, the category strictly is the category of *relata* not of relations. If most, if not all, things being related belonged to other categories and were not *relata* (or at the least were not both in the category of *relatum* and in another category), then the category of *relatum* would have no individual members.

Are these paronyms serving as *relata* ones taken abstractly (2a) or concretely (2b)? Taken concretely, they would be the substance or logical subject with the accident, and not the accident proper. So the *relata* strictly speaking are paronyms taken abstractly—when we focus on them *qua* being in the relation and not on their being individual substances. But then all *relata* strictly speaking will be paronyms named from the relation. Heads can be things, substances, apart from being in that relation, but not *qua relatum*.

It is not obvious just what sort of thing a *relatum*, strictly speaking, is. Just what is "the bird *qua* winged"? Is it a singular or a universal thing? Whatever it is, it seems to have sufficient quasi-independence to serve as a subject in its own right in being related (2bii). This question becomes the focal point in Aristotle's discussion of the existence of mathematical objects and perhaps even of substances in general.

Aristotle's distinctions of types of parts may well offer a solution to such dialectical difficulties. On the one hand a substance as one thing does not have parts in the sense of actually being separate substances. Still a substance like a dog is not absolutely one as it has parts, potentially and not actually. A substance does have parts

of its definition, as even the one might be said to have the parts of being and one. Still these parts form a whole as a unity where one part is not predicated of another.

Aristotle does speak of the parts of animals being like the elements, earth and fire and air, only heaps before they function. He also says that when they are separated from the whole and hence not functioning they are merely potentialities and exist as matter. [1040b7–8] A detached hand is at best just a potential hand. Still all this does not rule out these parts or even the elements from being substances in their own right. For Aristotle holds too that such a matter is proximate and has form and matter in its own right.

He does say that these parts and elements are continuous, when constituting the whole animal. [1040b14–5] Here he is speaking of those parts that have a principle of movement within their joints when separated from the whole animal, like some segments of insects.[62] Such parts have somewhat of a claim to be actual substances in their own right even when forming functional parts of the whole animal—and even on the level of being animate substances. [1040b13–6; *An*. 411b19–23; 413b13–24; *Iuv*. 468b4–9] Aristotle thinks that such cases are merely accidental and haphazard (Whiting 1992: 79). Again Aristotle does not worry much about cases where a part has lost its function but could regain it: "…he could maintain the homonymy principle in a form that would not prevent a blunt axe and a dismantled carburetor from counting as an axe and a carburetor (strictly speaking), and that he should recognise as a possibility the re-use of severed organs and the re-activation of dead bodies" (Ackrill 1973: 128).[63] Aristotle does not focus much on such difficulties. He is mainly concerned here to rule out parts, the *relata* themselves, serving *qua relata*, as substances in their own right.

Aristotle might be thought also to be claiming that a wing or a hand when functioning is not a substance in its own right at all. To be sure, taken as a part it is not a substance. But it can be taken not as a part but as a substance. Otherwise the natural history of parts of animals would have the curious feature of gaps when the heads and hands come to be fully functioning! For during that time they would cease being substances and begin being *relata*.

Rather the things that can come to serve as the parts of animals remain substances in their own right.[64] To be sure such substances have less complexity when they are not functioning parts than they do when they are functioning parts of an animate

[62] Lefebvre (2002: 3) notes that Aristotle admits that even human beings can function after being decapitated for a short time. Insects do this more, and consequently Aristotle considers them more as aggregates than as wholes. See 467a18–30; 468a13–b15; 471b19–29; 479a1–7.

[63] Again, I can agree with Ackrill (1973: 126): "If being alive, whether for an organ or for a whole body, is having certain powers (not necessarily exercising them) and to be an organ or a human body is to possess such powers, no distinction can be drawn for organs and bodies between their being potentially alive and their being actually alive. They are necessarily actually alive." It's just that I hold that Aristotle does in fact make such a distinction. Ackrill says "that he should recognise as a possibility the re-use of severed organs and the re-activation of dead bodies." Aristotle indeed does, as with the passages about the segments of insects and dying flesh. Cf. *Meteorology* 390b2–12; *On Generation and Corruption* 321b14–21.

[64] Whiting (1992: 86–7) has a similar account.

substance. Analogously, a fully functioning, cultivated human being has more complexity than a child who has the potential to become cultured or even a sleeping adult. In both cases—the functioning of the part and the virtuous acting of the excellent person—such an actuality is an accident of the substance. Yet this is a peculiar kind of accident, as this functioning is a *telos* for the person or part to develop into. Note that in such cases, as Aristotle himself tends to point out, we do not have words clearly distinguishing the fully functioning from the potentially functioning, nor the substance serving as matter and constituent for the more complex substance from it as a fully functioning part.

Aristotle says that parts of animals seem to be substances but are only potentialities. But, if substances are actualities, then parts of animals are not substances in the full sense but only homonymously. We can understand this claim if we hearken back to the discussion in the *Categories*. A part of an animal, like a wing, is strictly a *relatum*, whose existence is tied to its correlative whole, in this case, the winged, which, if it is to exist, must "be in" an animal. Likewise the animal *as this whole* is also a *relatum* whose existence is tied to its correlative, in this case, the part of the animal, the hand or wing. However, in another respect the whole, the animal, is prior to its part, as it can exist without its part, namely that particular part (Frede and Patzig 1988: 188).[65] For an animal must have some parts or other, some instance of that type of part.[66] Its actualizing form serves as the formal cause making these parts function. So too the object known in another respect is prior to the knowledge of it, although not in the strict respect in which both are *relata*. As a non-functioning part, the chunk of matter, developing into a functioning wing or hand, is a potentiality only—relative to its being a part. Aristotle makes the same point about needing to distinguish sense organs and faculties as potentialities and as actualities in *De Anima*. [Cf. *Metaph*. 1040b11].

My solution thus preserves "the homonymy principle". A fully actualized hand and a potential hand do not have the same definition or account. Likewise, the uncarved block in Musashi's studio may be a statue of Kannon, but not in the same sense that the finished status is. Still, when taken as correlatives, parts and wholes are not substances.

In sum, Aristotle does have a consistent account of the parts of animals.[67] The ancient doctrine, that they are *relata* in one respect and substances in another has merit, when explained more fully than the extant commentaries do. From this we may also learn to beware schizophrenic interpretations of Aristotle, where he has different theories in his early and his later works, or in his logical and biological works.[68]

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[65] I also don't object to Margaret Scherle's claim "that parts have their own functions *qua* having a nature of their own and, thus, can be fully actualized even when the whole is not functioning." [personal correspondence]

[66] Cf. Aristotle's similar remarks on how substances can exist without accidents in VII.1.

[67] I can agree with Cohen (1992 68–70) that Aristotle means the homonymy principle to apply to flesh, bones, and organs, as well as to artifacts. It's just that it holds of them *qua* fully actualized and not *qua* substances.

[68] Cf. Irwin 1988; Graham 1987.

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Chapter 11
Aristotle's Nominalism

> …the substance is the indwelling form, from which along with the matter the so-called concrete substance is derived… [*Metaph*. 1037a29–30]

Aristotle departs yet further from a Buddhism by looking for manifold principles and causes having a real basis. The principles are universal while the real basis lies ultimately and primarily in individual substances. This rapprochement of the universal and the individual produces central difficulties: how can the sciences say something adequate holding universally about real singularities? How can we acquire knowledge of the universal from perception of singulars? How can the essence, what it is to be an individual substance, have a universal definition while preserving its individuality? Abstraction plays a central role in solving these problems.

11.1 Semantic Ascent

> For the essence is what something is, but, when one thing is said of another, this is not what a 'this' is. [*Metaph*. 1030a3–4]

Aristotle denies that a universal is a substance. Yet a definition, the formula of the essence, is a statement composed of universals—and the substance is identical to its essence. [1031b19–20] Aristotle calls genera and species "secondary substances", and these are universals "said of" the individuals. Yet he says that no universal names a substance. Moreover, if genera and species also are substances strictly, then we have "substances of substances"—a conclusion that Aristotle rejects too: "Clearly then no universal term is the name of a substance, and no substance is composed of universals." [1041a4–5]

A. Bäck, *Aristotle's Theory of Abstraction*, The New Synthese Historical Library 73,
DOI 10.1007/978-3-319-04759-1_11,

Accordingly many modern scholars find Aristotle's account of substance and essence mystifying.[1] Yet even more mystifying is Aristotle's aplomb: he thinks that he is offering a clear solution to such puzzles about individual substances and their essences. [1039a22–3] However he finds being *qua* being primarily in individual substances and there primarily in their essences and forms. As 'form' and 'species' both give plausible translations of 'εἶδος' in different passages, this seems to make the form, even of an individual substance, a universal. Moreover the definitions that Aristotle gives for forms are complexes of universals. How then can he insist that no substance is a universal?

I suggest that reading what he says simply and literally goes a long way to offering a simple solution. In this section I sketch my approach, which I develop further later on. I do admit some murkiness and inconsistency in Aristotle's use of 'be' and its relatives.[2] He is forging new ground and new terminology. The surviving texts are scattered and sketchy. Still enough has survived to interpret his position thus.

Aristotle's terminology on this topic is rather opaque. He says that there are primary and secondary οὐσίαι. That is, substances are things having being primarily, as with the individuals, or secondarily, as with their species and genera. I propose taking *ousia* here in the sense of an existence, something being *in re*. He also calls substance the τί ἐστι: this can be translated variously: 'what it is'; 'what exists'. [*Top*. 103b22; *An. Po*. 90b3–4] A substance is what exists primarily, while an item in another category exists secondarily. [*Metaph*. 1030a17–20] Aristotle calls the essence the 'what it is [or: was?] to be' (τὸ τί ἦν εἶναι) or uses a phrase having the infinitive 'to be' (εἶναι) with the noun in the dative case, as in 'being man'. More loosely, the essence of something is the τὸ τί ἦν εἶναι, the 'what it is for it to be'; 'the being of the the substance'.[3] Its definition is "a statement signifying the essence". [*Top*. 101b38; *Metaph.* 1030a6–7] This consists in a statement (λόγος) of—what can be said about—the essence. For Aristotle a statement affirms or denies a predicate of a subject. [*Int*. 17a20–6]

Aristotle says that one sort of definition is an account of what the name signifies; the other is an account making clear why a thing is. [*An. Po*. II.10][4] A nominal definition can define what the name signifies, even when the name does not refer, like 'goat-stag'. [*An. Po*. 92b6–11] But, once the name has been found to signify, the real definition gives the formula of the essence of those real things. Either sort of definition typically defines a universal and not a singular, as the *definiendum* tends to be a universal term. The real sort gives the cause, typically the formal

[1] Or schizophrenic: Graham (1987) attributes two separate theories in Aristotle in the *Metaphysics*. Likewise Yu (2003: 135) says, "…a tension between *tode ti* and universal definition: Aristotle oscillates…without being able to solve it."

[2] Also for terms like 'form': 1033b19–23 is a good example of an obscure text, which I try to explain below.

[3] Buchanon (1962: 30) says that this phrase, 'what it was to be', has the "philosophical imperfect"; it "imputes to the phrase a 'back reference' to a definition already agreed upon." '*Ousia*' has a general sense of 'essence' and a stricter sense of 'substance'. Cf. Simplicius, *in Phys*. 474, 5–7.

[4] Other types of definitions may be being distinguished here, but these suffice for my purposes. See Deslauriers 1990: 1–26 for a discussion of them and the secondary literature.

cause why the substance exists. [*Metaph*. 1013a26–9] Aristotle favors such real definitions in science.

When what is being defined, the *definiendum*, is universal, both nominal and real definitions give synonyms that can be substituted *salva veritate*. However, when what is being defined is singular, they differ. The former, nominal sort of definition (or description—given that definitions strictly are of the universal[5]) still provides a synonym for the *definiendum* that can be substituted *salva veritate*. A real definition, the *definiens*, provides a synonym only when the predication in the statement of the definition is convertible. This happens when it is "immediate": the subject, the *definiendum*, and the predicate, the *definiens*, are commensurately universal, and there is no middle term linking them up so as to make the definition a conclusion of a demonstration. [*An. Po*. 94a10] Aristotle wants such commensurate universality in science. Normally, in a special science, when the terms are universal, an adequate, real *definiens* will provide synonyms for the *definiendum* too. The problem comes in the science of being *qua* being when Aristotle asks: what is it to be an individual substance? Now he is seeking a definition or a quasi-definition (since in the strict scientific sense only universals have definitions[6]) for an individual. He still offers universal definitions: what it is to be Socrates is to be a rational animal. Yet here the *definiendum* and the *definiens* no longer are immediate and commensurately universal.

A real definition states necessary features of the essence—preferably the core ones from which all the other ones, the *propria*, can be derived in demonstrations.[7] Since the definition is a statement about the essence, it will give its universal features.[8] For Aristotle a statement is a predication of one thing of another, where the predicate tends to be more universal and the subject less so. When the predication is convertible, the *definiens* and *definiendum* are commensurately universal; when it is not, they are not.

Although definitions where the *definiens* and the *definiendum* are commensurately universal may end up yielding identity statements, they themselves are not identity statements. Some today perhaps have not seen this on account of taking definitions as identity statements. However, Aristotle does not have the 'is' of identity—at best he has predications of sameness in number.[9] To be sure, when the subject and predicate terms are "immediate" and commensurate, they can be predicated reciprocally. [*Top*. I.8] Likewise he says that a *proprium*, while not indi-

[5] Hence at *Categories* 1a2 Aristotle speaks of a "*logos*" instead of a definition.

[6] Owen 1965: 137: "the primary subjects of discourse cannot be individuals such as Socrates, who cannot be defined, but species such as man."

[7] —although Aristotle will put up with demonstrations of the fact (ὅτι) in *Posterior Analytics*. I.13.

[8] Note that 'λόγος' and 'λέγεται κατά' have the some root: 'λεγεῖν'.

[9] Diophantus used an abbreviation of 'ἴσον' ('equal') in mathematical equations The identity symbol does not seem to have appeared until Richard Recorde in the sixteenth century—perhaps from Arabic algebraic roots. Thanks to Ignacio Angelelli and Christian Thiel. Also cf. Koslicki (2008: 130 n. 16), who says that Aristotle's one in number is "roughly equivalent to our current notion of numerical identity…the relation that each thing has to itself and to nothing else".

cating the essence, is predicated convertibly of the object. [*Top*. 102a18–9] Convertible or reciprocal predication *might* be taken to make an identity statement. Still Aristotle need not thereby recognize that logical form. Moreover definitions make identity statements and give synonyms only in their usual use, when the *definienda* are universal as is the case in the special sciences: "For definition seems to be of what a thing is, and what a thing is is in every case universal and affirmative." [*An. Po*. 90b3–4; cf. *Metaph*. 1039b27–30] The identity follows because the subject and predicate are essential and immediate, so that they are reciprocally predicated by necessity. As long as definitions concern universal terms, it is fairly harmless to treat such reciprocal predications as identity statements.

The harm comes when we seek "definitions" for singular things—which we ordinarily do not do in science. Sometimes Aristotle gets them by applying his universal definitions to singulars via the *qua* locution: Socrates *qua* man is a rational animal. This amounts to the conclusion of an expository syllogism: Socrates is a man; every man is a rational animal… [*An. Po*. 85b9–15; *Metaph*. 1032a6–9][10] What has that definition primarily is the species man; Socrates has it because he belongs to that species. However when Aristotle focuses on the individual itself and asks: what is it to be this-here individual substance, this-here essence of that substance, he can no longer give the definition in a commensurate and primary predication. [as in *An. Po*. I.4–5; 73b32–3] He can give only a statement *of* the essence. This statement has a singular subject and a universal predicate. The terms are no longer immediate; the predication ordinarily is not reciprocal. If the statement were converted, Aristotle would reject it as perverse: a case of unnatural predication having a singular substance as its predicate (Bäck 2000: 185–95). [*An. Po*. 83a14–23]

So here is the result: The essence is the singularity making the individual substance the individual substance that it is. When we talk about its necessary features we get universal attributes—hence a science of universals becomes possible. This happens by abstracting the universal features—making statements *about* the essence. It's just a brute fact about this world that singularities have common features and form natural kinds, with the result that we can make such true universal statements about individuals in groups.

On this reading what Aristotle says becomes consistent. What exist primarily are individual substances. What it is to be such a substance, its essence, is primarily its form. A definition is a statement about its form. It gives the core necessary features that are said of the substance or its essence. As these features are "said of" nonconvertibly, they are universal. Definitions of individual substances and their forms thus have universal constituents and so consist in universal statements like the other principles of science.[11] We get at these universals via abstraction from the singulars.

[10] Aristotle allows for singular terms in syllogistic in exposition and in rhetorical contexts. Cf. *Rhet*. 1401b11–19; Mignucci 1991.

[11] Ockham (*Ordinatio* d2.q4) says similarly that science consists in giving universal propositions whose terms supposit for individual things: its universal statements are about individuals.

A definition gives necessary and sufficient conditions for some instance or other of the type being defined—but not for this-here individual of that type.[12]

Think of the definition, the formula of an essence, like a cooking recipe. It gives the structure for the coming to be of a cake. Write as detailed a recipe as you would like, you still do not have a cake to eat. A particular instance of the recipe has to be embodied in individual hunks of stuff of the right type: flour, sugar, eggs. An essence is like this too: it has a formula, a recipe, its definition. Still it cannot come to be on its own; its existing requires its being a singularity.

As discussed in Chap. 7, Aristotle takes a science to cut off a piece of being and treat it "as if" it were a subject independent in its own right. He finds this abstraction harmless.[13] The aspects of being cut off tend to be universal: science deals with the universal, and its demonstrative and definitional statements speaking about those aspects give their predicates.

This process moves from the singular to the universal via a semantic ascent: a shift from the essence to talk about it.[14] Those animals having *noûs* are able to move thus via induction. They can apprehend the universal features really constituting the individual substances and then abstract them.

In a discussion of science and definition, we have already made this semantic ascent to the level of universals. The new, universal subjects there have attributes different from and incongruent with their singular bases. Their essences, the quasi ones, are universal; the forms of individual substance are not. Talking of 'the essences of individual substances' has some ambiguity: in the sense of their forms, they are not universal and have no definitions; in the sense of their necessary features or what it is to be this species or that genus, they are universal and have definitions of the usual scientific sort. Once on the level of the universals, the definition and its *definiendum* are commensurate and so have synonymy—but to get there the semantic ascent has to be made.

We can piece together Aristotle saying all this even in the *Categories*: "Every substance seems to signify a certain 'this'." [*Cat*. 3b10] This does not hold strictly for secondary substances. These rather signify "a certain qualification" (*ποιόν τι* —some *quale)*, although not in the way that qualities do. [3b15–21] This amounts to a secondary substance, a species or genus, being an (essential) aspect of a primary, individual substance. Moreover, the primary substances are subjects for everything but themselves; the secondary for "all the rest". [2b37–3a6] That is, on the level of universal statements in science the secondary substances can be taken as if they were independent subjects. These subjects have their essences commensurate with them. Still the individual substance itself has no definition (immediately and primarily), although it does have attributes necessarily predicated of it.

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[12] This account may also explain why Aristotle keeps the necessary and the essential distinct. Those universal attributes that are said necessarily of the essence or substance are said essentially of it, but are not 'essential' in the sense of 'being the essence' as that is not universal.

[13] Not counting the harm done by the confusion to his interpreters.

[14] Rather like Quine (1960: 271): "a shift from talk of objects to talk of words…It is what leads from the material mode to the formal mode…from talking in certain terms to talking about them."

Via abstraction we can ascend to what is most evident in itself and least evident to us. Yet in doing so we do not leave the world of individuals. Rather, we point to universal features inside of it.

> Further, substance means that which is not predicable of a subject, but the universal is predicable of some subject always. But perhaps the universal, while it cannot be substance in the way in which the essence is so, can be present in this; e.g., animal can be present in man and horse. Then clearly there is a formula of the universal. And it makes no difference even if there is not a formula of everything that is in the substance… [*Metaph*.1038b15–20]

11.2 Paronymy Again

> Therefore substance is the starting point of all production, as of deduction. [1034a31· ὥσπερ ἐν τοῖς συλλογισμοῖς, πάντων ἀρχὴ ἡ οὐσία.]

Aristotle says that substance is primary in formula to the other categories "…for in the formula of each term [literally: of each[15]] the formula of its substance must be present." [*Metaph*. 1028a35–6] This means that a substance term appears in the definition of everything else. Now this claim is manifestly false for some lexical terms. Aristotle himself defines concavity, whiteness, etc. without including a substance term in the formula. However Aristotle has a more restrictive sense of 'terms' here: expressions signifying beings *in re*. For a quality etc. to be *in re* requires it to be in a substance. As I have stressed already, when that happens, the complex, the quality in a substance, is represented by the *quale*, the concrete paronym: no longer 'whiteness' but '(the) white'.[16] The substance does appear in the definition of '(the) white', sc., of 'the thing that is white'. Thus 'the white is the white of the goat' is not relational and does not convert relationally due to the implicit presence of a substance.[17]

Aristotle recognizes paronymy to hold only when the item signified by the abstract term is an accident: bravery or triangularity, but not humanity or animality. The concrete paronym, the item signified by the concrete term, is a substance: the brave is a substance happening to have bravery etc. Taken abstractly, apart from the substance, we get the bare accident abstracted away from its existing *in re*, which can serve as a subject for the sciences: the brave; the triangle.

Accordingly, the relational features of paronyms have great importance for Aristotle's metaphysics too. In the *Categories* I have claimed Aristotle to hold

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[15] I would prefer: of each thing, as Aristotle want to give real definitions of objects and not nominal ones of terms. But given the isomorphism between the two in his theory, 'term' is mostly harmless. So I shall use the Revised Oxford translation so as not to appear to be stacking the deck.

[16] Ward (2008: 118) however says that the substance appears in the definition of the abstract paronym.

[17] As noted above, the abstract paronym is relational: the whiteness is the whiteness of the whitened.

that the category of *relatum*, like that of *quale*, strictly speaking contains the abstract paronyms, like fatherhood or bravery, even though they do not "exist" except as *in* substances as their subjects. What do exist are the concrete paronyms, sc., complexes of such accidents in substances: the brave, the father. Yet, as existing, the latter are compounds, of the abstract paronym plus a substratum, ultimately an individual substance: a thing or substance having bravery. (They may also be taken abstractly in their own right, in the mode of "as if", as with subjects in the sciences.)

In the *Metaphysics*, Aristotle holds that only concrete paronyms exist *in re*, while still maintaining that the items in the accidental categories are the abstract paronyms. He asks if walking and being healthy and being seated are beings, as substances are. [1028a18–22] (Note that he is speaking of non-substantial things like quantities and qualities—not *quanta* and *qualia*—being in the categories.) Rather he says, if there is anything real about them, it is the one walking, the healthy one, the one seated that comes to be. [1028a24–5; 1049a30–4]

On this interpretation, the items in the accidental categories, the abstract paronyms, come to exist, as concrete paronyms, through getting some relationship to objects namely, as being in substances. Aristotle indicates this relational structure by speaking of their holding πρὸς ἕν.

Recall that Aristotle calls a relation a πρὸς τι. Surely he could notice easily this common 'πρός' connection and even be hinting at the relational structure of the concrete paronyms: whiteness has the relationship of 'being in' to a surface and then ultimately to a substance. (I say 'relationship' and not 'relation' because these uses of 'πρός' do not signify anything in the category of relation proper.[18])

Aristotle spends a lot of his Metaphysical time getting clear on the relationship between the abstract and the concrete paronym when he worries whether a thing is identical to its essence. The abstract paronym turns out to be the essence or form of the concrete paronym. For instance, take 'the brave'. What it is to be brave is its essence or quiddity. But also what it is to be brave is bravery, the correlated abstract paronym. If we can get clear on abstract and concrete paronyms, we can go a long way to understanding Aristotle's account of form and universal.

In Chap. 3 I have stressed the importance of Aristotle's doctrine of paronymy. The main distinction concerns concrete paronyms like the white and abstract ones like whiteness. "The white" and other, similar concrete paronyms do make reference to another in their very definitions, while the other, abstract paronym does not. E.g., 'whiteness is a color standing out in sight'; '(the) white is (something) having whiteness'. The latter refers to "something" else, namely, a substance having the whiteness, like a goat. However here the dependence is not mutual but one-way: the concrete paronym presupposes and refers to the substance, but the substance does not do so with the concrete paronym. The definition of the goat does not have whiteness or the white as a constituent. Hence Aristotle says that substances can exist without their accidents, sc., the individual ones that they have, although not *vice versa*. [1028a33–4] To be sure, substances must have some accidents or other; a

[18] Cf. Avicenna's use of *nisba*.

goat must be some color or other. Yet, primarily, above all, this necessity is not contained in the definition itself, the formula of the essence. Secondarily what necessity there is for a goat to have color concerns the universal accident or genus of color and not the species of whiteness nor the individual accident of this-here whiteness in that-there goat.

Aristotle claims also that the essence of such items like a white object has the problem that either we must take it in abstraction from the thing, the substance that is white, or we have redundancy in giving the formula of the essence. The redundancy comes about because if we define 'white' strictly, as the concrete paronym, we have 'whiteness in a substance', say, a goat. Now when we talk about the white as existing, we seem to be talking about the white thing, where 'thing' signifies substance. On this reading, 'the white' becomes 'whiteness-in-a-substance substance': "white goat goat". [*Int*. 20b39–40] Likewise Aristotle says about the snub nose that we seem to get "snub nose nose" and about the white surface that we get "white surface surface". [*Metaph*. 1030b32–4; 1029b16–20]

We can think of 'the white' abstractly, as the existing color apart from the existing subject in which it is.[19] The existing color will not be whiteness but just "the white", the concrete paronym being considered abstractly apart from its relationship to a substance. Here we treat "the white" as if it were a subject in its own right, even though in fact it is not. Aristotle uses this conception of abstraction routinely to have objects for the particular sciences: triangles, numbers and colors.

Accordingly Aristotle claims that to say that the *quale* and *quantum*[20] "are" is to use 'are' either homonymously "or to use it by making qualifications and abstractions." [1030a32–3] He then goes on to deny that they "are" homonymously but rather are said πρὸς ἕν. [1030b1–3] He says that it does not matter in which way the situation is described: sc., as being πρὸς ἕν or as being by way of qualification and abstraction. [1030b3–4]

So he leaves us also with the option that they are by way of qualification and abstraction. Aristotle goes on to explain that the *quale* and the *quantum* "are" "in the way that what is not known is said to be known". [1030a34–5] Here he is contrasting what holds simply with what holds in some respect. For him the implicit danger lies in committing the fallacy of *secundum quid ad simpliciter*. [*Soph. El.* 166b33–7; 180b2–7; cf. *An. Po*. 71a24–9] The *quantum* and the *quale* "are" in respect of being relative to a substance (πρὸς ἕν), that is, in respect of being in a substance, or, more shortly, '*qua quantum*' or '*qua quale*'. Still they "are" not, simply or without such a qualification.

The abstraction would be from the subject in which the *quale* or *quantum* is, so as to understand 'the white' as 'the whiteness-in-a-substance' and then abstract or take away its matter, the 'in a substance', just as concavity is abstracted from snubness, which Aristotle defines as "concavity in a nose". [1030b31–2]

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[19] See *Posterior Analytics* I.19; cf. *On Interpretation* 11 for the type of redundancy involved.

[20] Not "quality" and "quantity" as the Revised Oxford translation has it at 1030a31 and 1030b10–1.

Aristotle concludes that, strictly speaking, only substance is definable. Concrete paronyms are not, as to be defined they would require the addition of a substance: the white needs the addition of a thing or substance. Once the addition is made we get the redundancy. With the addition of a substance, a concrete paronym has no definition.

On the other hand, the abstract paronyms do look definable. Even Aristotle himself gives definitions of whiteness and snubness and concavity—and of eclipse, harmony, and triangle. [*An. Po*. 90a15–20] All these are not substances but accidents. Indeed these are the "beings" of the *Categories*. It's just that they do not have being, or exist, in their own right but only insofar as they are in subjects and, ultimately, in substances. Thus, strictly only existent things have (real) definitions, which contain existence claims; abstract paronyms do not, as what do come to exist are the correlative concrete paronyms. Hence whiteness does not exist; rather whiteness in a substance does—and that is signified by 'the white'.

Why then does not Aristotle admit the abstract accidental paronyms, which at times he admits have essences, to have definitions? The reason is that he requires definitions to have an existence condition. Aristotle finds it absurd that not-beings and non-substances could have definitions. [*An. Po*. 92b28–30; 93a19–20] In general, as I have argued elsewhere, Aristotle holds that all (normal) affirmations make an existence claim: 'S is P' is to be read as 'S is existent as a P'. These include definitions, statements giving the formula of the essence; Aristotle gives no indication that they have a different logical form than other declarative statements. Indeed, Aristotle distinguishes real from nominal definitions. [93b29–31] He contrasts the real definition stating what the thing is, from one stating only what the name signifies or means. [92b5–8; 92b26–8] For him, to know what the thing is requires already knowing that there is such a thing, that is, that the things exist. "To seek what it is without grasping that it is is to seek nothing." [93a26–7; cf. 93b31–3][21]

What about concrete paronyms taken abstractly, like the white or the snub taken in abstraction from their substances: do they have definitions? At times Aristotle seems to say so, albeit not strictly. He admits that a *quale*, *quantum* etc. has a definition not simply but in a respect. [1030a20–3] He ends up concluding that "the white man", "the white", and a substance like "man" each has a definition but not in the same way. [1030b12–3] He likens giving the 'what it is' or essence of a *quantum* to claiming that a not-being "is": namely, not simply but in the respect of being a not-being.

So "the white man" and "the white" do not have definitions primarily but in a respect: the white man might be defined as the unity or compound of whiteness in the substance man. But what about "the white"? Aristotle has denied it to be definable on account of the redundancy problem. Now he admits it to be definable in some respect of being a *quale*. I suggest that he admits it to be definable when taken abstractly. He has said that the sciences cut off parts of being and treat them "as if" they are separate and independent from substance. Let us take the "being" here seriously. This would mean that the sciences are dealing with existing things—as

[21] Even a nominal definition *might* be said to define an existent name…

indeed Aristotle requires. [*An. Po*. II.1–2] Now the abstract paronyms do not exist in their own right, but only insofar as they are in substances. Yet what end up existing are not the abstract paronyms but the concrete paronyms.

In his theory of scientific demonstration Aristotle tends to use such concrete paronyms, and not the abstract ones, as middle terms of syllogisms. Already in his syllogistic we see him using concrete paronyms like "the white" as middle terms of syllogisms. [E.g., *An. Pr*. 26a38][22] Yet then they will have to serve as subjects of premises, for instance, in the premise of syllogisms where conversion is valid. After all the swan is white but is not whiteness; some white (thing) is a swan, but it is false or ill-formed to assert that some whiteness is a swan.[23] Again if we look at Aristotle's examples of demonstrations, we find there also many terms not signifying substances: the triangle, the line; the equal, number; the twinkling (thing); the spherical; thunder. [*An. Po.* I.5;] Rather they signify concrete paronyms of accidents.

The definitions of such concrete paronyms will have a quasi-substantial structure. Just as with a substance like man or goat, we do not define it but what it is to be a man or goat, so too with the concrete paronyms: we do not define the white or the triangle or two, but what it is to be white or a triangle, sc., whiteness or being a triangle or duality. Still, just as a substance is identical with its essence, so too these quasi-substantial paronyms are identical with theirs—but only when taken in abstraction, as identical with their essences, the abstract paronyms.

Let us take stock. Real definitions describe what things are and so apply only to things that exist. Substances, signified by concrete terms, have real definitions. The accidents of the categories are signified by abstract terms and have real definitions only insofar as they exist in substances. As their existence depends upon the existence of substances, the abstract accidental paronyms do not exist in their own right, but only in the complex of being in a substance. So, on the one hand, we may define qualities etc. like whiteness but will not be giving a real definition in the full sense: it can be defined only in abstraction from its existing in a subject in the mode of 'as if'. If we turn to the correlated concrete paronym, the white, it cannot be defined when taken in the normal way, concretely: for then we need to be defining the white substance, and then we get the redundancy problem. We can treat concrete paronyms abstractly, as if they were subjects in their own right, and then define these too. In this way we have the objects of the sciences. Nevertheless, strictly speaking, only substances have definitions, as only they satisfy both requirements: that they exist and that their definitions can be stated without redundancy.

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[22] At *Posterior Analytics* 90a13 *et passim* Aristotle uses abstract terms as examples of middle terms: 'equality', 'inequality', and perhaps 'eclipse'. Yet when he actually constructs syllogisms he uses the correlative concrete paronymous terms. The text is compressed, but my account does explain the gist: when discussing definitions Aristotle uses the abstract forms; when focusing on the demonstrations, the concrete forms.

[23] To be sure, Aristotle has his doctrine of unnatural predication in *Posterior Analytics* I.22. Once again the solution lies in his treating the concrete paronyms as quasi-substances, just as he does with *relata* in his theory of relations.

11.3 The Existence of *Abstracta*

> For when a man is healthy, then health also exists. [*Metaph.* 1070a22–3]

Aristotle offers a theory of a world of individual things having aspects, both individual and universal. Acts of abstraction isolate those aspects and treat them as if they were separate. Abstractions, like perceptions and pieces of knowledge, are products of this natural mental activity. Such things, like universals, describe facets of what is real without themselves being independently real. Moving to the level of universals makes a semantic ascent and makes science possible.

Even the rationality of an individual thing and its species (εἶδος) are such aspects, treated as if they exist independently. Accordingly Aristotle ends up being a sort of nominalist in his study of being *qua* being—yet a peculiar sort of nominalist. For the mental states themselves reflect the real structure of the aspects. The states of mind are not merely mental but point to, or intend, things that are not mental. So too for other states of mind like perceptions and pieces of knowledge. Abstraction as a *relatum*, has a dual aspect, just as is the case with perception and knowledge. On the one hand, all these are items in the soul or mind. On the other hand, they signify or point to objects that are not in the mind. My visual image of this dog is an experience or state (ἕξις) of my mind or "soul" yet is about an object that is not in the soul. My knowledge of the species dog is in the soul but is about something that is grounded upon objects that are not in the soul. The things said from abstraction, the reputable ones dealt with in the sciences, are in the soul but are about things that are grounded in things that are not in the soul.

Aristotle has said that except for substances everything else does not exist in its own right but only as *in* or *of* substances. We do not have to suppose that there exists the sitting of Socrates in addition to Socrates. [*Metaph.* 1004b1–3] They are one in a sense even though they can be distinguished. [*Metaph*. VII.4–5] Likewise, Aristotle says that secondary substances would not exist if the primary, individual substances did not exist. [*Cat.* 2a34–b7] We can distinguish these accidents from their substances too, have special sciences about them, and yet not have to postulate a plurality of entities existing *in re*: Socrates, the sitting of Socrates; the health of Socrates, the concave nose of Socrates, the concavity of his nose, the snubness of his nose, the snub, snubness, the concave, concavity … as separate objects. Likewise, we do not have to recognize the primary, fully actual and independent existence *in re* of each one of: Socrates, the species man, the genus animal. Yet we may treat them as if they were separate objects. When we do that, we are taking the predicative accidents as being able to serve as (2bi) distinctive subjects having their own attributes.

> …it is also true to say, without qualification, that the objects of mathematics exist…the science has the healthy as its subject if it treats things qua healthy…So too it is with geometry… [1077b32–1078a2]

So we can say that, like *relata* in general, *abstracta* ("abstractions") signify mental states *or* things existent *in re*. But understand the 'or' inclusively. Items like

'concavity' signify items in the categories as well as being a mental state or event (generally a universal one that can be in many minds as an object of science). Aristotle is a naturalist in that mental events and activities are also things existing *in re* ((Ps.) Simplicius, *in De An.* 182, 8–9). After all, perception and knowledge belong to the category of quality. He does not have a phenomenalist distinction of the real things existing *in re* versus their mental representations existing only *in intellectu*. Qualities and relations are real things, and knowledge and perception are qualities and relations. In medieval terms, Aristotle is a realist.

One obvious fact about Aristotle's placing perception, knowledge, and presumably abstraction, in the category of relation may escape modern notice. In doing so Aristotle has taken an extremely realistic stand about them. He has lumped them together in the same category as wings, rudders, and mothers. In contrast, in the modern, post-Cartesian period, we tend to separate the physical things from the mental experiences, taken now as mere phenomena or impressions of the real. Thus far Rorty has reason to hold that Aristotle *et al.* naively ignore, or pay little attention to, epistemological problems by assuming that our experience reflects reality. Yet we can describe the case of Aristotle in another way. Like a cognitive scientist today, Aristotle could be considering mental activity as just one more type of natural phenomena to be investigated. The phenomena of perception and knowledge are at least as worthy of study as the parts of animals like wings. On this approach, epistemology is "naturalized" in a fundamental way. The objects of knowledge, perception, and abstraction come to be included among "the things that are".[24]

So then what is being attended to in an act of abstraction is something mental, although that mental object may be pointing to and be based upon objects really existing apart from the mind.

On the one hand, the selective attention of abstraction is a mental process whereby someone fixes her attention, or, better, has her attention fixed (the middle voice), on certain aspects of the situation. Here the middle voice in Greek (which often appears in talk of perceiving, knowing and abstracting) serves a real function, sc., to indicate that selective attention is a state of attending selectively, and not necessarily of someone attending selectively, i.e., the work of a thinking thing or an agent intellect. It is worth noting that Aristotle does not introduce the idea of an agent, the perceiver, thinker, abstracter, into his account of correlatives. [7b30–8a6][25] He insists only that perception or knowledge comes into existence simultaneously with its object *qua* perceived or *qua* known. Of course, there is an animal doing (middle voice!) the perceiving or knowing. Yet the perceiving or knowing is accidental to the animal. Note too that items like perceivers are paronyms of

[24] Broadie 1993: 139: "But on this view there is no "external world," since the world is the totality of physical things and therefore includes the perceiving anural."

[25] At 88a6–7 Aristotle says that perception comes to be at the same time as what is able to perceive. He explains that perception and an animal comes to be at the same time. All this is compatible with having a perceiving, knowing, abstracting subject, but seems phrased in such a way so as to avoid the necessity of having a conscious agent.

relations like perception. (Moreover, given that an individual substance like Xanthippe perceives *qua* perceiver, Xanthippe would perceive *per accidens*.)

On the other hand, the person or animal attending to those aspects finds them in her experience of the world. If that experience be veridical, then the aspects being attended to have some sort of real status, be it in themselves or be it in signifying the real structures that cause them to cone to be in human experience.

In all these cases—perception, knowledge, abstraction, selective attention—we may well wonder why shouldn't the relation have more than the two *relata* given by Aristotle. Why not instead have three: say, the individual substance engaged in the mental activity, the object that is being worked on, and the product or result of that activity? E.g., take perception as a relation consisting in the activity of perceiving between the individual substance who is the perceiver, the object being perceived, and the perception resulting from the activity of perceiving.

In effect Aristotle recognizes all these components, but takes some of them to have not a relation (in the strict, categorial sense) but only an accidental connection with the perceiving etc. proper. Thus the individual substance is a perceiver only accidentally, if she has now the accident of perceiving. Aristotle says that the individual substance is a knower [of a particular piece of knowledge] *per accidens*. Other such relations, like knowledge or abstraction, have the same feature. The knower is not mentioned in an essential (*per se*) account of the relation, even though for there to be knowledge there must be a knower and an individual substance, as knowledge is in the soul of an individual animate substance. The knower, in turn one of the things an individual substance may happen to be, may be thinking about or using this knowledge now but need not be.[26]

Still, the knower is mentioned when the relation is the concrete one, like "a knower" or "an abstracter". (These cases, as with positions like sitting, seem to be paronyms from the paronyms of the relation: i.e., the knower is derived from the state of knowledge, which in turn is derived from the relation of knowledge.[27]) For the knower is a knower of something. Likewise there seem to be concrete cases of 'abstract'. An abstracter, a person doing abstracting, say, a mathematician, abstracts something abstract, say, concavity from something less abstract, say, snubness. For Aristotle says that a geometer deals with a human being *qua* solid and that some sciences consider mobile objects only *qua* body. [*Metaph.* 1078a25–6; 1077b28] Theaetetus or "a mathematician" abstracts numbers. Perhaps there is a three-place relation: s abstracts P from Q. Or we might make the relation even four-place: s *qua* M abstracts P from Q. E.g., an abstracter—Theaetetus *qua* mathematician—abstracts numbers from groups of apples and concavity from the snubness of noses. However, as in the other cases, Aristotle tends to resolve such claims into statements using only binary relations: Theaetetus has the accident of being a mathematician.

[26] So, for Aristotle, although I am essentially a rational thing, I am not a thinking thing, at least in the sense of second actuality, of actually thinking now. In contrast, for Descartes, I am a thinking thing in the sense of second actuality. At least in *Meditation* 2 I exist only so long as I am actually thinking.

[27] See *Categories* 6b11–4, discussed above.

The mathematician abstracts certain abstractions. These abstractions are abstractions of the shapes of physical objects.

We might suspect Aristotle of being shortsighted, as not being willing to recognize more than two-place relations.[28] Yet perhaps his position needs no corrective surgery. In modern logic, there is no need to posit more than a two-place connective in order to account for all n-place connectives. For instance, a superlative like 'largest' can be reduced to the binary relation 'as large as'; 'between' can be reduced to 'to the right [or: left] of'.

> …the work of our thought is separating the common attribute subsisting in the many. [Simplicius, *in Phys*. 490, 34–495, 1]

11.4 The Greatest Difficulty

> Perhaps, as difficulties are of two kinds, the cause of the present difficulty is not in the facts but in us. For as the eyes of bats are to the blaze of day, so is the reason in our soul to the things which are by nature most evident of all. [*Metaph.* 993b9–11]

Aristotle has definitions primarily only of the universal: he defines human being and animal, not Socrates and Xanthippe. Proper definitions give universal formulae. He states that individuals have no definitions. [1036a5] At best Xanthippe has a definition *qua* human. Nevertheless, for Aristotle, somehow, while science is seeking universals, it deals with the individuals in this world. He has not a transcendent but an immanent science. Aristotle insists that an individual thing is identical to its essence, even though the formula of the essence is a definition consisting of universal terms. In defining the universal we get somehow at the nature of the individual. How we get there and what we get when we do—this is the "greatest difficulty" of his *Metaphysics*. [1029a34][29]

In brief, Aristotle has two maxims, that existing things are primarily individual substances and that science is of the universal (Witt 1989: 147). He denies that universal genera exist alongside these individuals. [999a32] Yet he still wants to have a science of real things. Thus Aristotle avoids singular terms in his syllogisms and demonstrations. However in his metaphysics he has identified individual substances with their essences. He denies universality of them both. So he faces his "greatest difficulty": how can the universals of science be connected to the individuals of experience? [999a24–5][30]

> If, on the one hand, there is nothing apart from individual things, and the individuals are infinite in number, how is it possible to get knowledge of the infinite individuals? For all

[28] Perhaps he recognizes three-place relations at *Topics* 125a25–32.

[29] Halper (2009: 238) locates a source in Plato at *Parmenides* 133b–134e.

[30] He has another one, about one and being at 10014–5, but I put it aside—judging by 996a4–6 that might be the hardest for Plato.

> things that we know, we know in so far as they have some unity and identity, and in so far as some attribute belongs to them universally. [*Metaph*. 999a26–9; cf. 1000a4–8]

The syllogistic and science have a universal vocabulary. Science is of the universal. Still it needs to apply to real things, the individual substances. [1060b19–23] Aristotle keeps on insisting that only individuals exist: the universals themselves are from the singulars. [*An. Po*. 85a31; *Eth. Nic*. 1143b4–5]

How then does universal knowledge come from particulars and then give their real structure?

> If there is nothing apart from the individuals (μὴ ἔστι τι παρὰ τὰ καθ' ἕκαστα), there will be no objects of thought, but all things will be objects of sense, and there will not be knowledge of anything, unless we say that perception is knowledge. [*Metaph*. 999b1–4; cf. 1087a10–21]

Aristotle thus has big problems with universals: above all the problem concerns in what ways universal substances and universal constituents of individual substances (sc., the *differentiae*) are real.[31] He poses a dilemma: if they are real, then universals exist in the style of Plato's Forms; if they are not real, science does not offer truth. Aristotle seeks a middle path.

I have proposed a solution of semantic ascent: in short, animals having *noûs* can acquire universal concepts via induction. By abstraction we extract universal features of the singulars. Ontology becomes a science of talking about these universal features. The essence of an individual substance, itself an abstraction, has those features primarily and immediately. Still the essence, identical to that substance, does not thereby become universal: it is the singularity, the causal factor of the structure of that substance. What actually exists is individual, while the universal lies therein to be abstracted (Witt 1989: 165).[32]

As discussed in Chaps. 5, 6 and 7, Aristotle present some of the details of this process in his psychology. Animals apprehend individual features of things via sense perception. These apprehensions themselves abstract certain features from the totality and its matter. The images thus generated themselves may have strong similarities, particularly on account of their lack of detail. Animals having imagination can recall a generalized likeness, as with the image of a scarecrow. Those animals having *noûs* are able to abstract common features from such images gained by experience and then via induction. They can apprehend the universal features really constituting the individual substances and then abstract them. The process continues recursively until it ends up with the simple concepts of the most exact, mathematical sciences, "the things said by abstraction".

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[31] Ross (1953: 466), Albritton (1957: 708), Code (1984: 6–7), and Yu (2003: 153–4) take 1087a10–8, that actual knowledge is of the particular, to be inconsistent with Aristotle's usual doctrine or at least confused.

[32] Scaltsas 1994: 168: "What is definable is the substantial form in abstraction, namely the substantial form in its potential state rather than the form in actuality; what is particular is the substantial form in actuality that has incorporated the non- substantial properties, thereby giving rise to a whole that defies definition."

Certain brute facts make this process possible. It just so happens that certain animals, healthy human ones, can not only have generalized images but also perform certain abstractions upon them. It also just happens that there are enough similarities in the perceptions apprehended to construct a hierarchy of such universal concepts. [Alexander, *in Metaph.* 790, 11–2] Once that hierarchy is (re!-) constructed and apprehended, propositions abstracting and detailing certain relations between its components can be formulated. In this way, science of the universal becomes possible from the perception of individuals.

For Aristotle then science becomes possible because the universal features are given, in an inchoate way, in perceptions of the scattered, indefinitely many individuals. [(ps.) Alexander, *in Metaph*. 687, 10–1; 793, 2–12] Aristotle ends up adopting Plato's slogans but not his justifications for them: all knowledge does indeed come from pre-existing knowledge of universals—but not of the Forms apprehended before birth but of the universal theories already put forward by human beings, theories themselves based upon sense perception. All knowledge is of the universal, but of the general features of individual substances and not of transcendent Ideas existing apart from the objects of our sense perceptions.

So Aristotle solves this greatest difficulty by appealing to abstraction. He holds that "we know [individuals] in so far as they have some unity and identity, and in so far as some attribute belongs to them universally." [999a28–9] Note the '*qua*' language, typical of abstraction. We notice the common, universal constituents of individuals and abstract them. We then treat them as if they were separate. They are not really.

If universal constituents of primary substances really exist, don't universals then exist *in re*? Aristotle denies this taken absolutely. [999a31–2] Rather, for them to exist, they must be "said of" primary substances: they are real features *of* them. Once that happens, they form a complex with those subjects. We end up with this-here thing having a human nature, having whiteness etc. So we may know this-here individual *qua* human, *qua* white… When we know its necessary attributes, like the ones it has *qua* human, we know it essentially, "in virtue of itself". Universals exist only "in some mode": insofar as they are said of individual substances. In one sense universals are real; in another sense, without qualification (*simpliciter*) they are not. This amounts to the traditional doctrine of *universalia in rebus*.

Aristotle takes universals to be the objects of his sciences. Some of them are secondary substances, the species and genera, particularly in the biological sciences. The rest are accidents, concrete paronyms taken in abstraction as subjects existing in their own right in the mode of 'as if'. All these abstractions have a robustly real basis. Once this abstraction is performed, such universals have definitions. Defections consist in statements giving necessary features of individual substances.

Aristotle would like the ultimate principles and causes of science to be based upon singular substances existing *in re*. He finds some of them in his gods. These individual celestial substances are the causes of all things, in the sense that, if they did not exist so as to provide movement to the cosmos, nothing else would exist. Still these gods need not be causes in themselves or *qua* substances, but only *qua* causes, in the causal relation with their effects.

However, most of the causes and principles of individual terrestrial substances do not come from these gods but from other terrestrial ones. Those, Aristotle insists,

are again themselves individual. They have common features only in their accounts (*logoi*). Thus for the form of Socrates and the form of Xanthippe: they both are human. Aristotle wants to have a science of these causes and principles too, and his science is of the universal. Can he have such a science of these individual principles without contradicting himself or relapsing into a Platonism? We have already seen from the relational character of these principles, like matter and form, that they are abstractions from individuals. Given that they do in fact share these common features, science is possible once they are abstracted.

The definitions of science give statements of the essence: it provides attributes belonging necessarily to the thing being defined. As these are said of the essence, they are universal. The subjects having these universal attributes primarily are the species and genera. They too are abstractions, taken as if they are real in their own right.

How do real definitions exist *in re*? Here Aristotle may be thinking of his hierarchy of universals, as discussed in Chap. 7, from which the definitions may be read off. Real definitions then amount to higher-order abstractions: the universals in the hierarchy are themselves abstracted in succession from perceptions of individuals; their relations construct the hierarchy; these definitions are abstractions from the relations contained in this hierarchy. Such universals have a real basis and can serve as independent subjects for science. Still they are not independent substances. What actually exists is individual, although the universal is there potentially: it can be abstracted.

The ontological status of the principles like the principle of non-contradiction looks more difficult to explain or establish. Yet it might have the same account. Aristotle calls *noûs* the most certain mental ability and that principle the most certain axiom. [*An. Po*. 100b8–12; *Metaph*. IV.3] We start from things most evident to us and least evident in themselves. Induction drags us lovers of sights and sounds up to this divine perspective, the apprehension of the first principles of theoretical science by *noûs*. We can note in our experience as well as in the hierarchy of demonstration and definition in science that the principle of non-contradiction is being followed. *Noûs* enables us to have this insight; dialectic enables us to justify it (Ross 1949: 49).

> …being an element or principle cannot be the substance of things, but we seek what the principle is, so that we may refer the thing to something more intelligible. [*Metaph*. 1040b20–1]

11.5 The Identity of Substances and Their Essences

> Each thing then and its essence are one and the same in no accidental way. [*Metaph*. 1031b19–20; cf. 1032a4–5]
>
> By form I mean the essence of each thing and its primary substance. [1032b1–2; cf. 1035b32]
>
> I call the essence substance without the matter. [1032b14]

To review, Aristotle says that each primary substance and its essence are one and the same. The essence is the form of the substance, abstracted from its matter. He denies that any substance, primarily and really, is a universal.

Offhand, claiming that a substance is identical to its essence looks silly. Socrates is such a substance. It does not follow that Socrates is an essence. Rather Socrates is a compound of matter and the form. However Aristotle says only that the individual substance and its essence are "one and the same"—not identity in the modern sense.[33] Given the choices in his lexicon, likely he means: one in number, the strongest sense. For the substance and form (essence) share the same matter—as well as the same definition and category. So they are also one in species and in genus. [1018a4–5; 1016b31–6; *Top*. I.7] The substance and its form are also the same in number, on the same grounds. [1018a4–7][34] That is, the substance and its form exist only as a single thing: they are identical in their extension—not identical in the sense that the name of one can always be substituted for the name of the other *salva veritate*—especially in theoretical contexts. For they can differ in account: in intension, we might say, as Aristotle implies.

We can construe Aristotle thus when he says:

> …soul and to be soul are the same; man and to be man are not—unless the soul is to be called man. So in one respect a thing is the same as its essence and in another not. [1043b2–4]

Soul and being soul are the same because the soul is the form or essence, more or less as whiteness (or the white, taken abstractly) is the same as being white.[35] Man, the compound of that form and matter, is not the same in account as soul. Yet man and soul are the same with respect to what exists: the individual human substance. Man the individual substance is not the same as the essence of a man: they are the same thing but differ in their accounts and in theory. Here are the two respects mentioned; Aristotle had just noted that sometimes it is unclear whether a name signifies just the form or the compound of matter and form. [1043a29–31]

Aristotle says also that the *differentia* seems to end up being the essence of an individual substance, as concavity is the form of the snub. [1037a30] So too, the definition of a human being is rational animal. 'Rational' signifies the *differentia*, the component of the essence most distinctive and primary to human beings. Nevertheless he claims that a *differentia* is not substance but when with matter is like a substance. [1043a4–7] Rather, a *differentia* is not in the category of substance but in another one, often that of quality. [Alexander, *in Top*. 421, 14–4; *Cat*. 3a21] There it is the abstract paronym: rationality; mobility; life. When it is taken with matter, so as to become: a thing having rationality etc., then there is the concrete paronym, the rational, which is a complex with a substance or with a quasi-substance. Thus the *differentia*, the concrete paronym appears in its definition, the

[33] Bäck (forthcoming) discusses this issue.

[34] "Sameness is a unity of the being either of more than one thing or of one thing when it is treated as more than one, i.e., when we say a thing is the same as itself, for we treat it as two." [1018a7–9] That is, a single thing is one; to say that it is the same shows that we have made some distinction in account about a single thing.

[35] Aristotle does not seem to envision third-order properties like 'being whiteness'. He seems motivated to avoid an infinite regress of essences.

formula of the essence. Still it is not the essence; if it were, then the essence of a human being would be rationality, the abstract paronym.

Aristotle says also that *differentiae* are principles of the being of things. [1042b32–3] This suggests that abstract paronyms can function as principles: they are simpler than their concrete correlates. Still they do not exist *in re* as substances or as anything else: they are abstractions from what does so exist. Below I suggest how to understand Aristotle's conception of a principle along these lines.

Even universal or secondary substances are said of the primary substances. So they exist, yet in a secondary way: not in their own right but as being said of primary substances.[36] After all Aristotle has said that if the individual substances did not exist neither would anything else. [*Cat*. 2b5–6] To take these universals as subjects in the own right requires a semantic ascent, once again:

> But man and horse and terms which are thus applied to individuals, but universally, are not substance but something composed of this particular formula and this particular matter treated as universal… [1035b27–30]

Aristotle's language perhaps confuses too: he tends not to use abstract nouns. Rather he uses infinite phrases like 'being white' or perhaps at times relies on the predicative position of the concrete term to signify the abstract paronym or the essence. For instance, 'that a surface is white means that a surface stands out in sight'. Complicating matters even more, the same word, '*eidos*', is translated, and perhaps should be understood, variously: as 'form' and as 'species' (Rapp 1996: 183; Woods 1967: 237). Aristotle says that the essence is the form and is not universal. However the species is a universal, secondary substance said of individual ones. In his lexicon he allows using 'essential' to apply both to the individual and to the universal. [*Metaph*. 1022a25–9] Still, when he uses the "just what it is" (ὅπερ) construction, he typically is indicating the essence (Bäck 2000: 54–7). [1030a3]

Thus, in his ontology, Aristotle is describing here various modes or aspects of how something exists. Primarily, an individual substance exists; its form is what makes it be what it is[37]; the essence says what it is for it to exist or how or in what mode it exists, and the definition says what this substance is. The essence is the core structure of the existence of an individual substance, while its definition makes a statement about what it is necessarily. On the one hand, because it is such a statement, the definition gives a universal formula. Only the universal features of the essence can be stated—"said of". On the other hand, because the essence constitutes the mode of an individual's existence as such, it has to contain both singular and universal features. Such an essence at its full strength is one and the same as its individual substance. They both exist, but only as a single individual thing. Such an essence is not completely universal. Still as it has its universal

[36] Thus Kohl (2008: 160) says that individual substances have priority because they alone are the "ultimate subjects of predication".

[37] Yu (2003: 84) complains, "Strangely, this unexplained identity of form and essence, although crucial, has received little attention." Aristotle does not explain much either. Given that the form is such a cause, it is understandable why Aristotle identifies the form with the essence, what it is to be that substance. As discussed in Chap. 9, Aristotle identifies the essence with such a cause.

aspects too, by necessity it is perhaps misleading to say that it is an individual essence. So I have claimed.[38]

The propositions of science arise from such definitions and the properties following from it. Science becomes possible because of the universality of these necessary features of individual substances and their attributes, which can serve, abstractly, as subjects in their own right. Because they are universal, these features can be talked about. Moreover they can be, and are in fact, shared with other individuals. Still, when talking on the scientific level, the singular features of the individual substances have been abstracted away in the semantic ascent.[39]

A basic, brute fact makes universal knowledge of individual substances possible: their essences, functioning as their causes, tend to exist as members of the same kind as they are. They have universal features. In later terms, these causes are formal and not eminent—except for accidental ones as in spontaneous generation. [*Metaph*. VII.9] This occurs both for natural and artificial generation: man begets man; the health in the mind of the doctor causes the health in the body of the patient. [1032a24–5; 1034a22; *Part. An*. 640a24–33] Somehow the actual form in the individual substance serving as the cause gets reproduced so as to be able to act upon other materials having the right potential and produce another individual substance of the same type. Aristotle presents the details sketchily and obscurely, without having the benefit of the theory of meiosis: the soul is present in certain respects in the seed or embryo. [*Gen. An*. 736a31–b15] From our present knowledge of reproduction, sexual and otherwise, we can sympathize.

Clearly, the individuality in all its details does not get reproduced: Socrates does not beget Socrates.[40] Aristotle notes that even some necessary universal features do not either: a man may beget a woman; a horse[41] may beget a mule. [*Metaph*. 1033b32–4] Still some features of the agent substance do get reproduced: some accidental, often material features like having red hair; others necessary, often formal features like occupying space, being an animal, and being rational. They get reproduced together as a whole constituting a seminal substance: an actual one with its appropriate material, but one having many of its potentialities undeveloped. An acorn lacks many of the attributes of the oak tree.

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[38] Wedin (2000: 363–5, 426–7) has perhaps a similar view as he favors the view of "weak proscription", where, if something is predicated universally of a subject, it is not the substance of that subject, but still can be a substance.

[39] This has been claimed by many regarding some passages, for instance, that the universals attacked in VII.13 are genera, and that species have been elevated to the role of substance. E.g., Ross 1953: cxv; Woods 1967: 237–8, 1974: 168. However I differ in not finding Aristotle to be inconsistent and have a different account of this chapter.

[40] Hence to some extent I agree with Gallagher (2011: 375–7) and Loux (1991: 129, n.28) that the form in VII.8 is universal (since *toionde*). Many see a conflict between the form as individual in VII.3 and as universal in VII.7–9: e.g., Furth 1988: 24; Ferejohn 1991: 291, n.2. Owen (1978: 16) finds the conflict within VII.7–9. Aaron (1967: 7–9) and Witt (1989: 165) proceed thus too. So too Putnam (1995: 64): "…mind and language could not hook on to the world if that which is to be hooked on to did not have intrinsic or "built-in" form."

[41] More commonly: a donkey is the male parent.

What gets reproduced is a structured whole of universal attributes of the same type as those the cause has. This whole, a "such", exists in the appropriate material, which itself is a substance in its own right, at another level of complexity (just as is the case with the parts of animals). [1033b19–23] At this level, when Aristotle talks of the form, he is typically talking of something universal. After all, what can get reproduced? Nothing intrinsically individual. Here arises a semantic ascent to the universal, a natural one.

Aristotle takes some care to insist upon the essence of the individual substance not thereby being universal. He says that here the form is universal "in some mode" ("τρόπον τινὰ"). [1032b11–2] This means that the form is not universal *simpliciter*, without qualification. He repeats that one individual is produced by another sharing the same name (*homonym*!) "in some mode". [1034a19–24] It is quite significant that he calls the individuals "homonyms": this means that Socrates and his child share the name but not the definition or account. [*Cat*. 1a2][42] Well, they both belong to the human species and have the name, 'human being', in common. They also have the definition, 'rational animal', said of them. So what is missing? They do not have the same form or essence, strictly speaking. They would if the form or essence were universal and captured completely in the definition. But it is not. They are homonyms in some mode because they do share the necessary features although they do not have the form or essence in common. The account here is not of the universal features. Here, with the essence of the individual substance, there is no semantic ascent.

Thus, although essences of individual substances have necessary universal features, they are not universal.[43] Still they can serve to ground the propositions of a science whose subjects are universal. Abstraction produces an ascent to the universal.

In a way, on Aristotle's theory the form of an individual substance is, as Locke (*Essay* 1.4.8; 2.23.2.) charged, an "I know not what". That is, I cannot know what it is without describing it in universal terms. But then I have moved away from the individual substance to the universal in a semantic ascent. Nevertheless I can know what it does: causes the unity and persistence of the individual substance. I can know its essential, necessary universal features. I can know that this knowledge comes from my perception of the individual. Beyond that there is nothing more for me to know, but only to perceive. (Locke fares no better himself with his "secret springs of nature", the primary qualities hidden from us.)

The individual substance alone persists through change. Aristotle says so in the *Categories*. He gives no indication that he changes his mind.[44] In his Metaphysical

[42] There Aristotle says 'account' (λόγος) and not 'definition' (ὁρισμός) because homonymy applies to individuals as well as to universals. But individuals themselves do not have definitions strictly. So Simplicius, *in Cat*. 29, 19–20; Chase 2003: n. 253.

[43] So I do not go so far as Witt (1989: 104–8, 122–36) and deny the essence to have necessary properties. I allow for this so as to allow for Aristotle's science. Still I do agree with her that the essence is not thereby a universal but is the cause of the unity of an individual substance.

[44] Although many are inclined to say that he does: Frede (1987a: 74) observes that it is not automatic that the compound of matter and form in *Metaphysics* 7 is the same as the primary substance in the *Categories*. See too Bostock 1994: 75; Lewis 1991*:* 101; Furth 1988: 232. Lewis (2011: 366) speaks of a "shift from the secondary substances of the *Categories* to the ontology of universal compounds" [in the *Metaphysics*].

inquiries he just is asking the further question: what is that in virtue of which an individual substance persists through change?[45] Here he needs to focus on certain abstract features of the individual substance and ignore the ones that it has but do not persist.[46] Still certainly it needs all of its features, including its ephemeral accidental ones to be an individual substance.[47] Not all the common, persisting features of an individual substance like Socrates have relevance here. Socrates is Greek and terrestrial always. He had these features as long as he lived. Yet, somehow, we know that these common features are mere accidents and are irrelevant to his persistence. Likewise, Aristotle says that we know that flesh and bones are not part of the form of Socrates, even though all human beings have been made of flesh and bones. [1036b3–5] "It is difficult to abstract this in thought," he says. [1036b2–3] But we do.

Noûs enables us to make such abstractions—with difficulty. Given Aristotle's assessments of the products of *noûs* by his predecessors, even his *noûs* can err when it abstracts. Via dialectical discussion Aristotle seeks to isolate the features relevant to the persistence of individual substances: what is it that makes individual substances what they are. He concludes that primarily substance is the form and secondarily the complex of matter and form, the individual substance *per se*. [1039b20–3] We can dispute about whether he has isolated the right features, just as he disputed with his predecessors. Regardless of the final outcome, all the possible candidates are abstractions from the primary substance, the individual substance *in toto*. Like other abstractions, none of those abstract features can exist on their own. So, even if Aristotle identifies what it is to be a substance with its form, he has not relapsed into a Platonism. A form (μορθή) is separate in account (λόγος) only. [1042a28–9] To be sure, abstractly speaking, what persists is the essence, or form or nature, of the individual substance. But essences do not exist on their own.[48] At each point in time when they do exist, they exist as the essences of substances with a full array of accidents.

Hence Aristotle's analogy to the letters in *Metaphysics* VII.17 hits the mark. The *ousia* of a compound substance consists of its elements arranged in a certain way, with the form having primacy as it serves as the cause for the mode of their composition. [*Top.* 150b22–6] All that exist are the actual words, although they have certain essential structures of ordering and shape as well as accidental features, like being written on this page. We may isolate these features and have

[45] This is the "intractable problem" of Charlton 1994: 46.

[46] Bowin 2008: 75: "In general, an Aristotelian analysis of change will involve a contrast between different levels of abstraction, where on a certain level of abstraction, an object will persist, while at a comparatively lower level, it will not." [punctuation sic]

[47] Frede (1985: 17–26: 1987b: 63ff.) advocates individual forms and unique histories of the individual. Witt 1989: 144–5: "Forms or essences are individuals and substances." Witt (143, n.1) lists others holding to individual essences. Gallagher (2011: 371; 379–82) cites and discusses texts where Aristotle uses εἶδος only for individual human beings and γένος for the human species.

[48] Bowin 2008: 76. "…the persisting object can be treated as an abstract object…"—it *can* be, but only in the mode of 'as if'.

sciences about them. Still they remain features abstracted from the individual, this word written here.

I have claimed that the essence or form of an individual substance is not a universal. Nevertheless it need not follow that it is an individual. It does have universal predicates: the core ones given in its definition and the *propria* following demonstratively from them. Yet, since an individual substance is the same in number as its essence, the essence itself is not universal. Rather it can serve as a subject for the universal predicates.

To be sure, the individual substance itself is an individual. Although it is the same in number as its essence—only one thing really exists—still it differs from its essence in account. The essence is relational: the correlative matter has been abstracted away. Taken in this sense the essence serves as an abstract subject. Aristotle's point about rationality apart from its matter can be generalized: Once the matter has been abstracted away—and the relations to the matter and the context—the essence has been made universal as only its universal constituents remain. Once talk is about the essence, such an abstraction has been performed and so is already presupposed. There it is taken as if it were a subject in its own right. However, *in re*, the essence of an individual substance cannot be separated from its matter. So really it is just the individual substance.

Still we can make statements about essences.[49] Given the brute facts, that individual things share their causes and constituents of common types, these statements predicate universals of these subjects: man begets man; species reproduce their own kinds. One way of stating this brute fact of the commonality of the form is to say that two individuals, like Socrates and Callias, share the same form, but have different matter, so as to be different instances. Aristotle might be saying this when he says:

> Callias and Socrates differ in matter but are the same in form. For their form is indivisible. [1034a5–8]

This need not mean that the form of Callias is identical to the form of Socrates absolutely, but just that they share common features. 'Sameness in form' can mean 'sameness in species'—as indeed the phrasing (ταὐτὸ δὲ τῷ εἴδει) itself might suggest. Alternatively, this passage is discussing Plato's theory of Forms, according to which there is the same individual Form in Callias and in Socrates.[50] I find it hard to tell from the context. In either case, this passage does not establish clearly that Aristotle takes the substantial form to be a universal.

Again at 1030a11–3 Aristotle says that only a species of a genus will have an essence. He wants here to exclude accidents from having essences in the primary sense. As he is focussing on in what way definitions can be given for essences, he has already made the semantic ascent to what can be said about substances and

[49] Hence we need not accept the argument of Cohen 2009: "Since only universals are definable, substantial forms are universals." (Cohen offers here a good survey of the secondary literature on the nature of Aristotle's essences.)

[50] Frede and Patzig (1988: 147) hold that 1034a5–8 is a Platonist passage and a mistake.

hence to the universal. He concludes, "Therefore there is an essence only of those things whose formula is a definition." [1030a6–7] That is, a criterion for which things have essences is whether or not they have a definition stated in universal terms, of necessary, core features of the substance. All this does not require essence or form to be universal. He does admit at 1039a14–23 that he has a problem, because then it seems that no substance can be definable given than no substance can consist of universals, since a universal is a such and a substance a this. He promises to make it clear later.

I come closer to viewing essences as individual than as universal. Yet I advocate a safer alternative, indeed a traditional one. Essences in themselves are neither individual nor universal.[51] *In re*, coupled with matter, they are individual and are the same in number as the corresponding substances. *In intellectu*, in scientific theory, they serve as subjects having universal attributes necessarily and commensurately. In themselves it is safer and more precise to speak as many medieval Aristotelians did and say that they are neither one nor many.

11.6 The Triplex Status

> Besides this, will the substance of all the individuals, e.g., of all the men, be one? This is paradoxical, for all things whose substance is on this view one would be one. But are they many and different? This also is unreasonable. [*Metaph*. 999b20–3]

Aristotle begins his quest concerning what it is to be an individual substance in *Metaphysics* VII. Many modern commentators have found the text incoherent, inconclusive, or, at any rate, baffling. Yet, oddly, in contrast, the ancient and medieval commentators expressed relatively few overt qualms about the coherence of the text or even its consistency with earlier texts like the *Categories*.[52] Rather they managed to glean from its hints sophisticated doctrines like the *triplex status naturae* (threefold distinction of essence). Perhaps they had a different perspective: not merely a sometimes slavish devotion to the Philosopher coupled with a linguistic deficiency but also a practical interest in working out the details of Aristotle's thought and using the system in their own work. This use, as opposed to the modern mention, of Aristotle's doctrines, may yield different results and insights. (I find it ironic historically that recently scholars are reinventing if not rediscovering medieval doctrine despite commonly repudiating or ignoring it.)

[51] Somewhat like Reeve 2000: 130–2, where he takes a form or essence as an "suniversal" i.e., a particular form of man; neither universal nor particular ('Socrates' universal'). Code (1984) has forms or essences and common and shared but not universal. Wedin (2000: 401, 356–9) speaks of the "irrelevance of the particular forms controversy," that it does not matter much whether the form is particular or general. Witt (1989: 174, n.1) objects, but seems to end up (174–5) with about the same position: there are definitions of individual substances but they are common or shared.

[52] The latter has some exceptions, such as Avicenna in *Al-Maqūlāt*.

The traditional Aristotelian doctrine of the essence of an individual substance is that, (1) in itself, taken as a whole *in se*, it is neither individual nor universal. (2) When it exists *in re*, it is an individual. (3) When it exists in the mind, as a perception abstracted from its matter, it is a universal. This, in short, without its subtleties, is the *triplex status naturae*.[53]

In any case, I have taken inspiration from the earlier perspectives and have used the famous *dictum*, "the quiddity in itself is neither one nor many", to explain Aristotle's views on the essence of an individual substance. That is, what it is to be an individual substance like Xanthippe or Socrates can be said to have both individual and universal features, *if* we make certain *abstractions*.[54]

The account that I have given of Aristotle's theory of perception and thought supports such a doctrine. For Aristotle, so I have argued, we perceive not only the individual but also, in a disordered way, the universal attributes of individual substances. This has to be, given that we later are able to abstract the universals from what we have to perceive. For we are able to know not only individual substances and their individual attributes, but also the secondary species and genera, in all the categories. So they all must exist *in re*. An individual substance then would have to be a totality of parts, attributes etc., some of which are universal and some singular. Likewise for its essence. Depending on the perspective from which the individual substance is being considered, it can be taken as universal or as individual. So I can say of one thing that it is human, tall, intelligent, and that it is that one over there (τόδε τι), Xanthippe, a unique person. We might say today that this amounts to taking it under a description. This works fine, so long as we do not construe such a process as a merely psychological one: the structures, both universal and individual, are really in the world, including the processes of perceiving, abstracting, and thinking themselves.

Moreover, Aristotle's theory of the causes supports such a doctrine. For instance he says, "Man begets man". [*Phys*. 198a26–7; *Metaph*. 1033b32] Such a causal act has both individual and universal features. Aristotle gives certain of these causes an individual emphasis. The efficient cause of an individual human being is an individual act of two individual human beings. The species or universal or form does not do the copulating. Aristotle insists that universal causes do not exist. [1070a18–9] Peleus—not father in general nor the species man nor humanity—is the cause of Achilles. Still, he says, although this particular b is the cause of this particular ba, b in general is the cause of a without qualification. [1071a23–4] Again, things in different categories have different causes but can be said to have the same causes by analogy because they all have common structures of matter, form, privation and the moving cause. He goes on to say that the causes of substances are causes of them all because when those causes are eliminated (ἀναιρουμένων) they all are eliminated—but not *vice versa*: the asymmetry and primacy of substance.

The material cause of an individual human being lies in these-here and -there individual hunks and portions of material of the appropriate sort. Yet even these

[53] See Bäck 1996 for a useful summary.

[54] Madigan 1999: 81: "More likely, the difficulty is to conceive of something that is neither a kind (predicate, universal) nor a particular, but has certain attributes of both." So too Reeve 2000: 99–100.

causes have universality in that the individual reproductive acts, their agents, and the human materials all have common, essential structural features. The individual human begets *qua* human. An individual human being need not be composed of this-here stuff: she could have had something different for lunch and still replenish her body. Yet she must eat the right sort of stuff: carbohydrates and proteins, and not stuff like gasoline or silicon.

On the other hand, Aristotle gives the formal and final causes a universal emphasis. By nature species reproduce their own kind: Xanthippe and Socrates do not beget the same individual substances, Socrateses and Xanthippes only. They pass on the human form in their gametes (for Aristotle only the male does): note that, as εἶδος means form or species, we can equally say that they reproduce or propagate the human species. Still the parents do produce some individual human being or other. Xanthippe does not deliver the human species—just think, if so, if she had twins. Again the young human being does not grow at random; it grows, in a "forward-looking" causation, as David Charles puts it, to reach its adult, fully actualized stage of the human species. If it does not, it has lived in vain, is de-formed ("monstrous"), or had an accident and has become maimed.

So too, the goal or end for human beings is *eudaimonia*, set by the essential function of a human being, as determined by her universal human nature. Yet even the human function has its individual features, as it is affected to and conforms to the individual circumstances. The actual activities filling a person's life will have to vary. Aristotle gives no universal recipe for self-fulfillment but only stresses the need to have the skill to assemble these activities into a complex, coherent whole and no mere heap or totality: the need for *phronesis* at the level of the individual substance. Even though he claims that individual substances do not admit of degree and so that all humans are completely human, Aristotle does admit that different ones actualize the abilities of their species in different degrees. In the case of human beings, some flourish by actualizing their deliberative reason and living in accord with it, while others have it but do not live by it, while others never actually have it at all. *Acrasia*, accidents of upbringing, birth defects etc. do then affect how the human potentialities are developed and actualized, in the sense of first actuality. Character traits, individual circumstances and chance events determine what in fact we do, the occurrences of second actualities. We all may be busy being human all the time, as Kosman puts it, but some of us do it better.

Aristotle states at the start of his *Metaphysics* that he is looking for the first principles and causes of the things that are. He takes the form or essence of an individual substance to be a cause: the formal cause. Yet, on his own theory, the formal cause is not a sufficient cause. For all the causes are required: not only the four "essential" causes commonly distinguished but also their "accidental" counterparts—indeed the entire number of causes and their modes distinguished in *Physics* II.3.

Aristotle's doctrine of causation suggests that his own discussion of substance in the central books of the *Metaphysics* would have to be quite abstract: of course, intentionally so: *qua* being. Yet, in focussing selectively on certain aspects of a substance's nature—in line with the structure of science, on the most universal and essential aspects, Aristotle does not deny its individual attributes. The latter just are

often not his focus. Still, he does not thereby deny that the essence of an individual substance has both individual and universal features, any more than the mathematician denies that there are physical objects with individual shapes in dealing with her subject, the study of shape, universally. Yet by dismissing accidental causes along with the rest of being *per accidens* from the study of being *qua* being Aristotle has also banished the individual circumstances whereby one individual differs from another individual substance of the same species. [*Metaph*. VI.4] Instead, he has to speak of those individual circumstances in a universal say, as the 'this here' and 'matter'—terms that themselves have little content.

I am attributing to Aristotle a view having strong similarities with modern science as well as traditional Aristotelian doctrine. Today what makes an individual material substance an individual substance is its atomic structure, consisting of certain sorts of materials in certain sorts of relations. In the case of helium, atomic theory has it that it is an element with two protons. The reason why certain atomic particles constitute helium is because they have that structure or "form". In the case of a human being, we may speak of the human, organic matter and its structure, the DNA. That structure is encoded in the sequence of the amino acids; like Aristotle's form, that structure does not exist apart from them even though it is not identical to, or the same in account as, them. The amino acids themselves have their own structure or form, just as the materials and parts of Aristotle's substances do. Now each individual human being has her own DNA with individual features, with idiosyncratic relations and circumstances, just as a helium atom has a common structure with its own idiosyncrasies. Yet, at the same time, each individual human being shares in the common human nature as described by certain general, structural features of the DNA. A cell with only 12 chromosomes is not a human cell. Once again, what it is to be a human being, what causes an individual to be, has both individual and universal features. Like Aristotle's form, the DNA serves as a cause actively organizing, developing, and preserving the human organism.

11.7 Conclusions

> Reality has a hierarchical structure…with each level independent, to some degree, of the levels above and below, 'At each stage, entirely new laws, concepts, and generalizations are necessary, requiring inspiration and creativity to just as great a degree as in the previous one.'[55]

For better or worse, current science, if not philosophy, continues to follow much of the structure that I have found in Aristotle. Our sense perceptions may not give us immediate access to the world as it really is. Still they are reliable enough for us to get at the structure of the world. Its objects lie on different levels of abstraction: electrons, atoms, molecules, proteins, cells, organs, animals, species, ecosystems,

[55] Horgan 1999: 250, quoting Anderson 1972. So too Ronan 2006: 39; and Mandelbrot.

planets, galaxies. These objects are not atomic subjects. Rather, some are aspects of others, with varying sorts of interrelationships. Still they have some autonomy, perhaps to a higher degree than Aristotle himself envisaged: the laws of the behavior of electrons are not those of planets. These laws along with the universal features constituting them, like 'mass', 'acceleration', and 'energy', somehow lie immanently in the world. Following Plato more than Aristotle perhaps, modern science has its theory dealing with ideal objects: point-masses and frictionless surfaces—although Aristotle too tries to give a theory where the lines of geometry are not the ones that can be drawn or seen. Offhand, the theories of modern science seem preposterous and bewilderingly complex: who could imagine all the complexity in a bit of pond scum, all the different factors needed to describe the motion of a pendulum or the surface of a water bubble, what the Sun, seen as a dime-sized disk, really is. Nevertheless, we have come to recognize, slowly and painfully, that we have such a world. Compared to the current complexity of theories and their interrelated subjects, Aristotle's ontology, based on a simpler hierarchy and a simpler relational structure, may seem primitive. Yet we still follow many of its assumptions. Features of an object may come to have a relative independence on another level, without being independently real. Aristotle's position has turned into our science, not into sophistry.

> Whatever our philosophical position with respect to reduction, it is practically necessary to build science in levels. The phenomena at each level are described in terms of the primitives at that level, and these primitives become, in turn, the phenomena to be described and explained at the next level below. (Simon 1995: 675–6)

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Appendix

The Formal Structure of Abstraction

Aristotle describes abstractions in terms of 'qua': 'the bird *qua* winged'; the doctor *qua* doctor and not *qua* builder'; 'being *qua* being'. He discusses formal properties of such propositions with qualifying phrases not systematically but topically, as the need arose.[1] Thus he discussed how to construct syllogisms for conclusions having additional predications; he distinguished senses of 'καθ' ὅ' and 'καθ' αὑτό' when he discussed the distinction of essential and accidental properties; he dealt with various sorts of supplemental predication when he attempted to distinguish valid from invalid *secundum quid ad simpliciter* inferences. Aristotle never clearly gave a general overview of his views on qua propositions. However, in discussing *secundum quid ad simpliciter* inferences he did hint that there are two logical types, the essential and the accidental. In light of particular points that he made, each type could be divided further: the essential into the restrictive and the nonrestrictive, and into the causal and the concomitant; the accidental according to the modes of the fallacy of *secundum quid ad simpliciter* that he distinguishes, sc., into the case where the determination and the *determinatum* are opposed, like 'dead man', and into that where they are not, into the case where the determination is like 'in the teeth' in 'white in the teeth' and into that where it is like 'conceivable' in 'the chimera is conceivable'. Aristotle hinted at a further difference between essential and accidental qua propositions when he claimed that the qua phrase is attached to the predicate of an essential qua proposition, and not to the subject. It seems that the qua phrase of an accidental qua proposition has a different relation to the subject and predicate of that proposition. The Aristotelian tradition picked up and developed all these hints.

Aristotle has two main logical types of qua propositions. In the (strictly) *reduplicative* type, the respect introduced by the M term has a predicative relation to the

[1] For the textual basis for these claims, see Bäck 1996: Chapters 1–3. This Appendix was taken mostly from Chapter Eighteen.

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original subject and predicate, and sets restrictions on that predication. The original subject S is preserved along with 'P' continuing to be asserted of it. In the *specificative* type, the respect introduced by the M term has another, "mereological" relation to the original subject and predicate, and changes the original predication, so as not to be true of the original subject but of its "part" in varied senses.

Those statements maintaining the predicative relations of the original predicate, I too shall call reduplicative propositions. A central criterion is the validity of the *secundum quid ad simpliciter* inference:

Secundum quid ad simpliciter inference:

S qua M is P; therefore, S is P.

Moreover, since S is being asserted to be P in the respect that it is M, it is being asserted that S is M. Because the respect of M, a feature of M, is a certain complex of properties of S, the reason why S is P is that S has those properties, it is being asserted [in most cases: perhaps not for qua this M] that M is P. So the general, default form

[Reduplicative] Every S qua M is P iff Every S is M, and every M is P (or: to be an M is to be a P)

—and similarly for the other forms that have been distinguished for the reduplicative: in particular, what I have called the restrictive and the abstractive (discussed below). The qua phrase then explains why S is P. This explanation can be given a weaker or a stronger causal sense.

I list below the truth conditions that I have given elsewhere for these types of qua propositions and examples for them that would be accepted in the Aristotelian tradition:

(i) Every S is P qua M (reduplicative) if and only if:

$(x)((Sx \supset Mx) \,\&\, (Mx \supset Px))$ (12)[2]

(ii) Every S is P qua M (restrictive reduplicative) if and only if:

$(x)((Sx \supset Mx) \,\&\, (Mx \equiv Px))$ (20)

(iii) Every S is P qua M (abstractive reduplicative) if and only if:

$(x)(Sx \supset (Mx \,\&\, Px))$ and 'P' is an M-type predicate (97)

Examples: Every isosceles triangle *qua* isosceles triangle has its interior angles equal to 180°. [true reduplicatively and abstractively; false restrictively] Every isosceles triangle *qua* triangle has its interior angles equal to 180°. [true restrictively; reduplicatively and abstractively]

[2] The numbers in parentheses are the numbers for these analyses in *On Reduplication*. We might use instead the stronger '$(x)(Sx \vdash Mx) \,\&\, (x)(Mx \vdash Px)$'. I can see some textual justification for this. On the other hand, there is the grammatical point that a qua proposition asserts that S is P insofar as it is M.

The Great Pyramid *qua* geometrical is a triangular pyramid. [is false reduplicatively and restrictively]

Being *qua* mathematical is quantitative. [likewise]

The reduplicative qua phrase then explains why S is P. This explanation can be given a weaker or a stronger causal sense.

With specificative propositions, the *secundum quid ad simpliciter* inference, 'if S qua M is P, S is P', does not follow. To use Aristotle's example, which became the standard one, if the Ethiopian [say, Socrates] with respect to his teeth is white (Socrates' teeth are white), it does not follow that Socrates is white. Here 'P', what is predicated of the original subject S need not be predicated of S in the respect specified (M). That is, the predicates of that respect of S need not be predicates of S. If we take the notion of part broadly, as is traditional though not too contemporary, we can think of the respect M as being a part of S. Then the fallacy of composition and division can apply here: what is true of the part need not be true of the whole, and *vice versa*. So we can give the following analysis of an accidental qua proposition:

[Specificative] Every S qua M is P iff S qua M is a part of S, and everything that is S qua M is P [not that every M is P, but every M of S is P, in a mereological sense of 'of'].

This can be formalized, not too informatively as:

(iv) Every S is P qua M (specificative) if and only if:

(x) $((Mx \,\&\, x\ \varepsilon_i\ S) \supset Px)$, where '$x\ \varepsilon_i\ M$' indicates a part-whole relation between x and M (46)

Example: This Ethiopian (say, Socrates) is white with respect to his teeth.

A major feature of these analyses of types of qua propositions is that all qua propositions that are true reduplicatively are true specificatively on one part-whole relation recognized in the Aristotelian tradition; let us call it 'ε_1' (46a). That relation is not properly specificative, though, and does not make a *de re* determination. This part-whole, or belonging-to, relation is that of predication (Cf. the traditional doctrine of subjective wholes and parts.). So when the part-whole relation consists in predication, a specificative proposition, when true, will tend to be true reduplicatively as well, especially when it is not universal and when the M term is not taken universally. This connection of reduplicative and specificative qua propositions agrees with the medieval analysis of specificative propositions, i.e., that the specificative proposition, 'S is P qua M', means that S is P insofar as S is considered under the concept of M. This analysis amounts to a paraphrase of the original proposition. True reduplicative propositions then are true specificatively, on 'ε_1', the usual predication relation. Note that the expression, 'S qua M', in the 'ε_1' case does not change the reference of 'S'; '$x\ \varepsilon_1\ S$' is just 'Sx'. So reduplicative propositions may be said to be also specificative in syntactic structure, but not distinctively, or semantically, accidental: 'ε_1' is a syntactic, not a "real semantic", part-whole relation. Part-whole relations, like the integral or material, are "really" and properly accidental. Thus,

syntactically, a reduplicative proposition implies the corresponding specificative one, though in the former the qua determination is *de dicto* while specificative qua determinations are characteristically *de re*. (I reject this claim myself.)

The semantics for reduplicative qua phrases presents no more difficulty than what is needed for analyzing usual predicative sentences, as the analyses given above suggest. The reduplicative qua complexes formed may seem to have a reference different than the original subject. But that is because and only when they have had a further reification or abstraction performed on them: we have moved away from 'in respect of' to 'the respect that' or 'the respect of' (as I discuss further below). Specificative qua phrases however immediately, by themselves, change the reference of the original subject.

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