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Aristotle’s Abstract Ontology
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…in the statement of a relationship, the designations of the correlates ought to be considered as so many logical subjects and the relative itself as the predicate.¹

Aristotle has a metaphysics of individual substances, substrata persisting through time that are neither in nor said of a subject. That I do not dispute. However, when we move from the individual to the universal, from perception to knowledge, Aristotle has a metaphysics of relations. This I will try to sketch out here.

Aristotle appeals to abstraction at key places in his philosophy. Somehow abstraction gets us to the first principles and to the objects of the most fundamental sciences. Somehow universals are abstracted from singulars and have no transcendent existence.

Aristotle never states his theory of abstraction formally or too explicitly. Yet he surely uses it. Perception is the abstraction of forms from substances; knowledge is the abstraction of the universal from singulars; the objects of the mathematical sciences are “the things said from abstraction”. [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, the abstracta, for study in particular sciences. Above all, on account being abstractions, the essences of substances can be real without existing in their own right. Aristotle tends to express abstractions in the language of what later came to be called “reduplicatives”: something may be considered “qua this” or “qua that”. Yet he has not left us a treatise on abstraction. This lack of explicit doctrines I think accounts for many of the disputes over his ontology.

Abstractions have the formal features of relations. Aristotle appeals to these features in addressing the problem of universals. So let me start with relations.

1. Relations have the distinction of referring to another in their definitions. Being a father is to be a male parent of some child. In contrast, items in other categories do not do so.² E.g., the quality whiteness is a color standing out in sight. To be sure, paronyms of those items do so: the white is “the white thing”, sc., a colored feature of some surface or substance. Still the quality itself does not.

Aristotle discusses relations in his Categories. He says that 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. 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.³ 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 that happens to have begotten an offspring.⁴

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 of its child; a child is something begotten by its parent. [8a31-2; 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 their very definition of the attribute itself, although the things having those attributes (the attributa) do so refer. The abstract term (‘whiteness’) does not refer to another, even though the concrete term (‘white’), taken concretely, does: when ‘the white’ is taken to mean ‘(a thing) having whiteness’, it presupposes a thing having that attribute.⁵

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¹ C. S. Peirce, Collected Papers III. §467.
² There is some dispute whether action, for instance, is actually a subtype of relation.
³ Cf. Metaph. VII.6. This is a complex issue that I do not defend here. See Allan Bäck, Aristotle’s Theory of Predication, pp.185-97.
⁴ Cf. Porphyry, In Aristotelis Categorias Commentarium, ed. A. Busse, Commentaria in Aristotelis Graeca, Vol. 4.1, (Berlin, 1887), 124,6-14; M. Mignucci, “Aristotle’s Definition of Relatives in Categories 7,” Phronesis, Vol. 31.2 (1986), pp. 102-3. 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.
⁵ Cf. Metaphysics 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. That is, the quale, quantum etc., sc., what 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 make reference to another, while those items themselves (justice; fourness) do not. Substances differ from all accidents because neither a substance nor its essence makes any 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. 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.

2. Relata have a distinctive kind of conversion. E.g., a father is a father of some child; a child is child of some father.

Because of the need to specify the other relatum in the definition of the relation itself, a relatum has a distinctive kind of “conversion”: e.g., a parent is a parent of a child; a child is a child of a parent. 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. 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:

S is S π P; P is P π S.

Aristotle requires this sort of “conversion” to hold uniquely for all relata. [Cat. 7a22-5] 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.

3. Perception and knowledge are relations. Like other relations, their relata co-exist: namely the object and the mental state about that object. An individual substance that is the object of perception might exist before being perceived, but not qua perceptible.

Aristotle asserts that relata are simultaneous by nature. He then worries about perception and knowledge. The things perceived and known seem to exist prior to being perceived and known. Certainly the substances being perceived or known do. Yet they do not do so insofar as they are perceived or known. If the relata are named strictly, they are

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6 Philoponus, in Cat. 114,19-21.
9 ‘By a rudder’ is in the construction of a dative of means. Christos Evangeliou, Aristotle’s Categories and Porphyry (Leiden, 1988), p. 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.

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. [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.

11 Aristotle, Categories 6a36-7; 8a31-3. ‘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”.
12 Strictly, Aristotle holds that the perceiving is a type of motion, while what is produced by a particular perceiving is a quale, a state in the soul. Cf. Phys. 201a18-9; Mem. 451a2-5.
simultaneous by nature. [Cat. 7b15-8a12] The perceptible is simultaneous with its being perceived. For instance, when Britney is perceiving a goat, the goat exists before she perceives it, and so does she. Yet the goat insofar as it is perceived, and Britney insofar as she is perceiving it, come into existence simultaneously and co-dependently.

4. As the solution to the aporia over perception illustrates, strictly the relata are not the substances but rather “the substances qua being in the relation”.\(^{13}\) So these, the relata strictly speaking, serve as subjects in their own right. Such subjects have a quasi-independence from their bases, ultimately the individual substances. Relata, the things in a relation, have attributes different from those of their substances: substances exist before they are perceived, but substances in the relation of perception do not exist before they are perceived. This has the result that the relata have a quasi-independence from their substances. The relata stand as objects in the relation, whereas strictly speaking their substances do not. The relata thus serve as logical subjects (later: hypostases), taken as if they exist in their own right. Aristotle acquires subjects for most of the sciences from accidents in this way. 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 ultimate subject, here the individual substance, and the respect in which it is the relatum.

Moreover, the ultimate subject, always a substance, need not be the proximate subject. With ‘4 is the double of 2’, the relata, the logical subjects are the quanta 4 and 2, taken qua being in the relations of being double, with the quanta being their proximate subjects and the substances of which they are quanta being their ultimate subjects. The qua phrase makes the (part of the) connection of the respect to the subject transparent, so as to insist 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.

5. Abstraction satisfies Aristotle’s criteria for being a relation. Its definition make reference to another: an abstraction is the abstraction of an abstractum abstracted from an abstrahendum. It has the conversion characteristic of relations: an abstractum is an abstractum from an abstrahendum; the abstrahendum is the abstrahendum for the abstractum.

6. In his psychology, Aristotle make it clear that for him perception is an abstraction of individual sense perceptions from real objects, and that likewise knowledge is the abstraction of universal thoughts from those sense perceptions.

Aristotle characterizes both perception and knowledge as abstractions: perception abstracts the forms from their matter; knowledge abstracts the universal from the particular. [An. III.4; Metaph. I.1; Phys. I.1] As he explicitly classifies perception and knowledge as relations, it is highly likely that he considers abstraction to be a relation.\(^{14}\)

Aristotle describes perception (ἀίσθησις) in general thus: \(^{15}\)

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 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 attributes of the objects being perceived, without their matter. So it abstracts from the matter. Likewise, thought abstracts the universals from the images produced by perception:

\(^{13}\) In the case of perception, the two substances are the one perceiving and the object perceived; the relevant relata are “the perceptible,” ‘the substance insofar as it is perceived’, and “the perception,” “the state in the mind of the perceiver”. ‘The perceptible’ has the ambiguity that it is what is actually perceived [in the sense of first actuality] or what has the potential to be perceived. Aristotle argues that the former sense is the right one.

\(^{14}\) Perhaps as their genus—although even then Aristotle allows for genera and species to belong to different categories: for instance, he says that the species of knowledge like grammar are qualities. [Cat. 11a20ff.]

\(^{15}\) See Richard Sorabji, “Body and Soul in Aristotle,” Philosophy, Vol. 49 (1974); repr. Aristotle’s De Anima in Focus, ed. M. Durrant (London, 1993), p. 162, for a general survey of interpretations of Aristotle’s theory of perception. Some, like Slakey, take perception as physiological [what Everson, Aristotle on Perception calls the literalist view]; others, like Solmsen, take it as purely not physical [Everson’s spiritualist view]. Sorabji himself tends to side with the latter, as he, pp. 167-8; 175, takes perception itself to have a matter and a form, where the former is physical and the latter is not.
To the thinking soul images serve as if they were contents of perception (and when it asserts or denies them to be good or bad it avoids or pursues them). That is why the soul never thinks without an image. [An. 431a14-7]

The faculty of thinking then thinks the forms in the images, and as in the former case what is to be pursued or avoided is marked out for it, so where there is no sensation and it is engaged upon the images it is moved to pursue or avoidance. [An. 431b2-5]

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]16 In both thinking and perceiving by the senses, the result is becoming acquainted with, or recognizing, some beings (γνωρίζει τῶν ὑπαρχόντων). [427a18-21] Aristotle does note some differences between perception and thought. Of course, 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] Moreover, 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. That is, perceiving requires a sense organ while thinking has none. [429a24-7]

Thinking differs from perceiving mainly in having different sorts of items for discerning.17 Mind “perceives” the imaginations [παράσκευα] provided by the 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 [προσθήσεις] of the various “forms” perceived into memories, imaginings, and experience.18 “Thus the intellectual faculty [τὸ νοητικὸν] thinks the forms in the images.” [431b2]

Despite these differences, for Aristotle thinking and perception of its various kinds are capacities or abilities of the same type. [429a22-4; 28-9; 429b8] Indeed, as we have seen, he treats them in tandem as relations in the Categories.

Given that Aristotle likens thinking to perceiving, and not to remembering or imagining, it is likely that he views thinking as a process (primarily) of abstraction and not one of synthesis. For, although the imagination, like memory and the common sense, does abstract certain features from past perceptions and experiences, it also puts them together in a new way.

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’.19 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 Topics I.10. 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).20

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 his famous example of the snub. It is worth noting as a preliminary that being aware of the snub as an object is itself 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, 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.


17 Robinson, Aristotle’s Psychology, p. 75 n. 12, says “…perception and thinking…are alike in that they both are assertoric. They are entirely unlike, 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.

18 Alexander, in De An, 83,12, says that noûs deals with synthesis too.

19 The latter example seems to belong, strictly, to a later stage of the abstract objects discussed at 429b18ff.

20 Charles, Aristotle on Meaning and Essence, p 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.
various experiences of his snub nose. We judge, from synthesizing 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. (So various processes of synthesis would be required here too.) Even here we
probably don’t yet have the essence of being snub. For 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 its universal yet contingent common features.  

At any rate, although Aristotle gives few details, from our experiences of snub noses, we can extract the
essence of being snub. Yet 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 quiddity (tà ti ἄρτα). [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.

7. Thus mental abstraction for Aristotle is recursive: the output or range of one abstraction process can be
taken as the input of another one. The singular sense perceptions or “forms” are abstracted from the
individual substances, complexes of forms and matter. The most specific universal, like dog or goat, is
abstracted from singular sense perceptions. The next universal, the genus animal, is abstracted from these
species. Aristotle then gets a sequence of abstractions and their attendant predications and then argues that
there is no infinite progression. Rather we get to ultimate, simple mathematical objects, “the things said from
abstraction”.

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 ‘nous’
(‘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.”

As Aristotle’s psychology also suggests, 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 can combine
their memories of particular sensations into a single experience. [Mem. 450a15-9] “For the many memories of the
same object complete the capacity for a single experience.” [Metaph. 980b29-981a1; cf. An. Po. 100a4-5] Aristotle has a chain of mental processes—perception, memory, recollection, imagination, and experience—each
using the 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.

Aristotle himself gives two explanations of this process, the second being clearer than the first: [100a15]
(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. The “one”, the universal, is at rest relative to those perceptions giving its features, because
perceptions are motions wherein the universal is 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

21 Aristotle is rather silent on how this is possible and happens, but not so later Aristotelians like Avicenna. Cf. Avicenna, Al-
Madkhal, ed. G. Anawati et al. (Cairo, 1952) 70,1-20 [= Logica 12r col.1].
23 Alexander, in Metaph. 4,15-22, wants Aristotle to deny that animals have experience altogether. Still the text suggests that
animals do have a bit of experience: as Hume, An Enquiry Concerning Human Understanding, IX, will have it later: of the same
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24 I agree with Deborah Modrak, Aristotle: The Power of Perception (Chicago, 1987), pp. 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.
25 Translators like Mure assume that the experience itself is of the universal, and so take the “or” at 100a6-7 inclusively. Also cf.
Metaph. 981a1-3.
from them, the universal too would be moving about and fleeting, and not yet differentiated from the other features of the perceptions.

(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 perception so as to remain still standing in the mind while the perceptions have gone, the universal appears. Aristotle calls such universals “states” of the soul. [100a10; 99b18; cf. Eth. Nic. 1039b12-3; 1039b31-2] This second passage goes on to give further detail. 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, or lowest-level, universal 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, somewhat like the birds in Plato’s aviary. Thus we may have many different visual images of different women or even of the same woman.27 We might think here of Physics 184a21 & b13, where Aristotle suggests that we somewhat like the birds in Plato’s aviary. Thus we may have many different visual images of different women and men or even of the same woman.27 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.28 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.” So then from these fuzzy, indeterminate images of Mother and of other human beings by nous there comes the conception of the universal, the species man.

Aristotle then goes on to say that this universal “man” can then be taken as one of the items making a stand. This in turn can be taken as one of the items making a stand. Eventually we get the universals without parts, namely, ultimate abstractions having form but no matter.29

Aristotle seems to call all these processes ‘induction’ (ἐπαγώγη). Thus Engberg-Pedersen defines “induction” in Aristotle’s sense as ‘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’.30 All these cases of induction have in common that they extract some single, more general thing from a group of more particular things. They differ in the induction being done on things of different types, themselves the results of earlier inductive processes. Such a move from something more particular to something more universal involves abstraction. Induction then is a type of abstraction where something more universal is picked out of something more particular. When the output has no parts, then there is nothing to pick out with a residue left—such things without parts will be the ultimate abstraction. Perhaps too they will be “the things said from abstraction”, in the sense of being said after all the abstraction that can be done is done.

How then 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 general from a group of more particular things.


27 At 100a4 πολλάκις τοῦ γόνιοι 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.

28 Barnes translates 100a16 as ‘primitive’ but doesn’t seem to be making this point, as he regularly translates αἰσθητικός as ‘primitive’, e.g., at 71b21. David Summers, The Judgment of Sense (Cambridge, 1987), p. 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.”


Abstraction need not produce something more general, nor need it operate on a group. I can abstractly consider the particular shape of this particular table. To be sure, abstraction figures in every induction, but not every abstraction is induction.\footnote{Modrak, Aristotle’s Theory of Language and Meaning, p.118.} Still, it is easy to see how someone might confuse induction with abstraction.\footnote{Charles Kahn, “The Role of Noûs in the Cognition of First Principles in Posterior Analytics II.19, p. 354, holds that abstraction is a special case of induction.}

8. The objects of Aristotle’s sciences consist in such abstract objects. Like other \textit{relata}, they have a quasi-independence. Aristotle’s theory of mathematical objects provides a striking and final illustration.

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. \textit{Metaph}, \[1029b10\] \footnote{A favorite \textit{dictum} of Aristotle, repeated elsewhere: e.g., \textit{Phys.} 184a16-b5; \textit{An}. 413a11-13; \textit{Eth. Nic.} 1095b2.}

For Aristotle, the primary substances are not primary for us. Rather, what is first 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.\footnote{\[Pseudo-\] Simplicius, in \textit{de An.} 225.20-1 "For neither are the perceptibles themselves in the perceptive but their forms, being forms of accidents… "; 232,22 “for perceptibles are all accidents and particulars that perception is able to grasp accordingly.”; cf. 283,9-10. So too Irving Block, “Truth and Error in Aristotle’s Theory of Sense Perception,” \textit{The Philosophical Quarterly}, Vol. 11 (1961), p. 2; “Aristotle on the Common Sense,” \textit{Ancient Philosophy}, Vol. 8 (1988), 235-49.}

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 end up being denigrated are not the universals 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.

Aristotle insists that science deals with universals. These universals come about by abstraction. We have knowledge of individuals only as instances of these types: \textit{qua} this or \textit{qua} that. We get at the universals 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 provide the content for 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—so he keeps on insisting anyway.

In accordance with his account of how we grasp universals from perceptions, Aristotle 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 \textit{abstracta} that cannot serve in turn as \textit{abstrahenda}. These he calls “the things said from abstraction”—somewhat misleadingly, as the objects of the other sciences are also things said from abstraction, albeit not the ultimate ones.

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 dealing with the simplest objects, the most restrictive aspects of the object, is the best, the most primary, the logically prior science.

For instance, concavity, Aristotle says, is an abstraction from the shape of a snub nose, as snubbness is concavity in a nose. \[\textit{An.} 429b19; 431b12-7; \textit{Metaph.} 1030b31-2\] Snubbness is a quality of a nose; a nose, a part of an animal, is a substance. \[\textit{Soph. El.} 182a4; \textit{Cat.} 8a25-8; \textit{Metaph.} 1028b9-10\] What is said from abstraction, the concavity, is itself also a quality. \[\textit{Cat.} 10a11-3\] The shape of a snub nose is a \textit{qua}le, while the snub nose \textit{qua} continuous body is a \textit{quantum}. \[4b23-4; 10a11-2\] The snubbness of a nose would be dealt with in the biological science of the parts of animals; optics deals with the concavity abstracted from it while still interacting with the
motion of light in nature; geometry deals with the concavity abstracted completely from motion. [Metaph. 1078a14-7]35

For Aristotle the objects of science and philosophy are real but do not have an existence independent of the primary substances from which they are abstracted, nor from our experience of them. To be sure, he 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] (Note that this talk of “cutting off” implies 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. 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 asserts 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 (ὀψις) 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.36

Each of these own 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.37

Many properties [literally: many things— πολλά] attach to things [πράγματα] in virtue of their own nature [per se] as possessed of some such property; e.g. there are attributes [affects— πάθη] peculiar [τόια —sc., that are *propria* for] to the animal qua female or qua male, yet there is no female nor male


36 Aristotle certainly admits accidents to have essences and definitions. Cf. Metaphysics VII.4-6 and the use of *ousia* (essence) at Topics I.5 applying to all the categories; so Michael Frede, “Categories in Aristotle,” pp. 43-5, Concetta Luna, “La relation chez Simplicius,” in Simplicius, ed. I. Hadot (Berlin, 1987), p. 117, says that Simplicius holds that relation is a particular characteristic plus an inclination towards something else: former is a substratum; the latter is a formal aspect.

37 Being qua being is the obvious exception, although it does not fit into the scheme of the categories; perhaps also psychology, as the soul is the essence of animate substances. Cf. Metaph. 1037a5-8.
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. The “things in virtue of their own nature” refers probably to the individual substances. But they are to be considered qua this or qua that. 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.

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 phrase restrict the attention on the attributes of the individual substances. 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.

So Aristotle 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 abstracted as 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, these abstractions, signify real features of real objects.

9. Aristotle’s universals are just these abstractions. The status of relata gives us a way to understand how Aristotle says that forms and universals are real without being separate substances. Like other abstract objects, universals have independent, substantial being only in the mode of “as if”. Taking them to have the structure of relations ensures that they cannot exist apart in their own right.

…one must not grant that predications of those said relative to something signify anything when separated off by themselves… [Soph. El. 181b26-7; modified Revised Oxford translation]

We can find structures of abstraction similar to those appearing in Aristotle’s account of mathematical objects in the relationship of items in the accidental categories to substances: small wonder, as the mathematical objects are items in the categories. 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, secondary substances would not exist if the primary, individual substances did not exist. [Cat. 2b6-8]

We can distinguish accidents from their substances too, even have special sciences about them, and yet not have to postulate a plurality of entities existing in re: Socrates, the movements of Socrates; the health of Socrates, the nose of Socrates, the concavity of his nose, the snubness of his nose, the snub, snubness, the concave, concavity… as separate objects having independent existence. 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 distinctive subjects having their own attributes.

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38 Cf. Sophistical Refutations 181b35-182a3: “In the case of terms that are predicated of the terms through which they are defined, you should say that the term defined is not the same in abstraction as it is in the whole phrase. For ‘concave’ has a general meaning which is the same in the case of a snub nose, and of a bandy leg, but when added, in the one case to nose, in the other to leg, nothing prevents it from meaning different things; for in the former connection it means snub and in the latter bandy leg; and it makes no difference whether you say snub nose or concave nose.”


40 Richard Tierney, “The Scope of Aristotle’s Essentialism in the Posterior Analytics,” Journal of the History of Philosophy, Vol. 42 (2004) p. 19: “Aristotle’s underlying metaphysical conception is that an attribute belongs to something in itself if what it belongs to is a member of that exclusive kind whose members are such that they alone can ground its being. This is because they alone, in their coming-to-be, present the potentiality that is to be actualized as the attribute or as its opposite.”

41 [ps.] Simplicius, in de An., 253.39-40: “For, in general, he thinks the one (as) many through dividing in thought.’ 254.2 “Thus, even if not yet qua magnitudes, still it is being thought as magnitudes.”

42 Tierney, “The Scope of Aristotle’s Essentialism in the Posterior Analytics,” p. 15: “There is, for Aristotle, no such thing as a number, for example, except insofar as it 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.”
Aristotle insists that our knowledge of universals comes from sense perception via induction and abstraction:

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\textsuperscript{43}] some things belong to each genus, even if not separate, \textit{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. [\textit{An. Po.} \textit{81a38-b9}]

Since it seems that there is nothing outside and separate in existence from sensible spatial magnitudes, the objects of thought are in the sensible forms, viz. both the abstract objects and all the states and affections of sensible things. Hence no one can learn or understand anything in the absence of sense, and when the mind is actively aware of anything it is necessarily aware of it along with an image; for images are like sensuous contents except in that they contain no matter. [\textit{An. 432a3-10}]

Moreover, the existence of universals depends upon the existence of their primary substances. After all they exist as being either \textit{in} or \textit{said} of them. He ridicules Plato for having universals existing apart from them. [\textit{Metaph. I.6&9; VII.13-4}] In the middle of \textit{Metaphysics Z}, he insists, “...no universal term is the name of a substance...” [1041a4]

However, Aristotle has been charged with having an inconsistent position on universals. The story goes roughly like this: Aristotle finds individual substance to have being pre-eminently. When he asks, “What is it to be a substance?” he ends up with its form and essence—which have only universal features. A primary substance is identical to its essence. [1032a5-6] Now a definition is a formula of an essence, and definitions consist of universal terms. [1035b31-1036a1; 1036a26-9] So what has being pre-eminently ends up being something universal. Aristotle even goes so far to say that the most specific \textit{differentia} is the substance of the thing. [1038a18-21] Thus, it is charged, Aristotle relapses into a Platonism: despite asserting universals not to have an independent existence, he ends up having to have this.

To solve this problem, I claim that Aristotle takes universals to have a relational structure. For Aristotle such a structure enables there to be universals referring to real characteristics in the world without their being objects existing over and above the individual instances.

Relations have their starring role in the \textit{Metaphysics}. Note Aristotle’s metaphysical vocabulary: matter-form, substance-accident, universal-particular, species-individual etc. all have a relational structure. Although not items in the categories (as they are what came later to be called second intentions), they still have the formal structure of relations: they are said with reference to their correlatives in their very definitions and have the conversion typical of \textit{relata}.

So much of Aristotle’s central, theoretical vocabulary has a relational structure—as doubtless he noticed. This relational structure gives a way for universals to signify real features of the world without being separate substances. Take universals relationally. In this way, a universal has a quasi-independence but still does not have being, does not, indeed, cannot, exist \textit{in re} on its own. A universal is an abstraction. That is, strictly, it is an \textit{abstractum} abstracted from \textit{abstrahendum}. Once again we have two \textit{relata}, the \textit{abstractum} and the \textit{abstrahendum}, being related by a relation, abstraction. Neither exists on its own, yet each can be taken as if it did and can serve as subjects in the sciences. Like things perceived or known, the \textit{abstracta} are mental states in relation to the real things from which they are abstracted.

We can say that, like the other \textit{relata} of perception and knowledge, \textit{abstracta} (“abstractions”) signify mental states or things existent \textit{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 \textit{in re}. After all, perception and knowledge (and abstraction) belong to the category of relation, and their species to that of quality. He does not have a phenomenalist distinction of the real things existing \textit{in re} versus our representations of them whose elements exist only \textit{in intellectu}. These items are in the same categories as (being) wings, (being) rudders,\textsuperscript{43}

\textsuperscript{43} I agree with John Cleary, “On the Terminology of ‘Abstraction’ in Aristotle,” p. 15, that either translation is possible.
triangularity, and coldness. Qualities and relations are real things, and knowledge and perception are qualities and relations.\textsuperscript{44}

Aristotle finds the characteristic excellence of substances in their being able to take on contrary, accidental attributes while persisting through change. [Cat. 4a10-1; cf. Phys. III.1; I.7] Substances come to be through their underlying matter or substratum gradually coming to develop the potentialities of its substantial form, and pass away while losing their actualizations. [Phys. 226a10-1; 227a7-10] \emph{Relata} have neither characteristic at all:

\begin{quote}
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. [Metaph. 1088a29-35]
\end{quote}

Aristotle is claiming that there is neither any coming to be or passing away nor any change of a \emph{relatum}. [Phys. 246b10-17; cf. 247b3-4]\textsuperscript{45} That is, it has no gradual process where its potentiality develops, and its form appears in actuality instantaneously. It cannot persist through change. 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.\textsuperscript{46} Before these things happened to Coriscus, they did not exist; afterwards they did. So in a sense \emph{relata} like parents and relations like parenting do begin and cease existing. Yet strictly what undergoes the process of becoming is not the relation or the \emph{relatum}, but rather its substance. The \emph{relata} do not start existing via a gradual process, but come and go instantaneously, he says.

\begin{quote}
\emph{Relata} do resemble substances in not moving \emph{per se} and in themselves changing by appearing or disappearing.\textsuperscript{47} Although they do not do so gradually as substances do, \emph{relata} exist when the relation is present— and for Aristotle this happens all or nothing. Likewise the presence of a substantial form is an all-or-nothing affair, although unlike the relation it may be present in varying degrees in potentiality. In contrast, Aristotle seems to require the relation to be present in actuality only.
\end{quote}

\begin{quote}
\emph{Relata} then turn out for Aristotle to be the ideal quasi-substances, serving as the 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 \emph{relata} does not multiply entities or substrata so as to create an intelligible or abstract world over and above the perceptible world. On the other hand, \emph{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. Also like substances \emph{relata} have existence in an all-or-nothing way.
\end{quote}

We have here 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 mental activity. Such things, like universals, describe facets of what is real without themselves being real.

Even a specific \emph{differentia}, like the rationality of an individual human being, or a species or form (\emph{ei©doV}) will be one such aspect. Accordingly Aristotle ends up being a sort of nominalist in his study of being \emph{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. For the \emph{abstractum}, abstraction as a \emph{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 of my

\textsuperscript{44} Cf. [pseudo-] Simplicius, in De An. 182,8-9.

\textsuperscript{45} Although Aristotle says that only the \emph{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 \emph{relata} and has the definition of being from or of one ting relative to another. Cf. 200b31-3.

\textsuperscript{46} Physics 201a8-9. Thus Simplicius says, in Phys, 834,17-9, 836,6-7 re the similar passage at Physics 225b10-16, with Alexander, 834,24-7 [cf. 835,10] that Aristotle is not denying change [\textsuperscript{\textepsilon\textalpha\tauο\beta\omega\nu\eta}] but only motion in substances and \emph{relata}. He suggests, 835,12-20, that ‘change’ at 225a12 & 13 be understood in the sense of ‘move’ and not ‘change’ generally.

\textsuperscript{47} Richard Cross, “Relations, Universals, and the Abuse of Tropes,” p. 54, cites Physics V.1 [should be: V.2, 225b11-30] here. Cf. Mark Henninger, Relations, pp. 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 says, p. 61, “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.
mind or “soul” yet is of an object that is not in the soul. My knowledge of the species dog is in the soul but is of something that is grounded upon objects that are not in the soul. So too all the things said from abstraction, the reputable ones dealt with in the sciences, are in the soul but are of things that are grounded in things that are not in the soul. Still such universals are no transcendent Forms. Universals exist in things and are conceived as independent subjects. In themselves they have an objective basis yet no real existence. We have here the *triplex status naturae*, expressed more clearly later on by Avicenna et al.\(^{48}\)

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