DE ANIMA *II 5*

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ABSTRACT

This is a close scrutiny of *De Anima* II 5, led by two questions. First, what can be learned from so long and intricate a discussion about the neglected problem of how to read an Aristotelian chapter? Second, what can the chapter, properly read, teach us about some widely debated issues in Aristotle's theory of perception? I argue that it refutes two claims defended by Martha Nussbaum, Hilary Putnam, and Richard Sorabji: (i) that when Aristotle speaks of the perceiver becoming like the object perceived, the assimilation he has in mind is ordinary alteration of the type exemplified when fire heats the surrounding air, (ii) that this alteration stands to perceptual awareness as matter to form. Claim (i) is wrong because the assimilation that perceiving is is not ordinary alteration. Claim (ii) is wrong because the special type of alteration that perceiving is is not its underlying material realisation. Indeed, there is no mention in the text of any underlying material realisation for perceiving.

The positive aim of II 5 is to introduce the distinction between first and second potentiality, each with their own type of actuality. In both cases the actuality is an alteration different from ordinary alteration. Perception exemplifies one of these new types of alteration, another is found in the acquisition of knowledge and in an embryo's first acquisition of the power of perception. The introduction of suitably refined meanings of 'alteration' allows Aristotle to explain perception and learning within the framework of his physics, which by definition is the study of things that change. He adapts his standard notion of alteration, familiar from *Physics* III 1-3 and *De Generatione et Corruptione* I, to the task of accounting for the cognitive accuracy of (proper object) perception and second potentiality knowledge: both are achievements of a natural, inborn receptivity to objective truth.

Throughout the paper I pay special attention to issues of text and translation, and to Aristotle's cross-referencing, and I emphasise what the chapter does not say as well as what it does. In particular, the last section argues that the textual absence of any underlying material realisation for perceiving supports a view I have defended elsewhere, that Aristotelian perception involves no material processes, only standing material conditions. This absence is as telling as others noted earlier. Our reading must respect the spirit of the text as Aristotle wrote it.

Introduction

The negative message of *De Anima* II 5 is easy to state. This is the chapter in which Aristotle informs us of his view that, although perceiving is traditionally thought to be a case of being affected by something, an alteration

caused by the object perceived, it is only in a refined sense of being affected or altered that this is true. In the ordinary sense of these terms they signify the loss of a quality and its replacement by another (opposite or intermediate) quality from the same range (417a 31-2; 417b 2-3; 15; *Ph.* V 2, 226b 1-8; *GC* 1 7, 324a 5-14). That is not what happens in perception, which is a different way of being affected and altered. Aristotle concludes by saying that, for the discussion of perception now beginning, we must go on using the language of being affected and altered, but understand it in the light of the distinctions he has put before us in the main body of the chapter (418a 1-3).

In other words, *De Anima* II 5 is the chapter in which Aristotle expressly denies that perceiving is the sort of alteration or change of quality which a cold thing undergoes when it is warmed or a green thing when it is coloured red.

The negative message of II 5 is of some significance for current controversies about Aristotle's theory of perception. Richard Sorabji has defended,[1] and continues to defend,[2] an interpretation whereby the alteration Aristotle has in view, when he speaks of perceiving as alteration, is an ordinary qualitative alteration that would be observable by scientists who, unlike Aristotle, had instruments giving access to the inside of the relevant organ.[3] Better equipped than Aristotle himself, these scientists could observe one quality replacing another. They could measure the change of temperature involved in feeling warmth; they could see or film the change of colour involved in seeing red; they could hear or record the noises sounding in a listener's ear. On Sorabji's account, what goes on inside the organ is an alteration – a replacement of one sensible quality by another – of the same kind as the alterations that occur outside when a cold thing is warmed or a green thing coloured red. My objection[4] is that this is the sort of alteration that in II 5 Aristotle *contrasts* with the sort that perceiving is, where the altered state is not lost (like the cold and the green in the ordinary examples) but preserved (417b 3-4).

So much for the negative message of II 5. The positive alternative is harder to grasp. If perceiving is not an ordinary alteration of the type

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[1] In his 'Body and Soul' of 1974; cf. Ross *Aristotle* pp. 136-7.

[2] In his 'Intentionality' of 1992; cf. also 'From Aristotle to Brentano' (1991).

[3] Sorabji 'Body and Soul' pp. 49-50 with n. 22 and p. 64; 'Intentionality' pp. 209-10.

[4] 'Draft' (originally composed and circulated in 1983) p. 19. But I went too far when I denied that perceiving is alteration in any sense at all. Read on.

familiar from other Aristotelian writings such as the *Physics* and *De Generatione et Corruptione*, what sort of alteration can it be?

One possibility is suggested by certain details in Aristotle's account of the sense organs. Let us be clear that when Sorabji's scientists observe red replacing green within a perceiver's eye, that is not the replacement to concentrate on. Distinguish change of perception from the change which is perception. When the eye sees first green, then red, on Aristotle's theory its seeing green is one alteration, its seeing red another, and in each case Aristotle will say that the alteration is the taking on of a colour (first green, then red) by something *transparent*. But now, transparency is not a quality on the same range as green and red. It is a neutral state, which enables the eye to be receptive to all the differences in the colour range. So perhaps the alteration which is seeing can be the literal coloration Sorabji claims it to be and yet differ from ordinary alteration as defined in the *Physics* and *De Generatione et Corruptione*. It differs because what is lost in the alteration is not an opposite or intermediate quality from the same range as the colour replacing it.[5]

But this cannot be the positive message of II 5 either. Even if it were true that perceiving is an alteration that differs from ordinary alteration only in that it starts from a neutral, rather than from a contrary state, II 5 says nothing about the neutrality of the sense organs. Neutrality is first mentioned in II 8 (hearing depends on still air walled up inside the ear – 420a 9-11), and becomes a major theme in II 10 (esp. 424a 7-10).[6] I have argued elsewhere that the neutrality of the sense organs is a vital clue for understanding what happens when Aristotle sees red and hears middle C.[7] But it is not relevant to II 5, which is a general introduction to the study

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[5] Sorabji himself, I should emphasis, does not in the writings cited above dwell on the difference between altering from green to red and altering from transparent to red (cf. 'Intentionality' p. 212). I owe thanks to David Sedley for insisting that I do so. But see now Sorabji 'Aristotle on Sensory Processes', preceded by Broackes.

[6] This claim presupposes rejection of Hutchinson's proposal that III 12-13 belong between II 4 and II 5, for the neutrality of the organ of touch is mentioned at III 13, 435a 21-4. But I do reject the proposal anyway, for two reasons. First, because Hutchinson's transposition would have the result that the crucial idea of receiving form without matter would make its initial appearance without context or explanation at III 12, 434a 29-30, not as II 12's generalisation from the preceding study of individual senses. Second, because III 12-13 serve well enough where they are to round off the treatise with a teleologically grounded sketch of relationships and dependencies between faculties that have so far been analyzed on their own.

[7] Burnyeat 'Remarks'.

of animal perception.[8] In Aristotle's order of presentation, refining the notion of alteration comes before his detailed account of the five senses and their organs. We should respect that order, not grab pieces of evidence indiscriminately from all over the treatise. Otherwise we destroy the integrity of one of Aristotle's most carefully organized works. We may hope that II 5 will eventually help us understand the role of neutrality. But first we must get clear about the positive meaning of 'alteration' in the Aristotelian theory of perception; in particular, we need to understand what Aristotle means by saying that in perception the altered state is not lost, as happens in ordinary alteration, but preserved. And the best way to do that, I propose, is by a close scrutiny of the actual process of refinement undertaken in *De Anima* II 5.

It is a long chapter. By following it from beginning to end, we can see the refined notion of alteration emerging from the careful elaboration of distinctions that went before. As often in philosophy, the meaning of the conclusion is determined by the arguments, the message by the medium.

But I also have an independent interest in the medium. There is much discussion nowadays about the problems of reading a Platonic dialogue, but none about the problem: How should one read a chapter of an Aristotelian treatise? Many of the doctrines, claims and distinctions found in *De Anima* II 5 can just as easily be found elsewhere in the corpus. Some of them – the distinction between potentiality and actuality is a prime example – are so familiar that scholars seldom stop long enough with the chapter to inquire, What are they doing here? How, in detail, do they contribute to the final result? To my knowledge, II 5 has never received the kind of close scrutiny I offer here. I offer it not only in the hope of settling some controversial questions about Aristotle's theory of perception, but also with the aim of drawing my readers into wider issues about how an Aristotelian discussion works on the page.

In particular, I am interested in the function of the cross-references to other parts of the chapter, to other parts of the treatise, and to other treatises like the *Physics* and *De Generatione et Corruptione*. These cross-references are not to be dismissed as due to a later editor. That may be a plausible account for some of the cross-references in the corpus, but not for those in II 5. Here they are woven too closely into the texture of the discussion to be the work of anyone but Aristotle himself. Even if you

[8] Cf. n. 14 below.

think the cross-references in the corpus do not in general contain the clues scholars once hoped to find for the chronological ordering of the treatises, some of them may still offer guidance as to how a particular stretch of writing should be read. If, as I shall argue, this is indeed the case for the cross-references in *De Anima* II 5, the same may be true elsewhere.[9]

Finally, the text. Compared with other Aristotelian works, the *De Anima* has a higher than average number of textual problems, and not only in the third Book. It is all too easy to get used to Ross's OCT (or whatever edition you normally work with) and forget how many philological-cum-philosophical decisions are presupposed by the neatly printed page. Martha Nussbaum writes,

> The philosopher/scholar should be especially attentive to the critical apparatus when working on the *De Anima*, and should think with more than usual care about the alternatives that have been proposed, using, if possible, more than one edition.[10]

I agree; there is much to ponder in the apparatus to II 5.[11] The same holds, I would add, for the nuances of alternative translations. Accordingly, my footnotes will regularly call attention to differences of interpretation that may result from one choice or another in matters of text and translation. In addition, the two Appendices attempt to undo the effects of an emendation by Torstrik which, even when it is not printed, has so skewed the translation, and hence the interpretation, of the key lines 417a 30-417b 7 that a central Aristotelian doctrine is widely misunderstood.

Setting out the endoxa

I shall approach the chapter as a model example of Aristotelian dialectic working to refine the reputable opinions (*endoxa*) – in this case the opinions that surround the idea that perception is some sort of alteration. To grasp the positive message of II 5 we need first to ask what preliminary

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[9] In Burnyeat *Map*, chap. 5, I argue that the network of cross-references which link the many treatises of the corpus to each other should be read non-chronologically, as indications of the order of argument and exposition and hence of the appropriate order of reading. Burnyeat 'Foundations' is a particular case study of how this approach applies to the physical works.

[10] Nussbaum and Rorty, 'Introduction' p. 2.

[11] The most convenient account of the complicated manuscript tradition of the *De Anima* is Jannone xxiv-xlv; Ross is no longer adequate.

understanding of 'perception' and of 'alteration' we should bring to our reading of the chapter, and then watch carefully to see how, by the end, that preliminary understanding is transformed. The transformation is dramatic. Its implications reach far beyond the controversy I began from.

We are to speak generally about all perception (416b 32-3). Book I of the *De Anima* has reviewed a number of previous philosophers' accounts of perception. Aristotle's highly schematised roll-call of reputable opinions on the nature of soul sets out from the two great distinguishing marks by which, he claims, earlier thinkers separated animate (ensouled) things from inanimate ones: perception and movement (I 2, 403b 20-28). Perception, in this discussion, is the basic *cognitive* capacity of soul.[12] Those who looked to perception to explain the nature of soul were saying, in effect, that to be animate is to have the means of getting information about the world – a view Aristotle will endorse in his own terms when he makes the power of perception definitive of what an animal is (II 2, 413b 1-4; cf. *GA* I 23, 731a 24-b 5).

Some of these philosophers distinguish perception from other, higher types of cognition; most according to Aristotle do not.[13] But it is common ground between Aristotle and everyone else that the lowest level of cognitive interaction with the environment is the level at which the senses operate. In what manner the senses operate, what explains their operation, how much information about the world they can deliver and in what form it comes – all of that is moot, to be discussed and determined between now and the end of III 2.[14] It is the first two of these questions that II 5 will address.

As in Book I, so here we start from the reputable opinions on the subject:

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[12] The conjunction of knowing and perceiving at 404b 9 (τὸ γινώσκειν καὶ τὸ αἰσθάνεσθαι τῶν ὄντων) is echoed by the cognitive vocabulary which predominates in the sequel: 404b 17; 28; 405a 23; 28; 405b 8; 13-16; 21. The critical assessment in I 5 starts with the same conjunction at 409b 24-5 (ἵν' αἰσθάνεταί τε τῶν ὄντων καὶ ἕκαστον γνωρίζῃ) and continues with a similar predominance of cognitive vocabulary: 409b 26; 30-31; 410a 8; 18; 24-6; 29; 410b 2-4; 9-10; 16; 411a 4-6; 24.

[13] The Platonists do (I 2, 404b 25-30); the older philosophers do not (I 2, 404a 27-b 6, discussed below; III 3, 427a 21-2; cf. *Met.* IV 5, 1009b 12-13).

[14] The last sentence of III 2, 'So much, then, by way of discussion of the principle by which we say that an animal is capable of perception' (427a 14-16), closes the discussion begun at the beginning of II 5 and thereby credits all the intervening material (including III 2's account of perceptual self-awareness) to the power of perception.

> [1][a] Perception consists in[15] being changed[16] and affected, as has been said; for it is held [b] to be some sort of alteration. In addition, some say [2] that like is affected by like[17] (416b 33-5).

That these claims are not yet endorsed in Aristotle's own voice is confirmed by the back-reference 'as has been said', which reports Aristotle's *report* in I 5 of what had been supposed by reputable thinkers in the tradition:

> They suppose (*titheasin*) that perceiving is some sort of being affected (*paschein ti*) and changed (410a 25-6).

[1][b] has also been said before, but in a very different context (II 4, 415b 24) where it is clear that the word 'alteration' (*alloiōsis*) carries a technical Aristotelian sense 'change of quality', presupposing his theory of categories, which no previous thinker could have intended.[18] Aristotle's doctrine that, besides generation and destruction, there are just three categorially distinct types of change – locomotion (change of place), alteration (change of quality) and growth/diminution (change of quantity) – was introduced without argument early in the treatise at I 3, 406a 12-13.

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[15] Translations of συμβαίνει ἐν vary between 'consists in' (Hicks, Hett, Ross in his summary, Hamlyn, Barbotin) and expressions like 'depends on', 'results from' (Wallace, Rodier, Smith, Tricot). The causal implications of the latter are certainly premature so early in the chapter. 'Consists in' can be misleading in a different way, as we shall see (p. 77 below), but it is vague enough to mean no more than that perception belongs within the wider class of passive changes. I argue later for this understanding of [1][a] as a statement of classification.

[16] The usual translation 'moved' (Hicks, Smith, Hett, Hamlyn) is misleading for several reasons, the most immediate being that [1][b] will subsume alteration under κινεῖσθαί τε καὶ πάσχειν. κινεῖσθαι must therefore correspond to κίνησις in the generic usage exemplified at I 3, 406a 12-13, not to κίνησις meaning 'spatial movement'.

[17] How to translate καί in the last sentence? Usually, it is taken as 'also': 'Some add' (Hicks, Ross), 'Some say too' (Hamlyn; cf. Barbotin). But this tends to suggest that the thinkers who propounded [2] did so in conjunction with [1][a] or [b]. I hope to leave readers feeling that that is unlikely and irrelevant; for the dialectic of the chapter, Aristotle needs only to have these opinions in play, not to have any one thinker subscribe to the lot. Smith and Hett translate, 'Some say that like is affected only by like', with καί intensifying the emphasis on likeness; this is what [2] amounts to, as we shall see. Alternatively, my 'In addition' is designed to keep καί as 'also' but give it wider scope: 'Another opinion in the field is [2]'.

[18] Some scholars (Rodier, Hamlyn) propose this passage as the target of the back-reference 'as has been said' attached to [1][a]. I hope to show that the shift from [1][a] to [1][b] is not as innocent as they presume. But at least they stay within the treatise, unlike Hutchinson p. 376, who targets *Ph.* VII 2, 244b 10-245a 2.

The conclusion to draw is that, whereas our preliminary understanding of 'perception' comes from reading the *De Anima*, our understanding of 'alteration' should have been formed already by studying works like the *Physics* and *De Generatione et Corruptione*.[19]

This creates a problem for our reception of [1][b]. [1][a] looks vague and general: they suppose that perception consists in some change or other in which the perceiver is passive. [1][b] makes this more precise, specifying the change they have in view as alteration or change of quality. Both statements present a reputable opinion from the tradition. With what right does Aristotle substitute 'alteration' for 'passive change' when reporting what other people think? Even if those earlier thinkers used *alloiōsis* or related words in writing about perception,[20] why should their meanings be confined in his categories?

The relevant group of thinkers has been associated from the start with the principle that like is known or perceived by like (I 2, 404b 17-18; 405b 15; I 5, 409b 26-8). Their position is summed up in the passage already cited from I 5, where they are said to combine [1][a] with the epistemological thesis,

> [3] Like perceives like and knows like by virtue of being like it (410a 24-5).

Likeness for Aristotle tends to mean 'same in quality'.[21] Once we join [1][a] with [3] we realise that the qualitative bias made explicit by [1][b] was present all along.

Yes, but the two most prominent named members of the group, Empedocles and Plato in the *Timaeus*,[22] both account for perception by the movement of microscopic effluences and particles. In their case at least, for Aristotle to explain [1][a] 'Perception consists in some sort of passive change' by [1][b] 'Perception is some sort of qualitative alteration' is to insist that, for the purposes of the present discussion, the meaning of their ideas is to be fixed by his physics, not theirs.[23]

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[19] See *Ph.* III 1, esp. 200b 32-201a 3; V 1-2; *GC* I 4; also *Cat.* 14.

[20] See the quotations in III 3, 427a 23-6, and *Met.* IV 5, 1009b 18-25.

[21] *Cat.* 8, 11a 15-19; cf. *Met.* V 9, 1018a 15-18; 15, 1021a 11-12.

[22] They were named at I 2, 404b 8-18, as thinkers who make the soul out of their favoured elements in order to explain perception and cognition; Aristotle returned to them at 5, 409b 23-4.

[23] There is a neutral use in which the family of terms πάσχειν, πάθος, πάθημα does not select for any category, and a narrower use in which they select for attributes in respect of which a thing can alter and hence for the category of quality; cf. Ross *ad Met.* V 21. [1][b] reads πάσχειν in [1][a] more narrowly than Empedocles or Plato are

We need not be shocked to find the reputable opinions served up already cooked in an Aristotelian stew. It is well known that the same is true of Aristotle's treatment of his predecessors in the first book of the *Metaphysics*. My interest is in his presentation of the reputable opinions, not their historical accuracy. Aristotle has objections of principle against those who account for perception, or for other cases of being affected, by appeal to what happens at the microscopic level (*GC* I 8), and he is taking those objections for granted here. *That* is the point to emphasise. From page 1 of the *De Anima*, where knowledge of soul is introduced as one of the most important and certainly the most difficult of the tasks *of natural philosophy* (I 1, 402a 1-11), Aristotle's physical theory is presupposed. His psychology is designed to be the crowning achievement of his physics.[24]

A good example of psychology's intimate relation to the rest of Aristotelian physics is coming up next. But first, I want to pick out another feature of [1][b]: the careful vagueness of the phrase 'some sort of alteration' (*alloiōsis tis*), which echoes and preserves the careful vagueness of the phrase 'some sort of being affected' (*paschein ti*) in I 5's version of [1][a] (410a 25, quoted above).[25] 'Alteration' may carry its technical meaning 'change of quality', but Aristotle intends to leave plenty of room for the question what sort of change of quality perception is. The answer could be that perception is a certain kind of alteration, a subspecies marked off from others by an appropriate differentia. Alternatively, rather than 'a kind of alteration', *alloiōsis tis* could mean 'an alteration of a kind', the *tis*

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likely to have intended. A further narrowing takes place at *Ph.* VII 2-3, 244b 2ff., where alteration is confined to changes in *sensible* quality and perception is included under alteration (for discussion, see Wardy pp. 139ff.) To read this narrowest notion of alteration into [1][a] from the start would be outrageously unfair to the thinkers [1][a] reports. Yet it is the notion that Aristotle will obtain in II 5 by analysing perception *of* a sensible quality as alteration *by* it.

[24] The programme is mapped out in *Meteor.* I 1 (discussion in Burnyeat 'Foundations'). By 'physics' in this paper I mean the Aristotelian study of nature (φυσική), not the deeply anti-Aristotelian physics we have inherited from the 17th century; correspondingly, the adjective 'physical' means 'pertaining to Aristotelian physics' and imports no contrast with the mental. (In 'Draft' I confusingly switched back and forth between this and the modern usage of 'physical' in contrast to 'mental'; for amends and clarification, see Burnyeat 'Aquinas'.)

[25] This is the place to note Hicks's comment *ad* 410a 25 that the τι in πάσχειν τι agrees with the infinitive taken as a noun; it is not an accusative governed by the infinitive. There need be no significance in the variants τε for τι at 410a 25 and τι for τε at 416b 33, but they are interesting nonetheless.

being an *alienans* qualification to signal that perception is an alteration only in an etiolated sense.[26] I shall argue for the second: perception is an alteration from which you cannot expect everything you would normally expect from alteration.

Developing the aporia

After the reputable opinions, we expect a puzzle (*aporia*) to show that they cannot all be true as they stand; some modification is required. In fact, we know that already. To quote yet again, this time in full, from I 5:

> Further, it is absurd for them to maintain, on the one hand, [*2] that like is unaffected by like and, on the other, [3] that like perceives like and knows like by virtue of being like it, while at the same time[27] they suppose [1][a] that perceiving is some sort of being affected and changed, and so too is conceiving and knowing (410a 23-6).

Never mind whether any one philosopher ever held this seemingly inconsistent triad of opinions; we are dealing with a dialectical construct, not the stuff of history. The inconsistency is produced by adding in the principle [*2] that like is *un*affected by like. This has not been mentioned in the *De Anima* so far. It comes from *De Generatione et Corruptione* I 7, 323b 1-15, which ascribes it to all previous thinkers except Democritus.[28]

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[26] A nice illustration of *alienans* τις in *DA* is III 10, 433a 9-10: εἴ τις τὴν φαντασίαν τιθείη ὡς νόησίν τινα, where the very next sentence makes clear that φαντασία is not really νόησις. Cf. I 1, 403a 8-9; II 5, 417b 3 (echoing Pl. *Euthd.* 285b 1); III 3, 427a 19-20; 12, 434b 18.

[27] At 410a 25 Rodier reads γάρ instead of the usual δ', and Smith translates 'for'. γάρ has poor manuscript support, but at least it recognises that *[2] and [3] on their own, without [1][a], make no absurdity. If you translate the δ' adversatively as 'but' or 'yet' (Hamlyn, Hett, Hicks, Ross), you are liable to suggest that Aristotle supposes *[2] and [3] do make an absurdity on their own. My rendering of δ' is modelled on Siwek's 'cum tamen'.

[28] This enables Hicks and Ross *ad* 410a 23 to agree that, if we go by Aristotle's testimony, the charge of inconsistency holds against everyone except Anaxagoras, who denied that like knows like (I 2, 405b 14-15; 19-21), and Democritus. True enough, if 'affected' has the same meaning in [*2] and [1][a]; for example, if in both it means simple qualitative alteration. But that only underlines once more how artificial it is to leave out microscopic events when reviewing earlier theories of perception. Again, Joachim *ad* 323b 10-11 finds it strange that [2] should be attributed to Democritus alone, given that Empedocles and others subscribe to [3] and Aristotle treats [3] as a special case of [2]. But [3] does not instantiate [2] without [1][a] and a parallel assurance that 'affected' has the same meaning in both premise and conclusion. From the

De Generatione et Corruptione I 7, 323b 1-15, is also the source of the opposite (Democritean) opinion [2] that like is affected by like, which makes its first appearance in the *De Anima* at the beginning of II 5. It is entirely appropriate, then, that Aristotle's next move in II 5 (417a 1-2) is to send us to *De Generatione et Corruptione* I 7 for a general (*katholou*) account of what [2] gets right and what wrong. The cross-reference to *De Generatione et Corruptione* I 7 identifies the place where [2] and its contrary [*2] met head on and their conflict was resolved. The point of the cross-reference is not to say 'If you are interested in this topic, you will find more about it in *GC* I 7', but 'You need to bear *GC* I 7 in mind as you read *DA* II 5'.[29]

Both the conflict and the resolution presuppose the previous chapter of *De Generatione et Corruptione*, which isolated a narrow meaning of 'being affected' (*paschein*) and a correspondingly narrowed meaning of 'acting on' (*poiein*) – meanings that apply only to alteration or change of quality (I 6, 323a 16-20).[30] The chapter we are supposed to bear in mind as we read *DA* II 5 is narrowly concerned with alteration. Aristotle speaks in *GC* I 7 of agent and patient, acting on and being affected. But he means agent and patient of qualitative change, altering and being altered. Small wonder it has been hard to find an explanation or justification in the *De Anima* for Aristotle's tendency to construe his predecessors in qualitative terms, as when he gives [1][b] as his gloss on [1][a]. The decision to concentrate on qualitative change was made elsewhere, outside the *De Anima*.

It was not of course an arbitrary decision. *De Generatione et Corruptione* is a work about the lowest level of Aristotle's world, where the elements change into each other (elemental generation and destruction), act on each other and on other things, and combine by mixture to form more complex stuffs like bronze or flesh. At this level quality is all-important. Quality determines the elemental natures and explains their transformations and interactions. For the primitives of the theory are not 'the so-

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point of view of historical accuracy, the chief victim of distortion is perhaps Plato: he does at *Tim.* 57e 5-58a 1 propound a version of [*2], but for that very reason (and others) he should not be treated as a straightforward adherent of [3]. For intellectual knowledge, if not for perception, he has his own version of the assimilation story by which Aristotle solves the ἀπορία (*Tim.* 90cd).

[29] This was well understood in the ancient tradition. Witness the extra words λεκτέον δὲ καὶ νῦν (*vel sim.*) sometimes found added after πάσχειν at 417a 2 (details in Philop. 290, 25-8; Rodier *ad loc.*; Jannone's apparatus).

[30] Cf. n. 23 above.

called elements', earth, air, fire and water, but rather the four elementary qualities – hot and cold, wet and dry, hot and cold being active powers, wet and dry passive – which (a) explain the other tangible qualities that differentiate bodies as bodies (*GC* II 2, cited at *DA* II 11, 423b 29), and (b) determine through their four compatible combinations the essential natures of earth, air, fire and water (*GC* II 3). It is this qualitative physics that Aristotle invokes for the study of perception. The lower is to help us understand the higher. How?

What we should have learned from *GC* I 7 is that [*2] 'Like is unaffected by like' and [2] 'Like is affected by like' each capture one part of a larger truth. For an agent *A* to affect a patient *P*, *A* must *assimilate P* to itself (*homoioun heautōi*, 324a 10-11), as when fire makes a cold thing hot or warmer than it was before. *A* and *P* start off characterised by contrary predicates from the same range; they are thus generically alike, specifically unlike. When they meet, *A* is bound to act on *P*, and *P* is bound to be acted upon by *A*, just because they are contrary to each other; that is the nature of contrariety. So *A* and *P* end up with the same or closer predicates of the range.

Two curious arguments support this analysis (323b 18-29). One is that there could be no interaction between whiteness and a line, which confirms the requirement of generic likeness. The second argument is that, if likeness rather than contrariety was the explanation of *A*'s affecting *P*, both *P* and every other thing would continually affect itself (each thing is always as like itself and as close to itself as anything could be!), and nothing would be indestructible or unchangeable. This supports the requirement of specific unlikeness. Combine generic likeness and specific unlikeness, and qualitative contrariety emerges as a fundamental explanatory principle of Aristotelian physics (323b 29-4a 14).[31]

My theme is the dependence of Aristotle's psychology on (the more elementary parts of) his physics. What interests me, therefore, is to see the second of the arguments just mentioned reappearing in *DA* II 5, 417a 2-6, as the puzzle which will show that the reputable opinions need modification. Why are the senses not self-activating? They would be self-activating if *P* perceives *A* because of the likeness between them: *P*, which is always like itself, would continually perceive itself without needing an external stimulus. It was *GC* I 7, 323b 1-15, which made clear that 'Like

[31] Corollary: an organic unity cannot be affected by itself (*Met.* IX 1, 1046a 28; cf. *Ph.* VIII 4, 255a 12-15).

is (un)affected by like' is to be read causally: 'Like is (un)affected by like *because* they are alike'. All the *De Anima* has to do is take perceiving as a special case of being affected and find suitable values for *P* and *A*.[32] The puzzle about the senses perceiving themselves is then a complete and conclusive refutation of the initial set of reputable opinions, [1][a] and [2]. They cannot both be true as they stand.

But we already know from I 5 (above, p. 37) that if [1][a] is combined with the opposite principle [*2] that like is *un*affected by like, we must give up or modify the reputable opinion which gave rise to this whole discussion: [3] like perceives like. This is the moment for Aristotle to reveal the truth that does justice to the truth in each of [1][a], [2], [*2], and [3].

A preliminary lusis

The solution (*lusis)* which points the way forward is the assimilation story from *De Generatione et Corruptione*. For *P* to perceive *A*, *P* and *A* must

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[32] (i) Editors standardly remark that for *P* Aristotle writes αἰσθήσεις (417a 3) but means the organs rather than the faculties of sense, since it is the former that consist of the same elements as external objects. Parallels can of course be found (see Hicks *ad loc.*), but it seems important to add that there may be a philosophical reason for the language used here. Aristotle's target is a view he originally characterised (I 2, 404b 8ff.; 5, 409b 23ff.) by saying that those who explain soul by cognition of like by like make the soul consist of their favoured elements, whether these are material (Empedocles, etc.) *or immaterial* (the Platonists). They make the cognitive faculties out of elements too (410b 22), and fail to give reasons for denying that the soul is nothing but the elements it consists of (410b 10-12). I suggest, therefore, that for *P* Aristotle writes αἰθήσεις because that is what he means; it is his opponents who equate αἰσθήσεις with the elements (cf. Plutarch of Athens *apud* Simplic. 118.8-10).

(ii) For *A* Aristotle writes 'the elements in virtue of themselves or their accidents' (417a 5-6). Ross is right, against Rodier and Hicks, that συμβεβηκότα here must cover essential as well as accidental qualities of the elements, but wrong to see the disjunction as Aristotle hedging on which disjunct is more correct. It is not his doctrine either that perception is always of the elements (which in Aristotelian compounds have only potential existence), or that elements are ever perceived in virtue of themselves (*per se*); the classification of sense-objects in II 6 would have them perceived accidentally, in virtue of their sensible qualities, whether essential (earth's dryness) or accidental (its colour). I conclude that the clause ὧν . . . τούτων at 417a 5-6 states the doctrine of Aristotle's opponents, and that the disjunction recalls the problem posed for Empedocles at I 5, 409b 31-410a 13, about how he can explain the perception of compounds (which in his physics, as viewed through the Aristotelian eyes of *Ph.* II 1, 193a 21-8 and *GC* II 7, 334a 25-b 2, are accidental assemblages of elemental bits).

be unlike to begin with, so that *A* can affect *P* (because of the unlikeness between them) and make *P* like itself. The perceiving is an assimilation in which *P becomes* like *A*.

With [3] thus modified, the reconciliation of [2] and [*2] in *GC* I 7 allows [1][a] to stand – unmodified but now unambiguously explicated by [1][b]. For the upshot of the dialectic we have just been through is to confirm that perceiving is an alteration in the technical Aristotelian sense 'change of quality'.

However, it is not until the end of the first paragraph of II 5 that Aristotle sums up the assimilation story:

> [A] For this reason, in one way a thing is affected by like, and in another by unlike, as we said;[33] for it is the unlike which is affected, although when it has been affected it is like (417a 18-20).

As the initial 'For this reason' (*dio*) indicates, the lesson learned from *De Generatione et Corruptione* I 7 is now embedded in a wider explanatory context. The wider context is furnished by the all-pervasive Aristotelian concepts of potentiality and actuality.[34] Aristotle's immediate response to the puzzle about why the senses are not self-activating was to conclude that a perceiver as such is a potential being, not yet an actuality. That is why it needs an external cause to start one perceiving – exactly as combustible fuel needs an actual fire to set it blazing (417a 6-9). It is only after perceiving and the senses have been connected to potentiality and actuality (417a 9-18) that Aristotle reaches [A] and shows us he is prepared to endorse [1][b] in his own voice. [1][b] is simply [A] applied to perception.

This wider context for the assimilation story [A] does not come from *De Generatione et Corruptione* I 7.[35] The work to which Aristotle's cross-

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[33] Hicks and Ross *ad loc.* refer to II 4, 416a 29ff., where [*2] makes its second appearance in the treatise (line 32) and the dialectical treatment of conflicting opinions on nutrition exactly parallels the treatment of perception, the outcome being that in nutrition a feeder assimilates food to itself and the food takes on the form of the feeder. Hicks also entertains, but considers less probable, the idea that 'as we said' simply reiterates the reference to *GC* I 7. The question scarcely matters, since any reader who has followed up the earlier cross-reference to *GC* will realise that *DA* II 4 itself rests on *GC* I 7, as well as the lengthy analysis of growth in *GC* I 5.

[34] Hett begins a new paragraph at πρῶτον μὲν οὖν (417a 14). Hardly obligatory, but he is right that the argument takes a new turn here.

[35] The only hint of potentiality and actuality there is the reference to τὸ δυνάμενον θερμὸν εἶναι at 324b 7-8. Then silence until the equally brief reference at *GC* I 9, 326b 31.

referencing now sends us (417a 16-17) is *Physics* III 1-3 on the nature and definition of change itself.[36]

What we should have learned from *Physics* III 1-3 is that alteration, by virtue of being a kind of change, is 'a sort of actuality (*energeia tis*), though an incomplete one' (417a 16-17). The point is even more technical than it sounds.[37] Alteration, as a kind of change, is the actuality of the alterable *qua* alterable (*Ph.* III 1, 201a 11-12): what alters does so because it has a potentiality to be qualitatively unlike its present self, and the process of alteration is the exercise or actuality of that potentiality, its fullest manifestation. At the end of the process, when the subject has become unlike it was, the potentiality which existed before and (more fully) during the alteration is no more. It is exhausted, used up. A new quality, which is a new potentiality for change, has replaced the old.

This is the reason why alteration is essentially incomplete. It is defined by and directed toward an end-state outside itself. Cold is a potentiality for being warm. Being warmed, the actuality of that potentiality, is the process of changing from cold to warm. But once a thing *is* warm, it is no longer manifesting and no longer even possesses the potentiality for being warm.[38] It has the actuality of warmth instead. The cold has been destroyed and replaced by its contrary. Alteration really alters.

The notion of incomplete actuality suggests a contrast with complete actuality. This would be a process or activity which is not defined by and

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[36] 417a 16-17 virtually quotes *Ph.* III 2, 201b 31-2. But obviously the quotation makes little sense without III 1 to explain it. Moreover *Ph.* III 3, on the identity of changing and being changed and the location of both in the changed, will supply a key doctrine for the theory of perception in *DA* III 2, 425b 26-6a 26. Note also the supergeneralisation of which [A] is one instance at *Ph.* III 2, 202a 9-12. Accordingly, I take the cross-reference to be Aristotle's way of announcing that *DA* presupposes *Ph.* III 1-3 as the unitary discussion it was written to be. That might explain why in *DA* III 2 he feels no need to add a second cross-reference to the text he has already told us to bear in mind.

[37] For help with the technicalities I recommend Kosman 'Motion' (pp. 40-50, 56-8), followed by Waterlow chap. 3 and Hussey pp. 58-65. These authors all agree that the traditional charge that Aristotle's definition of change is circular can be blocked if we understand the relevant potentialities as potentialities for being, not as potentialities for changing. I have not been persuaded by critics like Heinemann who continue to prefer the latter. An obvious objection is that the actuality of a potential *for changing* should be complete as soon as change begins.

[38] See *Ph.* II 1, 201a 19-22; b 10-11, with Kosman 'Motion' pp. 57-8, Waterlow p. 115. Does this commit Aristotle to denying that if a thing is warm, it can be warm (ab esse ad posse valet consequentia)? No. What it shows is that the concept of potentiality on which Aristotelian physics is founded is not the bare concept of possibility.

directed towards an end-state outside itself. Rather, it is defined by and directed towards itself; its end is to engage in the activity itself, for its own sake. In ethical and metaphysical contexts Aristotle often contrasts activities which are their own end with those aiming at a further product (e.g. *EN* I 1, 1094a 3-5; X 6, 1176b 6-7; *Met.* IX 8, 1050a 23-b 2), but nowhere, so far I as know, does he call the former 'complete actuality'. The ancient commentators contrast change (*kinēsis*) with complete actuality (*teleia energeia*),[39] but the closest Aristotle gets to doing so is in three places, one far better known than the others.

(i) In *Metaphysics* IX 6, 1048b 18-35, actions which are their own end are classed as actualities (*energeiai*) in a sense that *excludes* change (*kinēsis*). Change, being incomplete, is not *energeia* at all, not even incomplete actuality. This terminological restriction on the scope of the term '*energeia*', unique in the extant corpus,[40] suggests that the passage was written as a contribution to metaphysics (first philosophy) or ethics, not physics. For in Aristotle's physics the idea that change is (incomplete) actuality has a foundational role. Thus (ii) he worries in *Physics* III 2, 201b 33-5, that the notion of change is elusive, difficult to grasp, because it cannot be classified either as privation or as potentiality – or as actuality unqualified (*energeia haplē*). Yet if change is nothing real at all, physics will have no subject matter to study. The one possibility remaining is that change is a qualified sort of actuality. So it becomes part of Aristotle's official definition of change (reaffirmed as such at VIII 5, 257b 8-9) that change is a qualified actuality, intrinsically other-directed and incomplete. But the *Physics* does no more than mention the contrasting idea of unqualified actuality.

(iii) *De Anima* III 7, 431a 6-7, contrasts change, as the actuality of something incomplete, with the actuality of something complete or perfected, and calls the latter 'unqualified actuality' (*hē haplōs energeia*). In (ii) and (iii), unlike (i), change remains actuality – subject to the qualification that it is incomplete. It is incomplete because (as explained already at *Ph.* III 2, 201b 32-3) the potential thing it is the actuality of is itself incomplete; the latter is incomplete, I take it, because it is not yet what it has the potentiality to be. (ii) and (iii), because they do at least mention an

[39] So e.g. Themistius 18.20-37, 112.28-32; Philoponus 296.21-297.10; Simplicius (if it be he) 264.23-6; Sophonias 66.14-17.

[40] Or so I argue in Burnyeat 'A much read passage', where I also show that the passage was not written for *Metaphysics* IX, even if (as I assume here) it is authentic Aristotle.

unqualified actuality that contrasts with the incomplete actuality of change, offer a line of thought to which I must certainly return. Not so (i), which rules itself out of the repertoire of passages relevant to the idea of change as incomplete actuality. If from time to time in the sequel I mention (i), I do so only to keep it at bay. Its influence on interpretations of II 5 has been a hindrance, rather than a help, to understanding the positive message of the chapter.

Back now to alteration. After reminding us that change is incomplete actuality, Aristotle adds that the agent of alteration must already have in actuality the quality the patient will acquire (417a 17-18, from *Ph.* III 2, 202a 9-13). This would allow him to reformulate the assimilation story [A] for perception in terms of potentiality and actuality, as follows:

> [P/A] The perceiver[41] is potentially what the sense-object is actually, e.g. warm or red, so perceiving is being assimilated to that object, altering to become actually warm or red.

Just that is the conclusion Aristotle states at the very end of II 5, 418a 3-6, where 'as has been said' refers back to the context we are discussing.[42] So this is a good place to review the results of the dialectic so far. At the end of the first paragraph of II 5 Aristotle has assembled all the equipment he needs for a full formulation of [P/A]. Had he provided it at once, without pausing to add the refinements of 417a 21-418a 3, we would still have a remarkable account of perception.

The most remarkable feature is a causal scheme which explains why one cannot perceive warmth or red unless something actually warm/red is

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[41] I write 'perceiver' here for two reasons. First, to bracket the question whether a perceiver is potentially *F* by virtue of having a sense which is potentially *F* or by virtue of having an organ which is potentially *F*; since my opponent presses hard for [P/A] to be a thesis exclusively about organs (Sorabji 'Body and Soul' pp. 52-3; 'Intentionality' pp. 212-13; cf. Hamlyn pp. 104, 113), it is only fair to keep my language as clean as I can. (For what it is worth, *EN* X 4, 1174b 17-8, implies that at least in that context it does not matter which we say.) But second, 'perceiver' may well be the best translation for τὸ αἰσθητικόν in II 5. Thus at 418a 1 and 3, instead of a reference to 'the perceptive faculty' (Hicks, Ross, Tricot, Theiler, Barbotin), a reference to the subject capable of perceiving (Rodier, Smith, Hett) would match the preceding neuters τὸ ἔχον τὴν ἐπιστήμην (417b 5-6), τὸ φρονοῦν (417b 8), τὸ μανθάνον (417b 12); a similar translation at 417a 6 would match the following neuters τοῦ καυστικοῦ (417a 8), τὸ δυνάμει ἀκοῦον καὶ ὁρῶν (10-11); 417b 16 and 418a 1 will fall into line later. II 3, 415a 6-7 is a nice example of a single sentence where both meanings of the – ικόν ending are displayed.

[42] So Rodier and Ross; Hicks is needlessly hesitant.

present to stimulate the appropriate sense. It is not just that *some* external cause is needed for perception. Perceiving something is being assimilated to it, e.g. being warmed or reddened, and the whole weight of Aristotelian physics stands behind the demand that the cause of this alteration be something actually warm or red.

What is more, the warm or red object acts as cause in virtue of being warm or red. Not for Aristotle the modern idea that the object acts on the perceiver in virtue of some non-phenomenal feature (molecular motion, light reflectancy) on which its appearing warm or red depends. Aristotle's is a world in which, as I have emphasised before,[43] colours, sounds, smells, and other sensible qualities are as real as the primary qualities (so called by us). They are real in the precise sense that they are causal agents in their own right.[44]

An immediate corollary, to be announced in the next chapter II 6, is that perception of such qualities as red and warmth is always true (418a 14-16; cf. III 3, 428b 18-19; 21; 27-8; 6, 430b 26-30; *Met.* IV 5, 1010b 2-3). This doctrine has provoked much puzzled discussion. It is seldom recalled that, if seeing red is being reddened and assimilated to something actually red, there is bound to be a match between the qualitative content and the qualitative cause of sight.[45] In causing the perceiver to become warm or red, sensible qualities cause themselves to be perceived as the qualities they are. Conversely, to perceive is to be altered *by* the sensible quality one has a perception *of*.

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[43] 'Draft' pp. 21-2.

[44] Essential reading on this topic is Broadie, interestingly (but in my view unsuccessfully) challenged by Broackes.

[45] We should not make too much of the solitary qualification ἢ ὅτι ὀλίγιστον ἔχουσα ψεῦδος at 428b 19; Aristotle himself ignores it at 21 and 27-8. Since Aristotle assumes his readers will understand the qualification, we should look for help within the chapters between II 6 and III 3. There we find II 9, 421a 9-26, on the 'inaccurate sense-organs' that make hard-eyed animals bad at discriminating colours and humans bad at discriminating smells, though we do brilliantly with objects of touch. No need to look ahead to the types of perceptual illusion discussed in *De Insomniis* 2, which are hardly examples of 'the least possible error'. No need to join the sophisticated revival by Charles pp. 118-124 of Block's teleological interpretation of proper object perception as true *whenever all is functioning well.* II 9's cases are genuine perceptions, not mere illusory appearance, for they are appropriately caused (as illusions are not) by the sensible form of the object perceived. Yet to hard-eyed animals that form appears less bright, or less distinctly orange, than it actually is. Again, *PA* II 2, 648b 12-17, mentions a case where the cause of a hot thing's feeling hotter than it should is the perceiver's condition, not their sense-organ. This is an exaggerated response to real heat out there, not just the illusory effect of fever within.

This result sets the framework for the *De Anima*'s theory of perception. All the talk of perceivers becoming like the object, of their being affected by sensible forms and taking on the colour or smell perceived – all this derives from applying the assimilation story [A] to the special case of perception, as spelled out in [P/A]. But perception is a very special case, as we are about to see.

For Aristotle in II 5 does not proceed directly to a full formulation of [P/A]. First comes a lengthy and complex analysis (417a 21-418a 3) of different types of potentiality. When we do reach [P/A], at the very end of the chapter, our understanding of what it means to say that the perceiver is *potentially* what the sense-object is actually is quite different from what it would have been had Aristotle derived his conclusion immediately from [A].[46] The difference brings with it, as a direct consequence, a new and radically different understanding of 'alteration' in our starting point [1][b]. In one fell swoop all the evidence for the Sorabji interpretation is turned to evidence for a different view. The rest of the *De Anima* must be read in accordance with that different view, as must its sequel *De Sensu*, which starts by announcing, 'All that has already been said about soul is to be assumed' (1, 436a 5; tr. Hett).

The demand for distinctions

We have learned a lot from *De Generatione et Corruptione* 1 7 and *Physics* III 1-3. But it is not enough for more than a preliminary solution. Aristotle's directions to the reader are loud and clear:

> *To begin with* let us speak[47] as if being affected and being changed and actual exercising (*energein*)[48] are the same thing; for change is indeed a sort of actuality (*energeia tis*), though an incomplete one . . .

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[46] Both Themistius 54.3-20 and Philoponus 289.31-2 have a sound appreciation of the point.

[47] Editors generally print λέγωμεν, both here and at 416b 32; an exception is Jannone, who prints λέγομεν each time. λέγομεν makes reasonable sense: by speaking in the simple way we are now (since 417a 6) speaking about potentiality and actuality, we are ignoring the distinctions embarked upon at 417a 21ff. Correspondingly, ἁπλῶς at 417a 22 refers to the way potentiality and actuality are spoken of in the preceding paragraph. Nonetheless, I prefer λέγωμεν in both places. The chapter is full of more or less imperatival expressions: 417a 21; b 8; 11-12; 14; 30; 418a 2. They are important guides to an intricate discussion.

[48] 'Actual exercising' is a compromise translation meant to bring out the connection, essential to this context, between actuality (ἐνέργεια) and the exercise (ἐνεργεῖν)

> At the same time, however,[49] distinctions should be made concerning potentiality and actuality (*entelecheia*). For *at the moment* we are speaking[50] about them in a simple way[51] (417a 14-17 . . . 21-22).

The discussion that follows sets out from a distinction between two types of potentiality (417a 22-8; cf. 417b 30-32).[52] A distinction between two types of potentiality implies a corresponding distinction between two types of actuality. We will find Aristotle unwilling to tell us as much as we would like to know about the actuality side of the distinction.

His reticence on this point shows up already in the provisional assumption that 'being affected and being changed and actual exercising (*energein*) are the same thing'. In effect, he is asking us to suppose that there is no such thing as complete or unqualified actuality,[53] and *a fortiori* no such thing as *energeia* in the exclusive sense of *Metaphysics* Θ6. There is only the incomplete actuality exhibited by a process of change which is defined by and directed towards an end-state outside itself. An extraordinary request. What can it mean?

Putting that puzzle on hold for later, let us note that the 'simple' way of speaking which Aristotle refers to here is the way he introduced poten-

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of an active or passive δύναμις; cf. *Met.* IX 8, 1050a 22-3. As a case of πάσχειν, perceptual sentience is passive, so I avoid the word 'activity'.

[49] δέ and καί function separately here (Denniston p. 305). δέ contrasts the distinctions to follow with the simple way we have been speaking about potentiality and actuality so far, while καί (for which the manuscript evidence is overwhelming) links to the previous imperative λέγωμεν in 417a 14-16. We will distinguish different types of potentiality and actuality *as well as* continuing to speak as if being affected and being changed and actual exercising are the same thing.

[50] Torstrik's emendation ἐλέγομεν ('Just now we were speaking'), adopted by Ross, is not only unnecessary, but wrongly suggests that 417a 21 makes a complete break with the previous paragraph's 'simple' way of speaking. We shall see that the gradual process of refinement begun at πρῶτον (417a 14) is still not completed when we reach εἰσαῦθις at 417b 29-30.

[51] Hamlyn's translation 'in an unqualified way' suggests that the contrast is potentiality and actuality *simpliciter vs.* potentiality and actuality in some respect or with some qualification, as e.g. ὂν ἁπλῶς *vs.* τι ὄν at *Met.* VII 1, 1028a 31, or ἐνέργεια ἁπλῆ *vs.* ἐνέργειά τις at *Ph.* III 2, 201ba 33-202a 3 (cited above). But here, as at 417b 2 and 30, to speak of X ἁπλῶς is to speak of it without distinguishing kinds of *X* (cf. III 2, 426a 26; *EN* II 7, 1108b 7-8); Philoponus 299.4 glosses the word as ἀδιορίστως. Aristotle enjoins us to make distinctions, not to add qualifications to what has already been said.

[52] The parentheses that Ross, following Torstrik, prints around 417a 26-8 are unnecessary and serve to obscure rather than to clarify the message.

[53] Well appreciated by Themistius 55.6-12 and Simplicius 120.13-14.

tiality and actuality in response to the puzzle about why the senses are not self-activating. The puzzle shows that a perceiver as such is a potential being, not yet an actuality (417a 6-7, p. 41 above). The moral is that we must recognise two meanings of nouns like 'sense', 'sight', and 'hearing', corresponding to two meanings of the verbs in such sentences as '*P* perceives', '*P* sees', '*P* hears'. In one meaning they signify a potentiality or capacity for perceiving (*P* is a seer or hearer even when asleep), in the other its actuality or exercise (417a 9-13).[54] But 'To begin with' (*prōton*) marks all this as a preliminary formulation. And it is easy to see why Aristotle should wish us to be aware of the preliminary character of his remarks so far.

For if the potentiality here is the type discussed in *Physics* III 1-3, its exercise will be the incomplete actuality of real alteration. The sense of sight will be the eye's potentiality to *be* red instead of transparent or the green it presently is. In short, the Sorabji interpretation will be correct.

'But distinctions should be made.' The sense of sight is not that type of potentiality. Nor, consequently, is its exercise the incomplete actuality of real alteration. The Sorabji interpretation stops with the preliminary solution. Aristotle does not.

The triple scheme

More technicalities – but this time Aristotle will lay them out on the pages of the *De Anima*. We are to be introduced to the distinction that tradition knows as the distinction between first and second potentiality. This is not a case where the lower is invoked to help us understand the higher (cf. p. 39). On the contrary, the distinction developed here for knowledge and perception is invoked in *Physics* VIII 4, 255a 30ff., to explain the natural motions of earth, air, fire, and water. That indeed is the only other work outside the ambit of the *De Anima* where the triple scheme, as I shall call it, is on display.[55]

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[54] On the problematic sentence 417a 13-14, see Hicks *ad loc*. His hesitations about adopting αἰσθητόν from Alexander *Quaest*. III 3, 83.6 (with Torstrik, Förster, Ross) seem to me unsound, as does the defence of the MSS αἰσθάνεσθαι by Welsch pp. 103-4 with n. 3. Better still, I incline to think, is Rodier's solution: read αἰσθητόν and delete the whole sentence as a marginal note to the effect that the potential/actual distinction applies also to the objects of perception. Alternatively, emend to αἰσθητικόν.

[55] The brief allusion at *Sens*. 4, 441b 21-3, is clearly within the ambit of *DA*, presupposing the careful elaboration of II 5.

Physics VIII 4 does not refer to the *De Anima*. It treats the distinction between first and second potentiality as a piece of conceptual equipment available for use when needed: '*Since* the potential is spoken of in more than one way' (255a 30-31). Yet the distinction is not explicitly marked in *Metaphysics* V, Aristotle's philosophical lexicon (compare V 12 with V 7, 1017a 35-b 9). Nor, more strikingly, does it receive attention in *Metaphysics* IX 6, 1048b 18-36, despite the connection scholars sometimes draw between that text and the topics of *De Anima* II 5.[56] Conversely, there is no reference in II 5 to the distinction in *Metaphysics* IX 6 between actuality (*energeia*) and change (*kinēsis*). Let us read on.

Last time Aristotle set out from two meanings of perception verbs (417a 9-13). His new distinction is modelled on two meanings of the nouns and adjectives which figure in such sentences as '*P* is a knower (*epistēmon*), '*P* has knowledge', and in more specific attributions like '*P* has the art of literacy',[57] '*P* is a builder'; the knowledge verbs come in later.[58] In one meaning, any member of the species *Homo sapiens* is thereby and from birth a knower, because the capacity for thought and reasoning, which differentiates human from beast, is also a capacity for knowledge.[59] In

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[56] See esp. Kosman 'Substance' pp. 128-132. Ackrill pp. 160-162 was quite right to disassociate the two texts.

[57] I.e. *P* is able to read and write (Theiler translates 'wer das ABC inne hat'). This, rather than the more highbrow achievements of Alexandrian scholars, is the standard meaning of γραμματική in Aristotle's day; LSJ *sv* aptly cite the definition at *Top.* VI 5, 142b 31-4. It makes good, simple sense of the example at 417a 29: actively knowing this A means using one's knowledge to recognise the A one is reading or to create the right shape when writing A. And it fits the suggestion in n. 73 below that the passage we are embarking on echoes the Aviary section of Plato's *Theaetetus*, where reading letters is precisely what ὁ γραμματικός is described as doing (198e).

[58] At 417a 29 and b 8-11. *Ph.* VIII 4 also starts with the adjective. Aristotle might well feel the verb ἐπίστασθαι to be inappropriate for first potentiality.

[59] For thought (διάνοια) and reasoning (λογισμός) as the differentia of human, see II 3, 414b 18; 415a 7-11 (cf. I 5, 410b 24; II 2, 413b 12-13; 30; 414a 13; 3, 414a 32; *Met.* I 1, 980b 27-8). My word 'also' is intended to pass lightly over the problem of fixing the exact relation of thought and reasoning to the intellect (νοῦς); that, as Aristotle keeps saying (415a 11-12 echoes I 4, 408b 13-29; 5, 410b 12-15; II 2, 413b 24-31) is another subject, for another discussion. Aristotle's καί in τὸ γένος τοιοῦτον καὶ ἡ ὕλη at 27 is equally delicate. He cannot be alluding to the analogy between genus and matter that he sometimes mentions but never firmly endorses (*Met.* V 28, 1024a 36-b 9; VII 12, 1038a 6-8; X 8, 1058a 1, 23-4), since γένος here is human nature in its fully differentiated specificity (for the usage, cf. *Met.* V 28). The potentiality for knowledge is intrinsic to the actuality that makes us human. From this some will infer that the potentiality must be grounded in the ὕλη of *DA* II 1, 412a 9-11 (cf.

the other meaning, someone who has acquired a sound knowledge of letters is a knower, by virtue of having an ability they can exercise at will (417a 22-8).

Both types of potentiality contrast with the actuality of someone exercising their knowledge of letters. This last is the person who knows in the proper sense of the verb (417a 29-30).[60] So there are three cases:

(1)	(2)	(3)
potentiality	*potentiality*	*actuality*
P is a knower	*P* is a knower	
	P knows[61]	*P* knows

No reader of the *De Anima* can fail to notice that we have met this scheme before. In II 1, however, the emphasis was on (2) and (3) as two types of actuality, not on (1) and (2) as two types of potentiality. As knowledge possessed is to knowledge in use, so is soul, i.e. the organised set of functional capacities which comprise the form or 'life' of a living thing, to the actual exercise of those capacities. Knowledge possessed was the model used to help us understand the definition of soul as 'the *first actuality* of a natural body which is potentially alive' (412a 22-28). But nowhere in II 5 is (2) clearly called actuality.[62]

Another innovation in II 5 is that the model of knowledge is explicitly extended to (1). This would not have suited the earlier context, where the explanandum was life as such and Aristotle intended to assert that the only

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Philop. 305.34-306.7); they can render καί 'and so'. Others will be happy to leave ὕλη in its abstract meaning 'potentiality' (Bonitz 785a 46-56). Themistius 55.20-21 paraphrases ὁ μὲν ὅτι τὸ γένος τοιοῦτον καὶ ἡ φύσις τοῦ ἀνθρώπου, ὡς εἶναι δεκτικὴ ἐπιστήμης.

[60] The reason why this is the proper (κυρίως) meaning of the verb is doubtless that, as actuality, it is definitionally and teleologically prior to the correlative potentiality (II 4, 415a 17-20; *Met.* IX 8, 1049b 10-17; 1050a 7-12).

[61] The implication that '*P* knows' can be entered under (2), with the verb in a potential sense, is confirmed by the more specific verbs at 417b 8-11.

[62] The two places where one might think to find (2) so called are debatable. At 417a 30-32 ἐνεργείᾳ is written into the text by the Torstrik-Ross emendation I reject in Appendix 1. At 417b 13 τοῦ ἐντελεχείᾳ ὄντος may in fact correspond to ἐντελεχείᾳ ὤν at 417a 29 and refer to the exercise of knowledge involved in the activity of teaching (cf. *Ph.* III 3, 202b 7; Philop. *De aeternitate mundi* 71.4-7; Soph. 67.5). *Ph.* VIII 4, 255a 35-b 1, does put actuality and potentiality together: γίγνεται ἐνεργείᾳ τὸ δυνατόν, οἷον τὸ μανθάνον ἐκ δυνάμει ὄντος ἕτερον γίγνεται δυνάμει. Another passage I would cite for the combined description is *DA* III 4, 429b 5-9, but not everyone recognises that this is about knowing in sense (2).

body which is potentially alive is one that is actually alive (II 1, 412b 15-17; 25-6). It is certainly not true that '*P* is a knower' in sense (1) implies '*P* is a knower' in sense (2).

It is important to appreciate these differences between II 1 and II 5, and the reasons for them, before adopting the technical terminology that tradition has devised for the triple scheme:

(1)	(2)	(3)
first potentiality	second potentiality	
	first actuality	second actuality

Of the four labels, 'first actuality' is the only one found in Aristotle himself, and that only in *DA* II 1 (412a 27; b 5). But there is ample justification for the others and they make it easier to give a crisp statement of the issue before us: Which type of potentiality does [P/A] refer to, first or second?

Aristotle's answer will be 'second' (417b 17-18). But first he explains why it matters. It matters because there is an important difference between the type of change or alteration involved in passing from (1) to (2) and the type involved in passing from (2) to (3). That is why the emphasis in II 5 is on first and second *potentiality*. Change is the actuality of the potential *qua* potential (*Ph.* III 1, 201a 10-12, p. 42 above). So to understand a change one has to understand what sort of potentiality it is the actuality of. The difference between first and second potentiality will be spelled out in terms of the difference between passing from (1) to (2) and passing from (2) to (3). We shall then know all that II 5 has to tell us about the difference between the actualities corresponding to the two types of potentiality.

A warning

As just hinted, the long intricate process of refinement that lies ahead will not reach completion within II 5. Aristotle's directions to the reader are again loud and clear:

> But there may ['will' in most translations] be an opportunity *another time* for a full clarification (*diasaphēsai*) of these matters; *for the present*, let it be enough to have got this far in drawing distinctions[63] <that we can say the following:>

[63] The sentence νῦν δὲ διωρίσθω τοσοῦτον implies that the process of distinguish-

> Since we do not in fact speak of the potential in a simple way, but would say that a boy is potentially a general in one meaning, and that an adult is potentially a general in another meaning, so it is [i.e., in both ways; most translations have 'in the latter way'][64] that we speak of the perceiver[65] (417b 29-418a 1).

417a 21 called for distinctions 'concerning potentiality and actuality.' But by the end of II 5 only the potential has been properly dealt with. Indications and implications for a corresponding contrast between two types of actuality have been plentiful, as we shall see, but they have not been fully clarified. Concerning actuality, the discussion remains incomplete.

The essential incompleteness of II 5 has not been appreciated. Since antiquity scholars have felt free to draw on all they know about Aristotle to expound his meaning here. This paper will be more circumspect.

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ing could be taken further, although we will not do that now. Accordingly, I take περὶ μὲν τοὑτων in the preceding sentence to refer to the distinctions called for at 417a 21-2 and elaborated in the sequel. These have been the main subject of the preceding discussion, but on another occasion they could be more fully clarified than they have been so far; after all, we are still speaking 'as if being affected and changed and actual exercising are the same thing'. The language fits this suggestion: διωρίσθω echoes διαιρετέον at 417a 21, οὐχ ἁπλοῦ here picks up ἁπλῶς there. I thus reject Simplicius' influential note (125.11-12), which refers περὶ τούτων to the last section of the previous paragraph: 'Concerning how the universal and contemplation is up to us: he will speak more clearly about them in Book III'. Following Simplicius, translators commonly render εἰσαῦθις as 'later' (*sc.* in *DA*), treat γένοιτ' ἄν as future indicative (only Smith writes 'may'), and send us to III 4 or III 4-5 for the promised clarification. An additional reference (Philop. 308.20-2, Soph. 69. 37-9) to the little that Aristotle has to say about the practical intellect in III 7 is presumably motivated by the immediately preceding remark (417b 26-8) about ἐπιστῆμαι (probably arts such as literacy or building) that deal with sensible things. The difficulty is that nothing in Book III could really be described as a full clarification of the issue Simplicius is interested in. When he reaches III 4, Simplicius does not remind us of the promise he made at II 5, for the good reason that III 4 does not explain the point that contemplation is up to us, but merely states once again that this is so (429b 7). Given Simplicius' gloss on περὶ τούτων, the only reasonable comment is that of Ross: 'It may be doubted whether A. has any particular passage in mind; he perhaps never gave the elucidation he intends to give'. The references in Bonitz 358a 28-33 (to which add *Ph.* I 9, 192a 34-b 1, looking forward to first philosophy) show that καιρός alludes to a unspecified occasion outside a given treatise more often than to a definite place within it.

[64] The minority of translators (Wallace, Smith, Ross) who refer οὕτως to both meanings of 'potential', not just the last, would of course agree that what an animal is born with and lives by is a second potentiality. But before birth comes the πρώτη μεταβολή of 417b 17, and we shall find that this passage from being a first to being a second potentiality perceiver has a role of its own in the refinement process.

[65] On translating τὸ αἰσθητικόν, see n. 41 above.

Because I am interested in the question how to read an Aristotelian chapter, I propose to take Aristotle at his word: II 5 does not contain everything he has to say about the triple scheme. And when I do draw on other works, it will often be to contrast what they say with Aristotle's meaning here.

Two types of potentiality, two kinds of transition

Aristotle continues in terms of the model. A knower in sense (1) has a potentiality to be a knower in sense (2), viz. someone who 'has been altered through learning and has repeatedly changed from a contrary condition' (417a 30-32).[66] The second conjunct of this specification brings out a point which is more fully analysed elsewhere, in the discussion of the priority of actuality to potentiality at *Metaphysics* IX 8, 1049b 29-50a 2. Just as an apprentice learns to be a builder by building, though not yet with the finished skill of the master, so pupils learn arithmetic or literacy by gradually acquiring, and exercising themselves in, bits of knowledge they were ignorant of before. It is true that one cannot exercise an art one does not have, but it is sophistry to infer from this that one cannot learn. By 'a contrary condition', therefore, Aristotle means ignorance of this or that aspect of the knowledge to be learned. The second conjunct explains that learning is a stage by stage process, a *growth* of knowledge.[67]

By contrast, a knower in sense (2) has a potentiality to be someone who knows in sense (3), viz. someone who has changed 'in another way': from having and not exercising the art of arithmetic[68] or literacy to exercising it (417a 30-b 2).[69]

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[66] This is construal (B) of the sentence 417a 31-2, defended in Appendix 1.

[67] Thus καί is epexegetic of διὰ μαθήσεως (Smith translates 'i.e.'); this construal makes intelligible the variant μεταβάλλων for μεταβαλών. Cf. *EN* II 4 for the parallel point about acquiring a virtue.

[68] Read ἀριθμητικήν for the MSS αἴσθησιν (following Themistius' paraphrase 55.28, Torstrik and Ross, against Rodier, Hicks, and most scholars since), or perhaps accept Theiler's ingenious suggestion ἀρίθμησιν. Despite the majority preference, and despite Philoponus testifying to αἴσθησιν as early as 529AD (*De Aet. Mundi* 69.26), conservative policies are indefensible in this case, for two reasons. (a) The MSS illogically (as Hicks concedes) anticipate in the model the thing the model is designed to illuminate, thereby making αἴσθησις an instance of ἐπιστήμη (!) and wrecking the step by step articulation of Aristotle's argument. (b) A marginal note inspired by 417b 18-19 could so easily cause corruption. A third ground for the emendation is canvassed n. 73 below. Alternatively, just delete τὴν αἴσθησιν ἤ.

[69] This is construal (B) of the sentence 417a 32-b 2, defended in Appendix 1.

This explanation of the difference between the two potentialities (1) and (2) continues the pattern we are familiar with. A potentiality is defined by what it is a potentiality to be – in the present case a knower in sense (2) or a knower in sense (3). At the same time, the difference between being someone who knows in sense (2) and being someone who knows in sense (3) is articulated as that between having been altered through learning and having changed in a different way. Senses (2) and (3) of '*P* knows' are specified as the results of two types of change. Ultimately, then, the two potentialities we are interested in are differentiated as potentialities for being the result of two types of change.[70] That is why Aristotle's next move (417b 2) is to say, 'Being affected is not simple either'.[71] The distinction between two types of potentiality leads into a corresponding distinction between their actualities: two types of being affected or altered, one of which might be said not to be alteration at all (417b 5-7). Aristotle will deny that the exercise of knowledge is alteration (417b 8-9). But he will refuse that option for perception, preferring to speak in terms of two types of alteration (418a 1-3). Let us do the same.

At this stage the first type of alteration is assumed to be the ordinary alteration we studied in the *Physics*, where indeed learning is a standard example of alteration;[72] modern readers have to suspend their post-Cartesian inclinations and accept that Aristotelian physics puts learning on a par with being warmed. That done, we can focus in *DA* II 5 on how the second type of alteration diverges from the first. The second is the novelty we need to understand.

We have already seen that ordinary alteration involves the loss of one quality and its replacement by another opposed quality from the same range. Aristotle makes the point vivid here by calling it 'a sort of destruction by the opposite' (417b 3).[73] As one learns, ignorance gives way to

[70] Not, please note, as potentialities for two types of change, on pain of the circularity that Kosman 'Motion' showed the way out of.

[71] οὐδέ picks up ἁπλῶς at 417a 22.

[72] *Ph.* III 3, 202a 32ff. is the most conspicuous case, but there are many others; cf. the miscellany of changes listed at 1, 201a 18-19.

[73] Such language is for obvious reasons not common in Aristotle's discussions of non-substantial change (*Ph.* I 9 and GC I 4 are exceptions motivated by their context). In n. 26 I suggested that φθορά τις is an echo of Pl. *Euthd.* 285b 1 (cf. 283 cd), where φθόρον τινά refers to the 'destruction' involved in becoming wise and good, i.e., to μανθάνειν in one of the two senses ('learning' and 'understanding') which the sophists confuse and Socrates distinguishes in the dialogue. Well might Aristotle recall the *Euthydemus* here, for his model for the two senses of 'alteration' tallies exactly

knowledge like cold to warmth. At the end of the process the ignorance, like the cold, is extinguished and destroyed. It has been replaced by its opposite, knowledge in sense (2).

But it is obvious that knowing in sense (3) is not opposed to knowing in sense (2) as the latter is to ignorance. Linguistically, the termini of the transition between (1) and (2) are marked by contrary descriptions: 'ignorant' vs. 'knows'. The termini of the transition between (2) and (3) are both marked by the same word 'knows'. We have been told that (3) is the proper meaning of the word (417a 29). That establishes a difference in meaning between (2) and (3), but not an opposition. On the contrary, Aristotle insists that the termini of the transition between (2) and (3) are like each other: both are to be described as knowing, save that one is knowing potentially, the other actually (417b 4-5). Rather than a destruction, the second type of alteration is better called a preservation (*sōtēria*, 417b 3) of the state it starts from. Whereas learning destroys ignorance, as warming something destroys its potentiality to be warm, knowing in sense (3) preserves the knower's sense (2) potentiality to be someone who knows in sense (3).

Much more is in play here than the common observation that knowledge – be it of languages, sciences, or skills – is kept up and perhaps even strengthened by exercise and use.[74] No doubt Aristotle has that in mind, but he is also applying a fundamental principle of his physics: no alteration without contrariety.

Then why call the transition from (2) to (3) an alteration at all? Preservation sounds more like the opposite of alteration than a species of it. The answer is again to be found in a fundamental principle of Aristotelian physics.

Epistemic states like knowing arithmetic and being literate are dispositional states (*hexeis*) which belong to the category of quality.[75] Standardly in Aristotle, any change in the category of quality is an alteration.[76] As

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with Plato's two senses of μανθάνειν. In the related passage from the Aviary section of the *Theaetetus* (198d-199a) the examples are ὁ ἀριθμητικός and ὁ γραμματικός, which may support the emendation defended in n. 68. Unlike Aristotle, Plato in the *Theaetetus* does not distinguish senses of 'know' (only senses of 'have'), but he does, as in the *Euthydemus*, anticipate Aristotle's two types of transition with the διττὴ θήρα of 198d.

[74] Pl. *Smp.* 208a; *Theaet.* 153b.

[75] In *Cat.* 8 knowledge-terms are a main focus of attention.

[76] Particularly relevant here are the definition of alteration at *GC* I 4, 319b 6-14, and the use of learning as a prime example of alteration at *Ph.* III 3, 202a 32ff. (n. 72 above). Not relevant (yet) is the non-standard passage *Ph.* VII 3, 247b 1-8a 9, which argues not only that the transition from (2) to (3) is not alteration, but also,

Alexander drily remarks, the transition from (2) to (3) is certainly not growth or spatial movement.[77] Then it must be an alteration of some kind. For it is the firm doctrine of Aristotle's *Physics* (III 1, 200b 33-201a 3, repeated *DA* I 3, 406a 12-13) that there are no (non-substantial) changes besides change of quality, quantity and place. Aristotle, it appears, has a compelling reason of theory to say that the transition from (2) to (3) is an alteration, as well as a compelling reason (the absence of contrariety) for saying it is not.

This should help explain why at 417b 5-7 he offers two alternative ways of describing the transition from knowing in sense (2) to knowing in sense (3).[78] Either (a) it is not an alteration at all, or (b) it is a different kind of alteration. In favour of (a), he amplifies the point just made about the similarity of the termini by saying that the knower's transition to knowing in sense (3) is an 'advance into itself and into actuality' (417b 6-7) – a surprisingly lyrical phrase, which I shall take up when we return to perception. In favour of (b), he adds nothing, and hardly needs to: that preservation is different from ordinary alteration is plain to see.

There is of course one way Aristotle could escape the dilemma. He could deny that the transition from (2) to (3) is a change of any kind. But already at II 4, 416b 1-3, we read that a carpenter is not affected by the material he works on; he merely changes (*metaballei monon*) from inactivity to activity. Merely changing, without being affected, is not the same as not changing. So the same choice applies: either (a) the builder's switch to activity is not alteration, but 'an advance into himself', or (b) it is a different kind of alteration. When *Metaphysics* IX 6 presents its distinction between actuality (*energeia*) and change (*kinēsis*), seeing and the exercise of knowledge appear as paradigm examples of actuality in contrast to change. But, to repeat, there is no hint of *that* distinction anywhere in II 5. On the contrary, the distinction between the two transitions is introduced as a distinction between two kinds of being affected (*paschein*, 417b 2) – in keeping with the provisional assumption of 417a 14-15 that the only actuality there is is the incomplete actuality exhibited by a process of change which is defined by and directed towards an end-state outside itself.

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contrary to II 5's assumptions so far, that the transition from (1) to (2) is not alteration either.

[77] *Quaest.* III 2, 81.25-6; cf. III 3, 84.16-17, where ποιόν must be a slip (by scribe or editor) for ποσόν.

[78] For defence of the usual view that this transition is what Aristotle means to be describing, see Appendix 2.

It is critically important that we respect Aristotle's reticence here. Remember the warning I gave earlier. The question to ask is: Why does II 5 *not* announce that perceiving and the exercise of knowledge are examples of unqualified actuality, which is its own end, hence not examples of change, which is defined by and directed towards an end-state outside itself? On the one hand, Aristotle will shortly say it is not good to call it alteration when a knower exercises their knowledge (417b 8-9). On the other hand, for perception he ends up saying that, due to the lack of specialist vocabulary, we have to go on using the language of alteration and being affected, so please remember not to give those verbs their standard meaning (418a 1-3). Why tolerate for perception the unclear language rejected for knowledge? What would Aristotle lose if he simply gave up the language of alteration and found new terms to characterise perceiving?

These questions would be pressing even if we did not know that elsewhere Aristotle distinguishes between unqualified actuality and the qualified (incomplete) actuality of change, and once offers special terminology (*energeia vs. kinēsis*) to mark the difference. Readers who have that knowledge must be especially careful to let Aristotle not use it here.

Fortunately, some materials for answering our questions are given in II 5, 417b 19-28 – the passage which leads up to Aristotle's final decision on how perceiving is best described. After expounding the triple scheme, with its several morals, Aristotle returns to perception. In terms of the triple scheme, the passage from (1) to (2) – from lacking to possessing the power of perception – is effected as part of the embryological development initiated by the male parent. Consequently, we and other animals are born with the power of perception already at second potentiality. Hence actual perceiving, the exercise of our sensory powers, is to be ranked with (3), the exercise of knowledge (417b 16-19). But, Aristotle continues (19-20), there is a difference (*diapherei de*). A difference, that is, between using one's senses and using one's knowledge.

Differences between knowing and perceiving

The difference has to do with the causality of the two cases. Exercising knowledge is something we can do at will (417b 19-26), but perceiving is not 'up to us'; it depends on an external agent, the particular object perceived (417b 20-26).[79] This difference implies another. For the *knower*, the

[79] Both points featured earlier in the chapter (417a 7-8; 27-8), but only now are they brought together to make the contrast.

transition between (2) and (3) is not a passive change, hence not a change at all as change is understood in *Physics* III 1-3. For the *perceiver*, on the other hand, the transition between (2) and (3) is a passive change, as [1][a] proposed, and within the framework of Aristotelian physics the only change it can be, as [1][b] explained, is alteration. If the external objects of perception are agents (*ta poiētika*, 417b 20), perceivers must be patients in something like the sense of *De Generatione et Corruptione* I 7.[80]

We can now see what Aristotle would lose by giving up the language of alteration. He would cut the links with the dialectic of *De Generatione et Corruptione* I 7 and the categorial analysis of change in *Physics* III 1-3. He would be set adrift, not merely from the reputable opinions he began with, but from the entire project of comprehending perception within the framework of the physics he develops in the *De Generatione et Corruptione* and *Physics* by analysis, systematisation and refinement of reputable opinions from the earlier tradition. He would have to tear up the *De Anima* and start again.

There would also be an epistemological loss. Perception is a power of *receptivity*, not of autonomous activity. To perceive is to submit to being in-formed (as we still say) about the particular objects around us, by the agency of the very objects we receive information about. Such receptivity is necessary for perception's content to be objective truth. It is objective because it is determined by the particular external object which causes the perception, rather than by factors internal to the perceiver. Ultimately, the role of [P/A] is to account for the cognitive accuracy of perception by treating the determination of perceptual content by the object perceived as a special case of assimilation or alteration. And for this it is essential to retain the idea that perception is some sort of passive change with a particular external cause.

Aristotle's solution is to keep the language of alteration, without which perception would no longer be covered by the pattern of explanation expounded in *De Generatione et Corruptione* I 7 and *Physics* III 1-3, but to refine the meaning of 'alteration' so that it signifies a (2)-(3) transition rather than the ordinary change it signifies elsewhere. To prepare for this, he must introduce the triple scheme without giving the impression that a (2)-(3) transition is incompatible with dependence on a particular external cause. That, I propose, is (part of the reason) why he makes no use of

[80] Contrast Rodier *ad* 417b 20: 'Les sensibles ne sont pas, à proprement parler, les agents de la sensation, puisque celle-ci n'est point une passion, mais le passage à l'acte des facultés du sujet.' That is not Aristotle but Plotinus, e.g. *Enn.* III 6.1, IV 6.2.

the distinctions he draws elsewhere between unqualified and incomplete actuality, *energeia* and *kinēsis*. (More on this later.)

But the triple scheme is introduced in terms of knowledge. This may be in deference to its Platonic ancestry,[81] but the fact remains that from 417a 22 to 417b 16 the focus is exclusively on knowledge and how to describe the two transitions involved in its acquisition and use.[82] Now if the point of the exercise is to elaborate a model that can be applied to perception (from 417b 16 onwards), then the knower's two transitions must themselves be described in terms compatible with an external cause.

This makes for strain. Aristotle issues several caveats about the language he finds himself using: it is not really appropriate to knowledge. But the chief sign of strain is the tortuous prose. I have already written two appendices and numerous footnotes to extricate his meaning from various textual and grammatical thickets. This is one of the densest stretches of the corpus. I hope that my readers will be encouraged to push on by the suggestion that the difficulty of Aristotle's writing is due to the difficulty of the philosophical task he has undertaken.

How not to speak of knowing

It is 'not good' (*ou kalōs echei*) to call it alteration when a knower (*to phronoun*) exercises their knowledge (417b 8-9). 'Teaching' is not the right (*dikaion*) word to describe what brings a second potentiality knower to the actuality of knowing in sense (3) (417b 9-12).[83]

There is a background to this rather muted criticism. In Aristotle's book lots of people do speak of knowing as alteration. *Metaphysics* IV 5 quotes Empedocles, Democritus, Parmenides, Anaxagoras, and Homer to illustrate the claim, 'In general, because they suppose that knowledge (*phronēsis*) is perception, and that perception is alteration, they say that what appears

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[81] Cf. n. 73 above.

[82] Recall n. 68 above.

[83] At Pl. *Theaet.* 198e 'learning from oneself' is not right either. Whether we keep the MSS ἄγον or change it to ἄγειν and then delete κατά (Torstrik, Ross), the verb suggests – without quite entailing – a causal agent distinct from τὸ νοοῦν καὶ φρονοῦν and parallel to the causal agent in the contrasting description at 12-13. What could the non-teaching causal agent be that brings a knower to the actuality of knowing in sense (3)? Torstrik suggested a geometrical figure (cf. 'this A' at 417a 29), Philoponus 304.7 τὸ ἐπιστητὸν ἢ τὸ αἰσθητόν. Other scholars tactfully refrain from asking the question. Torstrik also thought it mad to describe τὸ ἄγον as διδασκαλία (hence his emendation τὸ ἄγειν). I prefer the tortuosity of the MSS.

to perception is necessarily true' (1009b 12-15).[84] *DA* III 3 cites similar evidence for the even more tendentious statement, 'The ancients say that knowing (*to phronein*) and perceiving are the same' (427a 21-2). III 3 itself harks back (427a 17-19; 28-9) to the roll-call of earlier opinions in Book I, and at I 2, 404a 27-b 6, we find Democritus and Anaxagoras attacked for equating *nous* with soul generally, which implies that they see no difference between perception and higher forms of cognition. In sum, if perception is alteration, and perception is not different from higher forms of cognition, all cognition is alteration.

Now the aim of Aristotle's review of previous opinions about soul is to profit from what was well said (*kalōs eirēmena*) by his predecessors and to guard against what was not well said. In the course of Book I several highly reputable opinions are rejected as 'not well said' (I 3, 407a 2-3; 5, 411a 24-6). The audit continues in Book II (2, 414a 19-20; 4, 415b 28-6a 3; 416b 8-9). The criticism at 417b 8-9 is thus the latest in a sequence, couched in similar language to the rest. For knowledge, it seems, the language of alteration is ruled out.

This is confirmed by the argument. In full, what Aristotle says is, 'For this reason [*sc.* because of the preservative character of (2)-(3) transitions] it is not good to call it alteration when a knower exercises their knowledge *any more than* when a builder builds'. Contrary perhaps to modern expectations, and against the grain of ancient prejudice, the builder functions here as the more obvious case of non-alteration. If the builder does not alter, but merely changes from inactivity to activity, then the knower's passage to activity is not alteration either. The premise was laid down in the previous chapter (II 4, 416b 1-3). The new conclusion extends the lesson from productive skills to higher cognition generally.[85]

Such scrupulosity about the language appropriate to exercising knowledge serves to highlight the contrast with Aristotle's treatment of the language appropriate to perceiving. At 417b 5-7 he gave us a disjunction:

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[84] Truth follows alteration because Aristotle assumes his own causal scheme (pp. 44-45 above). Hence he must restrict 'alteration' in its refined meaning to the perception of proper objects, otherwise all perception whatsoever would be true, contrary to *DA* III 3, 428b 18-30. The restriction hardly needs to be made explicit because common sensibles like size and motion do not belong to the category of quality and so cannot be agents of Aristotelian alteration. For a valuable discussion of these matters, see Caston.

[85] It is instructive to compare the clear appreciation of the argument's structure in Waterlow p. 187, n. 19, with Alexander *Quaest.* III 2, 81.27-82.7, and Simplicius 123.10-14, whose prejudices show in their taking the builder to be the *less* obvious case – because he uses his body. Themistius 56.5 has it right.

either (a) not an alteration at all or (b) a different kind of alteration. He has now shown that for knowing he prefers (a). But throughout the *De Anima* and related works perception is classified as a sort of alteration (*alloiōsis tis*). I infer that the point of the disjunctive formulation was to make (b) available for the special case of perception. Perceiving is to be different both from the exercise of knowledge, which is not alteration at all, and from the ordinary alterations with which Sorabji and the PreSocratics have confused it.

A further refinement

Although 'teaching' is not the right word to describe what brings a second potentiality knower to the actuality of knowing in sense (3), it is the right word to describe what brings a *first* potentiality knower to the state of knowing in sense (2). But even here the implication that to teach someone is to alter them can be misleading. For the pupil, whom we have hitherto considered under the description 'ignorant', is also a knower in sense (1).[86] When the pupil is so considered, the termini of the (1)-(2) transition are no longer marked by contrary descriptions, but by the same word 'knower', in different but compatible senses. Just this was Aristotle's ground for saying that the (2)-(3) transition is either not an alteration or a different kind of alteration. By parity of reasoning he can repeat the move for the (1)-(2) transition: either (a) learning ought not to be called being affected at all, or (b) there are two types of alteration (417b 12-15).

These are not the same two types of being affected or altered as the two distinguished at 417b 1-7.[87] There ordinary alteration, due to contrariety, served as foil to preservation. Here it is foil to what I shall call *development*.

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[86] At 417b 12 ἐκ δυνάμει ὄντος (sc. ἐπιστήμονος) refers to first potentiality, whereas at b 10 the same phrase signified second potentiality. Torstrik excised the later occurrence as ungrammatical, a scribe's erroneous repetition. He was right that τὸ ἐκ δυνάμει ὄντος μανθάνον is oddly phrased, wrong to apply the knife. The oddity confirms Aristotle's determination to treat the two potentialities and the two transitions as parallel.

[87] Hence the textual crux at 417b 14: Should ὥσπερ εἴρηται be printed, or left out on grounds of falsehood? Hayduck p. 11 was the first to say, 'delenda videntur, quoniam diserte quidem nihil tale supra scriptum videmus'. But this is to understate the case for omission. Not only has Aristotle not previously said, or even hinted, that the (1)-(2) transition is not πάσχειν, but 417a 30-b 3 deliberately treats it as πάσχειν in contrast to the (2)-(3) transition. Some respectable MSS omit the words, as do Rodier,

Ordinary alteration Aristotle now describes, less vividly than at 417b 3, as 'change towards negative conditions' (417b 15). What he means is the familiar story we read before. Alteration is coming to be qualitatively unlike one's present self. At the end of the process, what was e.g. cold *is not* cold, but warm: the negation 'is not'[88] signifies that one quality has been replaced by another. Alteration, as we saw earlier, really alters.

Such alteration may well be temporary. Warmth, being a potentiality of the same type as the cold which preceded it, is a potentiality to be cold again. In normal circumstances you can expect a warm thing to change back to cold. That is why, when Aristotle formulates the contrast between two types of alteration at 417b 15-16, the results of ordinary alteration like warmth or cold are termed *diatheseis* (his word for temporary conditions), but the results of the (1)-(2) transition to knowing in sense (2) are called *hexeis* (his word for firmly fixed dispositional states).[89] In normal circumstances you can expect a knower *not* to change back to ignorance. This is not to deny that knowers can lose their knowledge – through disuse, forgetfulness, disease, etc. – but to insist that knowledge is not a potentiality to be ignorant as before in the way warmth is a potentiality to be cold again.[90] Knowledge, like virtue, like life itself, is a potentiality of a different type.

That, of course, is the thought with which we started drawing distinctions 'concerning potentiality and actuality'. What we are now discovering

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Hicks, Smith, Ross editio maior, Siwek. No commentator witnesses for them until Sophonias 67.24 in the 14th century, long after the MSS they appear in. The only published defence I know for printing ὥσπερ εἴρηται is De Corte pp. 193-4 (followed in the translations of Tricot and Barbotin), according to whom the phrase applies, not to the whole thought 417b 12-4, but more narrowly to ἤτοι οὐδὲ πάσχειν φατέον and most especially to οὐδέ: the (1)-(2) transition also is a case where it is appropriate to say, as was said about the (2)-(3) transition earlier, 'This is not being affected either'. The outcome is much the same as it would be if ὥσπερ εἴρηται could be paraphrased 'by parity of reasoning'. But I find it hard to take οὐδέ here otherwise than as 'not at all' (note the variant οὐδέν), and easy to imagine a reader writing ὥσπερ εἴρηται in the margin in an effort to chart the course of an intricate argument. After all, Ross remains unclear enough to suppose that ὥσπερ εἴρηται would change from false to true if, following a suggestion of Förster, ἤ was put before instead of after the words.

[88] στερητικός in its standard logical meaning = ἀποφατικός (see Bonitz *sv.*). στέρησις as that from which change begins is not to the point, nor, *pace* Them. 56.6-12, Philop. 304.16-22 and Rodier, is change to στέρησις in the sense of a bad condition like blindness or disease. What is needed is a calm version of 417b 3's φθορά τις.

[89] The contrast between διάθεσις and ἕξις is most fully developed at *Cat.* 8, 8b 26-9a 13.

[90] Recall n. 38: Aristotelian potentiality is more than bare possibility.

is that the difference extends to first potentiality as well. That too is a different type of potentiality from the warmths and colds of ordinary alteration. Aristotle does not spell out the implications of the difference. We must do it for ourselves.

If being a knower in sense (2) is not the 'negative' of being a knower in sense (1), the latter potentiality does not have to be lost, used up or 'destroyed' when knowledge is acquired. Nor can it be lost in the ordinary way if being a knower in sense (1) is an intrinsic part of human nature (417a 27); otherwise, it would be death to gain knowledge.[91] Hence, as the ancient commentators saw, if gaining knowledge is a change at all, it should be described as developing or perfecting the nature one already has.[92] Whereas ordinary alteration involves attributes accidental to a thing's nature, Aristotle speaks of the type of alteration that results in epistemic states (*hexeis*) as 'a change towards nature' (417b 16). There is a sense in which the learner, as well as the fully formed expert, qualifies for that lyrical phrase 'an advance into itself'.[93] Indeed it is Aristotle's view that the potentialities a biologist has to deal with are in general such that a thing can be nearer or further from itself – rather as, if you are a sleeping geometer, you are further from yourself than you are when awake but not theorising (*GA* II 1, 735a 11-7).

So much for option (b): distinguishing ordinary alteration and development. The alternative (a) is to say that gaining knowledge is not an alteration, not a case of being affected at all. Elsewhere, at *Physics* VII 3, 247b 9-8a 9, this is the option Aristotle prefers.[94] He prefers it on the ground that gaining knowledge is in truth a coming to rest, i.e. a cessation of change, rather than a change. Let me pause to wonder what this might mean.[95]

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[91] Recall n. 73 and Dionysodorus' threat to Cleinias. That a knower's first potentiality is preserved was appreciated by Plotinus, *Enn.* II 5.2.23-6. In general, if first potentialities were not preserved, Aristotle could not say that the only body which is potentially alive is one that is actually alive (II 1, 412b 25-6).

[92] 'Perfecting' is standard in the ancient commentators, implying that καὶ τὴν φύσιν is epexegetic of τὰς ἕξεις: Alex. *Quaest.* III 2, 82.13-17; 3, 84.27; Them. 56.12; Philop. 304.24. For the reverse epexegesis, cf. *Met.* XII 3, 1070a 11-12: ἡ δὲ φύσις τόδε τι καὶ ἕξις τις εἰς ἦν.

[93] Philoponus 304.26-8 agrees.

[94] Accordingly, Simplicius 123.34-5 assumes a licence to draw on *Physics* VII in interpreting this part of *DA* II 5.

[95] For antecedents, see Pl. *Phdo* 96b, *Crat.* 437ab. For help with the peculiarities of the argument in *Physics* VII 3 and its wider context, see Wardy pp. 209-39. Like him (pp. 86-7 *et passim*), I do not make the standard assumption that *Physics* VII is an early work.

At first sight the idea seems bizarre, especially if the example to hand is an individual item of knowledge such as knowing that 7 + 5 = 12 or knowing how to spell 'Theaetetus'. Why not keep to the view we met earlier at 417a 31-2, that learning is a series of changes from ignorance to knowledge of this or that aspect of the subject under study?

But consider the examples used to illustrate the triple scheme: knowing arithmetic and knowing one's letters. The question 'When did you acquire the ability to read and write?' or 'When did you get to know the multiplication table?', like the question 'When did you form the habit of drinking tea in the mornings?', could be answered 'When I was five' or 'In 1994', but not, as could be the case with individual items of knowledge, 'On my fifth birthday', let alone 'At 8.00 a.m. on Tuesday 13 September, 1994'. Just as a habit begins when you stop doing things differently, so knowledge of the whole subject begins when you stop making mistakes, when the last bit of ignorance is changed to knowledge. While the last mistake and its correction are determinate, exactly datable events, that they are indeed the last can be verified only in retrospect some indeterminate time later. When knowledge is conceived as the mastery of a whole complex domain, it becomes reasonable to invoke the dictum 'There is no coming to be of being at rest' (*Ph.* VII 3, 247b 12) to support the claim that gaining knowledge is not a change but the cessation of change.

But now it seems unreasonable not to say the same about individual bits of knowledge: knowing that 7 + 5 = 12, knowing how to spell 'Theaetetus'. They are *hexeis* too (417a 32) – *habitus* as the Latin translators say. They too begin when you stop making mistakes, when the last false judgement on the matter gives way to a consistent pattern of correct judgement. In this case what is true of the whole domain of knowledge is true of its parts: the passage from (1) to (2) is not an alteration, because it is not a change but the cessation of change.

None of this is on display in *De Anima* II 5. All more reason to infer, as before, that the point of the disjunctive formulation 'Either (a) not a being affected at all or (b) there are two types of alteration' is to make (b) available for the special case of perception. The considerations I put together to help explain why (a) might be Aristotle's preferred option for the passage to knowing in sense (2) could not possibly be applied to an animal's acquisition of sensory powers in the period between conception and birth.[96] That is undeniably the result of change. It is the end-result of

[96] *EN* II 1, 1103a 26-b 2, expressly forbids applying the model of knowledge-acquisition to the acquisition of sensory powers; cf. also *Met.* IX 5, 1047b 31-5.

the series of changes by which the form of the male parent is taken on by the female material so as to constitute an animal, i.e. a perceiver. It is the 'first change' (*prōtē metabolē*, 417b 17) in the strong sense that the embryo 'is first an animal when perception first occurs' (*GA* V 1, 778b 33-4). The previously plant-like organism was a first potentiality perceiver. The transition to being a second potentiality perceiver is not the coming to be of a new entity, but neither is it a straightforward case of an existing subject exchanging one quality for another. Rather, the subject arrives at a new phase of its own existence. Such a 'change towards nature', a real 'advance into itself', is no ordinary alteration.[97]

Recapitulation

It is time to take stock again. *De Anima* II 5 has separated three different things under the title 'alteration'. I shall give them numbers and names:

> (Alt^1) ordinary alteration is the replacement of one quality by a contrary quality from the same range;
>
> (Alt^2) unordinary alteration is the development of the dispositions which perfect a thing's nature;
>
> (Alt^3) extraordinary alteration is one of these dispositions passing from inactivity to exercise.

Aristotle first distinguished (Alt^1) and (Alt^3), with learning as his example of (Alt^1). Then he distinguished (Alt^1) and (Alt^2), with learning now an example of (Alt^2). The ultimate aim was to exhibit an animal's acquiring of sensory powers as a case of (Alt^2), their exercise as a case of (Alt^3). Neither is the ordinary alteration (Alt^1) that we studied in *De Generatione et Corruptione* I 7 and *Physics* III 1-3. Biology often requires more refined notions of alteration than were needed for the elemental level of *De Generatione et Corruptione* I 7 and the very general discussion of *Physics* III 1-3.

But if we are as mindful of the lessons of those chapters as Aristotle expects us to be, we will see that a distinction between three types of alteration implies a corresponding distinction between three different types

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[97] The definition of alteration at *Ph* V 2, 226a 26-9, explicitly excludes change involving τὸ ποιὸν ἐν τῇ οὐσίᾳ, i.e. the differentia. Is Aristotle thinking ahead to the unordinary alterations involved in generation? Burnyeat 'Foundations' offers several examples where *GC* I thinks ahead to the conceptual needs of other physical works, including those of *DA* II 5.

of potentiality. Alteration is the actuality of the alterable *qua* alterable (*Ph.* III 1, 201a 11-12; p. 42 above). If there are three such alterations, there must be three types of potentiality for the three alterations to be the actualities of:

> (Pot^1) the ordinary potentiality of a hot thing to be cold or of a cold thing to be hot;
>
> (Pot^2) the first potentiality, grounded in a thing's nature, to be a fully developed thing of its kind, capable of exercising the dispositions which perfect its nature;
>
> (Pot^3) the second potentiality of a developed thing to remain a fully developed thing of its kind by exercising, and thereby preserving, the dispositions which perfect its nature.[98]

Pulling all the threads together, we could draw up the following schedule of actualities:

> (Act^1) is the actuality of (Pot^1), and proceeds towards the replacement of (Pot^1) by a contrary potentiality of the same kind;
>
> (Act^2) is the actuality of (Pot^2), and develops the dispositions which perfect the subject as a thing of its kind;
>
> (Act^3) is the actuality of (Pot^3), and contributes to the continued preservation of the dispositions which perfect the subject as a thing of its kind.

Aristotle does not pull all the threads together in this way. Having distinguished different types of potentiality, he does not move on to different types of actuality, but asks us to be content with the distinctions he has drawn so far (417b 29-30). Thereby he avoids a number of complications which would delay his getting into the detailed study of perception that II 5 is meant to introduce. In particular, he avoids having to take cognisance of the fact that we are still speaking 'as if being affected and being changed and actual exercising (*energein*) are the same thing' (417a 14-16). We have made distinctions, but in terms which leave unchallenged the idea that (Alt^1), (Alt^2) and (Alt^3) are all examples of change (*kinēsis*) in the sense of *Physics* III 1-3: actuality (*energeia*) which is incomplete in the sense that it is directed towards a result beyond itself (417a 16; p. 42 above). The very words 'alteration' and 'being affected' imply as much, especially when II 5 is read in proximity to *De Generatione et Corruptione* I 7 and *Physics* III 1-3.

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[98] To the texts already mentioned add II 4, 416b 14-17, on the preservative function of the nutritive soul.

Now elsewhere Aristotle insists that seeing, for example, is not incomplete in the sense just given. It is complete at every moment, i.e. it is not intrinsically directed towards any result besides and beyond itself; its goal is simply to see what is there to be seen (*Met.* IX 8, 1050a 23-5; *EN* X 4, 1174a 13-b 14; *EE* II 1, 1219a 16). On several occasions he cites a logical rule that holds for perception verbs like 'to see' and 'to hear', as well as for verbs like 'to contemplate' which refer to the exercise of theoretical knowledge: at the same time one φs and has φed (*SE* 22, 178a 9-28; *Sens.* 6, 446b 2-6; *Met.* IX 6, 1048b 23-34). The idea is that there is no moment of φing at which the goal of φing is not achieved.[99] This does not immediately show that seeing is a counter-example to II 5's provisional assumption that being affected, being changed and actual exercising (*energein*) are the same thing. For (Alt^3) is the transition to seeing, not seeing as such. But it does show there are a number of issues in II 5 that further distinctions might address. In particular, we would like to know more about the relation between seeing and the transition to seeing.

Meanwhile, Aristotle offers the alternative of saying that (Alt^3) is not alteration at all (417b 6). He offers the same alternative for (Alt^2) (417b 13-14), where the illustrative example is learning. But in *Metaphysics* IX 6 learning is classed as change or *kinēsis*: it is as incomplete, because intrinsically directed to a result beyond itself, as slimming and building (1048b 24-5; 29). As already mentioned (p. 49), *Metaphysics* IX 6 is innocent of the distinction between first and second potentiality and so has no basis for separating (Alt^2) from ordinary alteration (Alt^1). It is safe to conclude that *Metaphysics* IX 6 is not the place where Aristotle undertakes the further analysis that would complete the process of refinement begun in *De Anima* II 5.

Nor is *Metaphysics* IX 8, 1050a 23-b 2, where seeing, an activity that contains its own goal, is contrasted with building, which aims at a product beyond itself. That too is innocent of the distinction between first and second potentiality. Remember that *Physics* VIII 4 is the only other place in the extant corpus where the distinction between first and second potentiality can be found (p. 48 above). If there are any further refinements, they must be sought within the ambit of the *De Anima*.

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[99] More accurately, there is no moment at which the *immediate* goal of φying is not achieved. Aristotle does not deny that the goal of seeing and other cases of perceiving may itself be the means to some further goal: *Met.* I 1, 980a 2-6, *EN* I 4, 1096b 16-19.

In search of more

This brings me back to *De Anima* III 7, 431a 4-7, mentioned earlier (p. 43). III 7 is a collection of fragmentary scraps often thought to have been put together by an early editor.[100] I prefer to treat it as a sort of 'folder' kept by Aristotle himself for storing bits and pieces which might in due course be integrated into the treatise.[101] But whatever its origin and status, the passage in question shows how Aristotle may once have thought to continue the process of refinement begun in II 5:

> In the case of sense, on the one hand,[102] clearly the perceiver already was potentially what the object perceived makes it to be actually; for it [the perceiver][103] is not affected or altered. This must therefore be a different kind of change (*kinēsis*) [or: some kind of thing different *from* change].[104] For change is [or: was agreed to be][105] the actuality of the incomplete. Actuality unqualified, the actuality of what is completed/ perfected (*tetelesmenou*), is different.

Here, as in *Physics* III 2, Aristotle makes explicit what other texts merely imply, that incomplete actuality contrasts with a different sort of actuality: actuality unqualified, actuality *simpliciter*, or, as the ancient commentators put it, complete actuality. In effect, he takes up the option of

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[100] So Torstrik, followed by Ross, who is in turn followed by Hamlyn.

[101] Burnyeat *Map* chap. 3 introduces the concept of an Aristotelian 'folder' to help account for the peculiarities of *Met.* VIII 3-5.

[102] There is no δέ to answer this μέν. The fragment is itself a torso.

[103] Menn p. 110 n. 49 is exceptional in taking the αἰσθητόν as the subject of the verbs, not the αἰσθητικόν, so that Aristotle argues from the object's not changing to the conclusion that the perceiver is the passive partner in the encounter. It is true that the object does not change (otherwise perception would always mislead), but the fact that the perceiver is changed is not in dispute and needs no argument. The dispute is about the manner of its changing, which our fragment (as traditionally understood) begins to clarify. Smith's translation best captures the direction of inference indicated by γάρ: from the absence of alteration to the reason why no alteration is needed, viz. the sense is already potentially what the object makes it to be actually. Hicks and the French translators get much the same effect by saying that the object *merely* brings the potential into actual exercise. (As before, I render τὸ αἰσθητικόν by 'perceiver': nn. 41, 65 above.)

[104] So, rather plausibly, Ross and Hamlyn.

[105] A number of MSS omit ἦν after ἐνέργεια at 7. It is very wrong if editors who print the word (= all editors save Ross) then cite II 5 as the implied back-reference (so Rodier, Smith, Hett). There is nothing in II 5 about the incompleteness of the subject of change. Supposing ἦν does refer to another text, not just to established doctrine, a better candidate is *Ph.* III 2, 201b 32-3, to which (as we saw) II 5 itself refers. That does mention the incompleteness of the subject of change.

saying that the transition to perceiving is not an alteration at all, but 'an advance into oneself', a perfected disposition springing to its proper actuality. The transition may still (depending on how we translate) count as some sort of change (*kinēsis*), but if it does, it is a different kind of change from those of *Physics* III 1-3 because a perceiver is not altered when they perceive something; like the builder of *De Anima* II 4, they merely switch from inactivity to exercise, from potentiality to the actuality of the power of perception. One commentator hails this passage as Aristotle discarding at last much of what he had said earlier about perception being some sort of alteration. Another denounces it, for that very reason, as an interpolation.[106] Both reactions are too quick. We do not know what Aristotle would have done with the option he is beginning to develop. All we have is the one brief fragment, either because Aristotle wrote no more or because the continuation was lost. In the extant corpus, II 5's process of refinement is nowhere carried to completion.[107]

In this situation all we can do is observe Aristotle at work in II 5 and speculate about why he takes the refinement no further. He *asks* his readers to join with him, initially, in speaking 'as if being affected and being changed and actual exercising are the same'.[108] This is an invitation to cooperate, not an attempt to deny, or to disguise, the difference between complete and incomplete actuality. It is a request to readers who do have some sense of what would be involved in a full clarification to keep that knowledge in abeyance for a while, so that II 5 can set out such distinctions as are relevant for the purpose to hand. I have already proposed that the immediate purpose is to do justice to the receptivity of perception (p. 45, p. 58). On that, more shortly. I want first to add a more distant goal.

Look again at the passage (417b 29-418a 1) where Aristotle warns that the process of refinement is to remain incomplete. Two types of potentiality are mentioned. Clearly, they are the two potentialities of the triple scheme: (Pot^2) and (Pot^3). A boy's eligibility for being a general is confirmed, not cancelled, when he reaches the age at which he can actually be elected.[109] (Pot^1) has been left behind. When Aristotle says that we must

[106] Hamlyn *ad loc.*; Webb p. 27, n. 14.

[107] I suspect that a stronger statement is in order: it was not carried further in any work available to Simplicius and Philoponus but not to us. Cf. n. 63 above.

[108] Recall n. 47's defence of the reading λέγωμεν.

[109] I suppose this to be a genuine analogy in which νόμος is invoked to illustrate φύσις and δύνασθαι refers to legal capacity. This gives force and point to the phrase τόν ἐν ἡλικίᾳ ὄντα. The age in question is not known for certain, but at Athens it was probably at least 30 (Rhodes pp. 510-11). Thus the analogue for a first potentiality

go on speaking of the perceiver as being affected and altered (418a 2-3), Sorabji's ordinary alteration is not even a candidate for being the sort of alteration he has in view. Only (Alt^2) and (Alt^3) are pertinent, the one for the acquisition of sensory powers, the other for their exercise.

They continue to be pertinent until *De Anima* III 4, where perception becomes the model for knowing, instead of the other way round, and the acquisition of knowledge is treated as a special case of being affected (*paschein ti*, 429a 14-15; b 24-6; 29).[110] The word 'alteration' is not used, but learning is analysed, in terms strongly reminiscent of [P/A], as an assimilation in which the intellect comes to be actually, instead of potentially, like its object; in other words, as the unordinary alteration (Alt^2) it was said to be in II 5.

Thus II 5 sets the framework for studying both the most basic cognitive capacity of soul and its highest. At birth perception is a second potentiality, intellect a first potentiality. Both are to be included in Aristotelian physics. However, unlike modern proponents of 'naturalized epistemology', Aristotle is acutely concerned to fix the limits of physical science, lest no scope be left for first philosophy.

The *locus classicus* for the worry is *De Partibus Animalium* I 1, 641a 32-b 12, where Aristotle argues that if intellect (*nous*) falls within the scope of physics, so too do its objects, the intelligibles (*ta noēta*), and physics will aspire to be a theory of *everything*. His response is that physics, natural science, does not deal with all soul, but only with soul that is a principle of change: 'Not all soul is nature, *phusis*' (641b 9-10).[111] Physics extends as far as change extends and no further (*Met.* VI 1; cf.

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perceiver (i.e. a newly conceived embryo in the womb prior to 'the first change' of 417b 15-16) is a newly born male whose legal standing is such that, if and when he reaches the stipulated age, he will acquire the further capacity for a passive change, being elected, into a busily active office. A non-legal acquired capacity for generalship would presumably be some skill or experience such as Nichomachides boasts of at Xen. *Mem.* III 4.1; being of a certain age is no doubt a necessary condition for that sort of qualification, but it is hardly sufficient.

[110] On πάσχειν τι Hicks *ad* 429a 14 rightly recalls his note *ad* 410a 25, cited above n. 25. Aristotle's addition ἢ τι τοιοῦτον ἕτερον (429a 14-15) confirms that it is a very special case.

[111] Does this exclude all νοῦς, or only the active exercise of second potentiality νοῦς? If the former, *PA* is inconsistent not only with *DA*, but also with the *Physics*' attitude to learning. The related worry at *GA* II 3, 736b 5-8, is answered by the famous statement that νοῦς enters θύραθεν (27-9), from outside: a statement which can perfectly well refer, not to a magic baptism, but to second potentiality νοῦς acquired through the agency of a teacher.

Ph. II 2). For nature, the object of physics, is a principle of changing and resting (*Ph.* II 1, 192b 21-2).

I can now present the hypothesis which explains, I believe, both the intricacy of II 5 and its reticences. The reason why II 5 takes the refinement process no further than it does, why only incomplete actuality is considered, why the discussion is full of qualifications and alternatives, why the writing is so tortuous, and finally, why this paper has to be so long, is that Aristotelian physics is by definition the science of things that change. If physics is to study the (2)-(3) transition involved in perceiving and the (1)-(2) transition involved in learning, it must treat them as types of change, where 'change' means passive change. That, I propose, is why II 5 distinguishes two special types of alteration, (Alt^3) and (Alt^2), while acknowledging, in the disjunctions of 417b 6-7 and 12-15, the legitimacy of perspectives from which neither would be alteration or any kind of passive change.

I do not mean that physics cannot study the active agency which brings change about. Of course it can, and must, do that. But Aristotle has good epistemological reasons for putting the two transitions on the passive side of this correlation. He wants both second potentiality perception and first potentiality intellect to be powers of *receptivity*, rather than of autonomous activity.[112] Both are capacities for being in-formed by an object, a sensible form in the first case, an intelligible form in the second. Both perceptual content and conceptual content must be determined from outside if the content is to be objective truth.[113] Aristotle holds strong views on this determination being something that occurs *naturally* as part of the life cycle of animate beings, both the rational ones and the non-rational perceivers. His task in II 5 and III 4 is to refine the basic explanatory notions of his physics to the point where the attainment of truth, by sense-perception or by intellect, can be accounted for as some sort of natural physical change.

But the further refinements undertaken in III 4 are another subject, for another and more controversial discussion.[114] All I need say here is that

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[112] The key terms are δεκτικόν, δέχεσθαι, linked to the notion of 'form without matter' first introduced at II 12, 424a 18-19; cf. 424b 1-2; III 2, 425b 23-4; 12, 434a 29-30. The parallel is drawn for the intellect at III 4, 429a 15-18. Remember that it is proper (ἴδιον) to a human to be ζῷον ἐπιστήμης δεκτικόν, an animal receptive of knowledge (*Top.* V 4, 132b 2-3, *et al.*).

[113] For the parallel, see III 6, 430b 27-30, disregarding Ross's daggers.

[114] Note especially πάσχειν ὑπὸ τοῦ νοητοῦ (429a 14) instead of the teacher normally presupposed as the agent of assimilation (cf. the surprising suggestion at *Met.*

for the highest, as for the lowest, types of cognition Aristotle intends to make serious use of the assimilation story to explain the cognitive accuracy of sense and intellect. The word 'must' (*anagkaion*) in 'We must go on using "being affected" and "being altered"' (418a 2-3) is the 'must' of hypothetical necessity: those verbs really are needed for the explanatory goals of the *De Anima*. Aristotle is not normally shy of inventing new terminology. If he refrains from invention here, preferring to refine existing notions, it is for a reason. New words could not draw on the explanatory power of the familiar theorems from *De Generatione et Corruptione* I 7 and *Physics* III 1-3.

This takes us back to the problem raised earlier (p. 67) about how the transition to seeing, an example of (Alt[3]), relates to seeing as such, which is complete at every moment. Seeing is the end-state without which the transition would not count as any sort of alteration. But it is an end-state instantaneously achieved. When Aristotle says there is no coming to be (*genesis*) of seeing, any more than of a geometrical point or arithmetical unit (*Sens.* 6, 446b 3-4; *EN* X 4, 1174b 12-13), he means that there is no time-consuming *process* that precedes the seeing. What precedes is nothing but the animal's enduring *capacity* to see: in II 5's terms, a second potentiality. (Alt[3]) is as limiting a case of alteration as ingenuity could devise.

But I hope to have made clear that Aristotle has theoretical reasons for devising it. The language of alteration directs attention to the causal agent responsible for getting itself perceived. Perception is not 'up to us', and it is cognitive of sensible qualities in our environment precisely because it is not 'up to us'. II 5's careful analysis of the transition to perceiving helps to ensure that from now on, when we meet simpler statements which ignore the transition and describe perceiving itself as alteration or being affected,[115] we hear them as: 'Perception is special sort of qualitative change induced *by* the actual quality it is a perception *of*'. Provided this is understood, the (instantaneous) transition to perceiving and perceiving

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I 1, 980b 21-5, that animals without hearing do not learn). *Ph.* VII 3, 248a 2-3 is a partial exception: ἠρεμίζεται πρὸς ἔνια μὲν ὑπὸ τῆς φύσεως αὐτῆς, πρὸς ἔνια δ' ὑπ' ἄλλων. More considerable is *DA* III 4, 429b 9: μαθεῖν ἢ εὑρεῖν. The difference between teacher and intelligible form disappears when we view the teacher, in the perspective of *Ph.* III 1-3, as bringing the form to the learner as the builder brings the form of house to the bricks.

[115] Examples from later within *DA*: II 11, 424a 1-2; 12, 424a 22-4; III 12, 435a 1 (cf. *Insomn.* 2, 459b 4-5). Examples from elsewhere (to be discussed below): *MA* 7, 701b 17-18; *Ph.* VII 2, 244b 10-11.

can be allowed to merge. And it can be left to other works (*Ethics* and *Metaphysics*), where the causality of perception is less important, to make capital of the point that there is no moment of perceiving at which its goal is not achieved.

Conclusion

We may now return to perception for the decisive announcement at 418a 1-3:

> Since we have no names to mark the difference between them [*sc.* first and second potentiality],[116] but our distinguishing has shown that they are different and in what way they are different, we must go on using 'being affected' and 'being altered' as if these words < still> had their standard meaning.[117]

The long delayed statement of [P/A] follows immediately (418a 3-6), linked by the back-reference 'as has been said' to the original formulation of the assimilation story [A] at 417a 18-20.[118] But what it means for the perceiver to be *potentially* such as the sensible object is actually, to be *affected* and *altered* by the sensible object, so as to be *assimilated* to it – all of that is dramatically different from what it would have been before. New meanings of 'potentiality' have been distinguished, and we have seen how they bring with them new, non-standard meanings of 'being affected' and 'being altered'. Hence there will be new meanings also for 'assimilation' and its specific varieties: 'being made red', 'being warmed',

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[116] What is missing is not one name for the difference (Hicks: 'as this distinction has no word to mark it'), but two names, one for each of the items distinguished (Barbotin: 'puisque ces différentes acceptations n'ont pas reçu de noms distincts'). Presumably, this remark of Aristotle's was the cue for the later tradition to come up with the terms 'first' and 'second potentiality'. Carteron translates *Ph.* VIII 4, 255b 9-10, as if that (admittedly suggestive) text already had the terms, but to my knowledge they are first attested in Alexander (cf. *Quaest.* III 3, 84.34-6; 85.25-6).

[117] ὡς κυρίοις ὀνόμασιν is usually translated 'as if these words were the proper terms'. But the references in Bonitz, *sv.* κύριος show that a κύριον ὄνομα is a word used in its ordinary, standard, or accepted meaning, as opposed to a word that requires explanation (γλῶσσα) or a word used in a transferred meaning (μεταφορά). Either way the implication of ὡς, as earlier at 417a 14, is negative: perception is *not* properly called πάσχειν and ἀλλοιοῦσθαι, or (on the rendering I prefer) is so called only in a non-standard meaning of the verbs. I write 'go on using' to bring out the point that the novelty is not the verbs, which have been in use since the beginning of the chapter, but (as the ancient commentators agree) their non-standard meaning.

[118] Cf. n. 42 above.

'sounding Middle C'. By the end of II 5 the familiar theorems from *De Generatione et Corruptione* I 7 and *Physics* III 1-3 have been filled with a whole range of new meanings undreamed of in earlier philosophy.

The result is that perception is *alloiōsis tis* in the *alienans* sense, 'an alteration of a sort': an alteration from which you cannot expect everything you would normally expect from alteration. You cannot expect the perceiver to be really altered, really reddened at the eye; seeing red is not at all like a case of internal bleeding. You cannot even expect the alteration to take time, as ordinary changes do (*Ph.* V 1, 224a 35).

Nevertheless, you can still expect from perceiving some of the things you would normally expect from alteration. The term has not lost all connection with the lessons of the other physical works. You can expect this type of alteration to be caused by a sensible quality, which determines the qualitative character of the effect in the perceiver in such a manner that the perceiver is in some new sense assimilated to it. To see a red object is to be reddened by it *in a way* (cf. the *alienans* qualification *estin hōs* at III 2, 425b 2-3).[119] To feel the warmth of a fire is to be warmed by it, but not in the way the cold room or your chilled hands are warmed by it.[120]

Naturally, readers will ask: But what are these new ways of being reddened and warmed? II 5 does not say. Our chapter is a general introduction to the study of perception and cognition. It distinguishes between the two non-standard types of alteration that are pertinent to the *De Anima*, (Alt^3) and (Alt^2), by contrasting each in turn with ordinary alteration (Alt^1). The main positive message of II 5 is that the new meanings exist: [P/A]'s description of perceiving as assimilation is to be understood as referring

[119] Webb p. 38 with n. 101 resists the *alienans* interpretation here and translates 'it is true that it is coloured', on the grounds that LSJ and Bonitz cite no case of ἔστιν ὡς = πως in a genuine Aristotelian work. Evidently, he wants a case of ἔστιν ὡς by itself, like ἔστιν ὅπου at *Pol.* IV 5, 1299b 28, as opposed to ἔστι μὲν ὡς . . . ἔστι δ' ὡς οὐ. An unreasonable demand, but easily met by reading Aristotle, e.g. *Met.* VII 10, 1035a 14 with 2-4; X 9, 1058b 16.

[120] The idea that perception of hot and cold is intuitively a favourable, perhaps the most favourable case, for the Sorabji interpretation should dissolve on inspection of *PA* II 2, 648b 11-649b 8, where Aristotle's discussion of the many meanings of 'hot' begins (648b 12-15) with a distinction between imparting heat and being hot to the touch (= τὴν ἁφὴν θερμαίνειν, 649b 4-5). This text establishes beyond question that in Aristotle's mind 'heating the room' and 'heating the touch' are two quite different things; Johansen pp. 276-280 has a good discussion of the point, while Burnyeat 'Aquinas' presents Aquinas as an Aristotelian thinker who accepts that perceiving heat is always accompanied by actual warming, but not that the warming underlies the perception as matter to form.

to extraordinary alteration (Alt[3]), a (2)-(3) transition, and hence to a new way of being reddened or warmed. If you want to know more about what such assimilations amount to, read on. Many of the answers are in II 7-11, where Aristotle studies the individual senses one by one, with II 12 the general summing up. But he continues to add to the picture in Book III (III 3, 428b 10ff., on appearance, *phantasia*, is a vital contribution) and in the *De Sensu*. If we respect the author's order of presentation, we will learn soon enough.

In a study of II 7-8[121] I have argued that according to the Aristotelian theory of perception the effect that colours and sounds have on the relevant sense-organ is the same as their effect on the medium. Suppose Aristotle sees a red object. The effect of the red colour is a 'quasi-alteration', as I there call it, in which neither the medium (obviously) nor the eye (*pace* Sorabji) turns red, but red *appears* to Aristotle through the medium at his eye. All Sorabji's scientists would see, given an instrument for looking into the transparent jelly of Aristotle's eye, is: the red object Aristotle sees (if they look from behind) or the flesh around the transparency. Just as the power of vision is preserved by its exercise, so the eye preserves its neutral state of transparency when Aristotle sees first green, then red.[122] Precisely because transparency lies outside the colour range, transparent stuff is the ideal material base for a second potentiality which is to be preserved, not lost, on each and every occasion of perceiving. Precisely because transparency is a standing material condition for eyes to have the power of sight, and analogous conditions apply to the other sense organs, these organs must remain *perceptibly* neutral throughout. Thus the transparent stuff within the eye would not even exhibit to scientific observation the sort of borrowed colours one sees on a TV screen, a white wall illuminated by red light, or a sea whose surface viewed from a distance shows a tinted sheen; borrowed colours are no easier to see through than inherent colours.[123] All that happens when Aristotle sees red is that (to use

[121] Burnyeat, 'Remarks'.

[122] In both sense and intellect ἀπάθεια is a condition of receptivity: III 4, 429a 15-18; 29-31. With σωτηρία at 417b 3 compare σωζόμενον in the description of the organ of taste at II 10, 422b 4, and Magee pp. 318-9 in contrast to Broackes pp. 66-7.

[123] Thus II 5 does, as I hoped p. 31, help us to understand the importance of the neutrality of Aristotelian sense-organs. The TV analogy has often been put to me as an example of (Alt[3]) compatible with literal coloration. The sea's sheen, discussed at *Sens.* 3, 439b 1-5, is Sorabji's starting point for his new approach in 'Aristotle on Sensory Processes'.

a more recent jargon) he is 'appeared to redly' by an actually red object, and is so appeared to because the object is red. This gives the sense in which he is reddened by the red object, and comes (instantaneously) to be like it. The object's redness appears to him. He is aware of red.

We should be careful not to think of Aristotle's awareness of red and the red's appearing to him as two events, one of which causes the other. *Physics* III 3 lays it down that correlative cases of acting on and being affected (e.g. teaching and learning) are one and the same event, taking place in the patient, described from different points of view. And this physical principle is invoked in the key doctrinal passage *DA* III 2, 425b 26-426a 26, to give the result that Aristotle's seeing red is identical with the red object's action of appearing to him. The cause of this doubly described but single event is the object's redness.

Of course, Aristotle might be appeared to redly because of some internal condition or disease; this might happen even when he has a red object in view. But that would not be seeing red: 'Appearance is not the same thing as perception' (*Met.* IV 5, 1010b 3). Seeing red is being appeared to redly by a red object in the external environment, because it is actually red.[124] Proper object perception is always true. Extraordinary alteration is an accurate awareness of objectively real sensible qualities in the environment. That is how the refinements of II 5 allow the general principles of Aristotelian physics to account for the basic *cognitive* function of soul.

Two controversial morals

The Sorabji interpretation combines two claims: (i) that ordinary alteration is what Aristotle requires for perception, (ii) that its role is to stand to awareness as matter to form.[125] I have shown that a careful reading of II 5 makes (i) untenable. I then went beyond II 5 to argue, with the help of a previous study of II 7-8, that the alteration relevant to perception, extra-

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[124] The 'because'-clause could be used to rule out the case of a white object appearing red because it is bathed in a red light, or grey because it is seen at a distance. Aristotle touches on such issues at *Met.* IV 5, 1010b 3ff., but he nowhere specifies further conditions *external* to the perceiver (besides the presence of light) for seeing red.

[125] References for (i) in n. 3 above; for (ii), see 'Body and Soul' pp. 53-6; 'Intentionality' pp. 208-9. (i) is a position that Sorabji shares with Slakey's well-known paper, (ii) an addition which avoids Slakey's conclusion that ordinary alteration (the eye's going literally and visibly red, etc.) is all there is to perception on Aristotle's account.

ordinary alteration (Alt[3]), is itself the awareness of sensible qualities in the environment. From this it follows that (ii) is untenable as well: extraordinary alteration is not the underlying realisation of awareness, but awareness itself. My final point is that the untenability of (ii) can be established from within II 5, without the extra illumination from later chapters of the *De Anima*.

Let us go back to the beginning:

> [i][a] Perception consists in (*sumbainei en*) being changed and affected, as has been said (416b 33-4).

The translation 'consists in'[126] may suggest that the change in question is the underlying realisation of perception. But the back-reference 'as has been said' is to I 5, 410a 25-6, 'They suppose that perceiving is some sort of being affected and changed', where the 'is' sounds more like the 'is' of classification than the 'is' of composition. The same goes for [1][b], 'Perception is some sort of alteration'. But this is not decisive. Considered on their own, both the I 5 and the II 5 versions of [1][a] could be taken either way.

Considered in the full context of II 5, however, [1][a] and [b] are unmistakably statements of classification. The whole business of the chapter is with types of alteration. Learning, the transition from (1) to (2), is unordinary alteration (Alt[2]), and this is a distinct *type* of alteration because it is the development of a firmly fixed dispositional state (*hexis*) which perfects the subject's nature. Aristotle's example is learning to be literate, which culminates in being able to read and write. It would be nonsense to say that developing the ability to read and write, an unordinary alteration (Alt[2]), stands to learning one's letters as matter to form. It is what learning to be literate *is*. In the statement 'Learning is some sort of alteration', the 'is' is clearly the 'is' of classification, not the 'is' of composition.

By parity of reasoning, it should be nonsense to say that extraordinary alteration, a (2)-(3) transition, stands to perceiving as matter to form. Extraordinary alteration is what perceiving *is*, not some underlying realisation for it. The 'is' in [1][b] is like the 'is' in 'Alteration is a sort of change', not like that in 'Anger is boiling of the blood around the heart'. It is the 'is' of classification, not the 'is' of composition.[127]

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[126] For the alternatives, please reread n. 15.

[127] Cf. Philoponus 290.4-5: ἡ οὖν αἴσθησις ἀλλοίωσις, ἡ δὲ ἀλλοίωσις κίνησις, ἡ αἴσθησις ἄρα ἐν τῷ ἀλλοιοῦσθαί τε καὶ κινεῖσθαί ἐστι.

This conclusion does more than complete my refutation of the Sorabji interpretation of Aristotle's theory of perception. It bears also on a wider controversy, of larger philosophical significance.

Martha Nussbaum and Hilary Putnam have defended,[128] and continue to defend,[129] the thesis that Aristotle's psychology is an ancient version of what modern philosophers know as the functionalist solution to the mind-body problem. For the solution itself, as a solution suited to modern physics for the mind-body problem bequeathed to us by Descartes, I have much admiration. My objection to the Nussbaum-Putnam thesis[130] is that Descartes' problem presupposes Descartes' rejection of Aristotelian physics, a rejection we all share today. Aristotle's account of the soul-body relation cannot be resurrected to help in the modern war against Cartesian dualism because, as I have emphasised throughout this paper, Aristotle's psychology is designed to be the crowning achievement of his physics, and his physics is irretrievably dead and gone. I am all in favour of setting up comparisons between ancient and modern philosophy. But what I think we learn from comparing Aristotle and modern functionalism is how deeply Descartes' influence has settled in ordinary consciousness today.

So large a claim is obviously not one I can take further here.[131] But it so happens that the Sorabji interpretation of the 'is' in [1][b] is a main prop for the Nussbaum-Putnam thesis. They need an underlying realisation for perception if perception in Aristotle's theory is to conform to, and confirm, the general functionalist pattern: constant form in variable matter. [1][b] is the star witness for their case. So if, as just argued, II 5 makes Sorabji's point (ii) untenable, the Nussbaum-Putnam thesis is seriously undermined.

Admittedly, Nussbaum and Putnam do not cite [1][b] from the *De Anima*. They adduce the same proposition as it appears (in the plural) at *De Motu Animalium* 7, 701b 17-18: 'Perceptions are in themselves alterations of a sort (*alloiōseis tines*)'.[132] But it is the same proposition, and I

[128] Putnam *Papers* 2 pp. xiii-xiv; Nussbaum *De Motu* p. 69 with n. 14 *et passim*.

[129] Nussbaum-Putnam.

[130] 'Draft' p. 16, p. 26.

[131] But see Burnyeat 'Aquinas'. Nussbaum-Rorty is a splendid symposium on the issues involved. For an introduction to functionalism and its varieties, I recommend Block (the idea of Aristotle as the father of functionalism achieved textbook status in Block's 'Introduction: What is functionalism?' at pp. 171, 177, citing Hartman chap. 4).

[132] Nussbaum-Putnam p. 39, the key item in their 'Exhibit A' but in my own translation, to be compared with Nussbaum's in her *De Motu*: 'sense-perceptions are at once a kind of alteration' (p. 42), 'aistheseis are a certain type of qualitative change'

have been arguing that *DA* II 5 is Aristotle's official account of how it is to be understood.[133] So if Sorabji falls on claim (ii), Nussbaum and Putnam fall with him.[134] The (extraordinary) alterations which perceptions are do not serve as the underlying material realisation of perception. They belong on the side of form rather than matter. As Aristotle will put it in the well-known passage II 12, 424a 17-24, the alterations are the receiving of sensible form without matter.[135] That is what Aristotelian perception essentially is.

The *De Motu Animalium* version of [1][b] does, however, add something important to the picture we have formed so far. The question at issue in the context is, How do animals get moving? Aristotle cites automatic puppets and other mechanical systems as analogies to illustrate how a small initial change can produce a variety of larger changes further on in the causal chains for which the mechanisms are designed (701b 24-6) –

(p. 147), 'perceptions just are some sort of alteration' (p. 151). Nussbaum-Putnam p. 39 paraphrase the first of these as 'perceptions just *are* (*ousai*), are realized in, such *alloiōseis*'. The crux is εὐθύς, which I take to mean 'directly', 'in their own right', in contrast to the alterations *caused* by perceptions mentioned in the previous sentence. (A good illustration of this logical sense is *Met.* VIII 6, 1045a 36-b 6; more in Bonitz *sv.*) A helpful parallel is *Poet.* 10, 1452a 12-14: εἰσὶ δὲ τῶν μύθων οἱ μὲν ἁπλοῖ, οἱ δὲ πεπλεγμένοι· καὶ γὰρ αἱπράξεις ὧν μιμήσεις οἱ μύθοί εἰσιν ὑπάρχουσιν εὐθὺς οὖσαι τοιαῦται. λέγω δὲ ἁπλῆν μὲν πρᾶξιν κτλ.

[133] Nussbaum *De Motu* pp. 151-2 agrees that we are dealing with a 'clear recapitulation of the *DA* position on perception'. The cross-references between the two treatises support this. While *DA* III 10, 433b 19-30, looks forward to the account of animal movement in *MA*, *MA* 6, 700b 4-6, looks back to *DA* on the question whether the soul is itself moved (Bonitz 100a 45 refers us to II 2-3; Nussbaum *ad loc.* to I 3-4; Burnyeat *Map* chap. 5, n. 72, to III 9-11), and if so, how, while b 21-2 looks back to *DA* III 3 on the differences between appearance, perception, and intellect. Nussbaum pp. 9-12 draws the chronological conclusion that *MA* is a late work. I prefer to emphasise that, whatever the dating of individual works, readers of *MA* are expected to have studied *DA* as carefully as readers of *DA* are expected to have studied *GC* and *Ph.*

[134] Nussbaum argues for reading [1][b] with the 'is' of composition in her *De Motu* pp. 146-52 (cf. pp. 256-7). Nussbaum-Putnam p. 36 distance themselves from Sorabji's account of perceptual assimilation (previously accepted by Nussbaum), but at p. 40 they endorse his (i) and (ii), merely substituting a different set of underlying ordinary alterations to make them true. Their substitute alterations (heating and chilling and resultant changes of shape in the bodily parts) cannot, as Sorabji's ordinary alterations can, provide a material account of the difference between seeing red and feeling warmth – for the good reason, I believe, that Aristotle invokes heating and chilling to explain how perceptions produce animal movement (see below), not to explain the initial perceiving.

[135] Notice πάσχει (i.e. ἀλλοιοῦται) at 424a 23.

'just as, if the rudder shifts a hair's breadth, the shift in the prow is considerable' (701b 26-8, tr. Nussbaum). The key idea is the incremental power of certain types of causal chain.

When Aristotle comes to apply this idea to animal movement, he mentions several alterations. The first alteration is (a) the heating and cooling of bodily parts, which causes them to expand, contract, and change their shape (701b 13-16).[136] He then adds that such alterations[137] may in turn be caused by any of three things, each of which either is or involves alteration. (b) 'Perceptions are in themselves alterations of a sort' (701b 17-18), and (c) there are the alterations which, he now argues, are involved in (i) the appearing or (ii) the conceiving of something hot or cold, either pleasant or painful (701b 18-23).[138] The novelty is to see extraordinary alterations (b) listed alongside ordinary alterations (a) as members of the same causal chain.[139]

Another place where this happens is *Physics* VII 2. *Physics* VII 3 was mentioned earlier for its claim that gaining knowledge is not an alteration, because it is not a change but the cessation of change. In the previous chapter, by contrast, Aristotle insists that when an animate thing perceives, no less than when an inanimate thing is warmed or cooled, this *is* an alteration – of a sort: 'The senses too are altered *in a way*' (244b 10-11).[140]

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[136] I agree with Nussbaum *ad loc.* that in 16 ἀλλοιουμένων is epexegetic of διὰ θερμότητα καί . . . διὰ ψύξιν.

[137] ἀλλοίουσι with no object specified at 16 because Aristotle is moving to the causes of the alterations (a) just mentioned.

[138] At line 20 Nussbaum excises θερμοῦ ἢ ψυξροῦ ἤ on the grounds that it is hard to make sense of the words: 'Aristotle nowhere suggests that the hot and the cold have, in themselves, any particular motivating power as objects of thought. Their inclusion probably originated in a gloss by a scribe anxious to indicate that θερμόν went with ἡδύ, ψυξρόν with φοβερόν (Nussbaum 'Text' p. 152). A reasonable excuse for the editorial knife, but one that can be rebutted by making sense, as follows. Precisely because the hot and the cold have no motivating power in themselves, but only in relation to the agent's situation (θερμόν does not go with ἡδύ in a heatwave), Aristotle makes separate mention of the cognitive content and the emotional aspect. (The claim in Nussbaum-Putnam p. 43 that Aristotle nowhere separates the cognitive and the emotional in this way is falsified even for perception by *DA* II 9, 421a 7-16; III 7, 431a 8-17.) Since hot and cold are opposites, one might paraphrase, 'hot or cold, whether it be the hot which is pleasant and the cold frightful or the other way round'.

[139] I suppose that alterations (c) are to be understood in the light of the doctrine that thinking, the exercise of intellect, requires φαντάσματα (*DA* III 7, 431b 2-9; 8, 432a 8-10), φαντάσματα in turn being likenesses of the perceptual alterations from which they derive (III 2, 429a 4-5).

[140] ἀλλοιοῦνται γάρ πως καὶ αἱ αἰσθήσεις. For discussion, see Wardy pp. 144-9.

It is scarcely an exaggeration to say that the Aristotelian universe would collapse if perception could not legitimately be treated as alteration alongside ordinary alterations like heating and cooling; for perception so characterised has a pivotal role in the *Physics*' grand argument for the existence of a first, unmoved cosmic mover.

I take these two texts (*MA* 7, *Ph.* VII 2) as some confirmation for my hypothesis that it is the needs of physics that lead Aristotle to classify perception as alteration and (passive) change. To return briefly to *De Motu Animalium*: if Aristotelian physics is to account not only for perception, but for the role of perception in determining animal movement, perceptual awareness must itself be a physical change – one of the small initial changes that set the series going. Nowadays the favoured alternative would be to treat 'perception' as a place-holding term for *whatever it is* in the animal's physiology (let the scientists find out) that starts it moving. That is functionalism. It is not Aristotle, for it rests on the post-Cartesian assumption that terms like 'perception' and 'awareness' belong to our mental vocabulary *in contrast to* the vocabulary of the physical sciences.[141] No wonder modern scholars have had difficulty translating [1][a] and [b]. 'Perception is some sort of alteration' seems to subsume the mental under the physical. But for Aristotle the physical does not contrast with the mental in the way we are used to.[142] His psychology, to say it for the third time, is the crowning achievement *of* his physics.

Finale

Before I stop, a word about an objection often put to me: 'Even if perceiving as such is not ordinary alteration, it might still involve ordinary alterations in the body, or other changes of a non-qualitative kind. After all, neither the builder's transition to activity nor his building is alteration or passive change, but that does not exclude his getting hot and bothered on site.'

I agree that *De Anima* II 5 shows only that the Sorabji interpretation is

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But I prefer Ross's translation of αἰσθήσεις as 'senses' to Wardy's 'sense-organs', which allows him to interpret the statement as referring, albeit vaguely, to ordinary alterations in the body.

[141] Readers may like to compare my remarks on the Ramsey sentence in 'Draft' p. 22 with the assumption at Nussbaum-Putnam p. 40 that committing Aristotle to reductive materialism is the only alternative to understanding the 'is' of [1][b] as the 'is' of composition.

[142] More on this in Burnyeat 'Aquinas'.

wrong. Claim (i) is wrong because the assimilation that perceiving is not ordinary alteration (Alt[1]). Claim (ii) is wrong because the extraordinary alteration (Alt[3]) that perceiving is is not its underlying material realisation. From this it obviously does not follow that no underlying realisation is needed for extraordinary alteration (Alt[3]) itself. The extraordinary alteration which perceiving is does require certain standing conditions in the organ – transparency for example. Why not material processes as well? II 5 on its own does not rule out the involvement of some (as yet unspecified) ordinary alteration, or some non-qualitative change, which stands to the extraordinary alteration (Alt[3]) that perceiving is as matter to form. What II 5 shows is that the assimilation refined in the course of the chapter cannot itself play such a role; the perceiver's becoming like the object perceived is not a material process but belongs on the side of form. This leaves *logical* space for a material realisation of perception, a space that commentators can fill with coded messages, vibrations, or any other processes they fancy.[143]

But Aristotle goes on speaking of perception as alteration and not speaking of it as anything else. We have just seen him still at it in *De Motu Animalium*. He leaves no *textual* space for anything but alteration – and remember that in his physics alteration is an irreducible type of change, one of the only four types there are.[144] We have watched Aristotle extending his notion of alteration, originally defined in *De Generatione et Corruptione* I for cases like a fire's heating a cold room, to fit the alteration by which a perceiver sees red. He has taken care to specify the refinements needed for the purpose. The presumption is that in other respects the analogy between heating and perceiving holds good.

Let me push this point a little further. Aristotle's story about the heating action of fire is *logically* compatible with an underlying process in

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[143] Sorabji 'Intentionality' p. 210 lists various suggestions that have been made, with references. Two cautions are in order. First, anyone who chooses a process that Aristotle would count as κίνησις had better not combine it with the idea that perceiving is ἐνέργεια in the sense which *Met.* IX 6 contrasts with κίνησις, lest they countenance a matter-form marriage between logically incompatible partners. Second, there is a widespread illusion that Aristotle's methodological remarks in *DA* I 1 positively demand some concomitant material change underlying perception. Nussbaum-Putnam appreciate that the claim has to be argued for, not assumed. I argue the contrary in 'Remarks' p. 433 with n. 38.

[144] *Cat.* 14, 15a 17-27, expressly rejects the idea that alteration necessarily involves some non-qualitative change. The only place to suggest otherwise is *Ph.* VIII 7, 260b 7-13, disarmed by Furley p. 134.

terms, say, of molecular motion. But it is perfectly clear that heating for Aristotle is a primitive, elemental process which needs no further material changes to explain it. Anyone who proposed otherwise, to bring Aristotle nearer to modern views, would violate the spirit of his texts. The same is true, I submit, of Aristotle's theory of perception, which takes up more pages in the *De Anima* (not to mention *De Sensu*) than any other topic. If so extended a treatment leaves no textual space for further material changes underlying the alteration which is perceiving, we should take the author at his word. He has said what he has to say about perception. Extraordinary alteration (Alt^3) is where he means to stop.

The merit of the Sorabji interpretation is that it accounts for Aristotle's continuing use, throughout the *De Anima* and related works, of the qualitative language of alteration as the *lowest level* description of what happens in perception. Anyone who claims to interpret Aristotle, not just to make up a logically possible theory inspired by Aristotle, must match Sorabji's achievement over the same range of texts. No responsible interpretation can escape the question this paper has been discussing: Given that perception is to be *wholly* explained as some sort of alteration, which sort is it? Sorabji's ordinary alteration, or the extraordinary alteration I have laboured to bring to light in *De Anima* II 5? Within the text as Aristotle wrote it, *tertium non datur*.[145]

Appendix 1: 417a 30-b 2

> ἀμφότεροι μὲν οὖν οἱ πρῶτοι κατὰ δύναμν ἐπιστήμονες, ἀλλ' ὁ μὲν διὰ μαθήσεως ἀλλοιωθεὶς καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἕξεως, ὁ δ' ἐκ τοῦ ἔχειν τὴν ἀριθμητικὴν ἢ τὴν γραμματικήν, μὴ ἐνεργεῖν δέ, εἰς τὸ ἐνεργεῖν, ἄλλον τρόπον.

30 οἱ [πρῶτοι] κατὰ δύναμιν ἐπιστήμονες <ἐνεργείᾳ γίγνονται ἐπιστήμονες> Torstrik: οἱ πρῶτοι, κατὰ δύναμιν ἐπιστήμονες <ὄντες, ἐνεργείᾳ γίγνονται ἐπιστήμονες,> Ross 32 On preferring ἀριθμητικὴν to the MSS reading αἴσθησιν, see n. 68

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[145] This paper originally took shape in seminars at Princeton (1989), Harvard (1991), and Pittsburg (1992); to the senior and junior members of those audiences, many thanks for helping me clarify my ideas and improve my arguments. Thanks also to later audiences in St Petersburg and at a conference in Basel on ancient and medieval theories of intentionality. Individuals who gave challenging criticism and useful comments include Sarah Broadie, Victor Caston, David Charles, Dorothea Frede, Michael Frede, Thomas Johansen, Geoffrey Lloyd, Martha Nussbaum, Ron Polansky, Malcolm Schofield, David Sedley, Richard Sorabji, K. Tsuchiya, Robert Wardy.

Modern discussion of this densely concentrated passage begins with Torstrik. On the received text, ἀμφότεροι οἱ πρῶτοι is the subject of the sentence at 30, bifurcating into ὁ μέν as the subject of the sentence at 31, ὁ δ' the subject of the sentence 31-b 2. To this Torstrik had two objections.

To begin with, he said, the first sentence is ridiculously repetitive: we have just been told not only that but how (1) and (2) are potential knowers. Then, more damagingly, with ὁ μέν as subject (referring to first potentiality) διὰ μαθήσεως ἀλλοιςθείς is in predicate position, but it is absurd to say of a newly born infant ὁ μέν (*sc.* ἐστι) διὰ μαθήσεως ἀλλοιωθείς. The future perfect ἠλλιοιωσόμενος would fit, but not ἀλλοιωθείς. (Theiler does in fact read and translate ἀλλοιωθησόμενος . . . μεταβαλῶν.)

After much thought (diu haec animum sollicitum habuerant: sentiebam corruptelam, medela in promptu non erat), Torstik found a solution: desideratur notio transeundi. If διὰ μαθήσεως ἀλλοιωθείς is what the infant *becomes*, instead of what the infant already *is*, the difficulty disappears.

Torstrik proceeded to write the idea of transition into the text by emendation. Ross does the same, rather more neatly in that he does not have to excise πρῶτοι or shift κατὰ δύναμιν ἐπιστήμονες to subject position. Most editors and translators suppose that the Torstrik-Ross *meaning* can be got out of the text as it stands, without emendation.

But how? The only scholar to explain is Hicks:

> There is no verb in this sentence (sc. ἀλλ' ὁ μέν κτλ.). We cannot supply κατὰ δύναμιν ἐπιστήμων ἐστί from the last sentence because of the participles ἀλλοιωθείς and μεταβαλών. The effect of these participles is best shown if we supply γίγνεται ἐπιστήμων, 'but the one [becomes possessed of knowledge] after modification . . . the other . . .'

Call this construal (A). It has been followed, without further discussion, by nearly every translator since. It can also claim ancient precedent: both Alexander *Quaest.* III 3, 83.27-30 and Philoponus 300.8-30 take this line, which Philoponus expounds again with especial clarity at *De Aeternitate Mundi* 69.4ff., dating from 529AD (our earliest MS of *DA* is E, 10th cent.); his quotation of our passage at 69.22-70.1 and 71.17-20 confirms that he read it in the form it has come down to us, without supplementation.

The other ancient commentators are less definite. Themistius 55.25 writes ἀλλ' ὁ μὲν δεῖται μαθήσεως καὶ τῆς κατὰ μάθησιν ἀλλοιώσεως . . ., but this is paraphrase (inexcusably adopted by Rodier for his *translation*). Simplicius 121.29-30, writing ἀλλ' ὁ μὲν τελειούμενος ἀλλοιώσει τῇ διὰ τῆς μαθήσεως, seems to fall to a version of Torstrik's second objection: even the present participle τελειούμενος is inappropriate to a newly born infant. Sophonias 66.38-67.4 is interestingly obscure: ἀμφότεροι μὲν οὖν οἱ πρῶτοι κατὰ δύναμιν ἐπιστήμονες, ἀλλ' ὁ μὲν πρώτως, ὁ δὲ δευτέρως, καὶ ὁ

μὲν διὰ μαθήεως ἀλλοιωθεὶς καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἕξεως, ὁ δὲ ἐκ τοῦ ἔχειν τὴν αἴσθησιν τελείαν ἢ τὴν γραμματικὴν μὴ ἐνεργεῖν δέ. It is time to reopen the issue.

I agree that Hicks was right to say we cannot supply κατὰ δύναμιν ἐπιστήμων ἐστί. But he was also right to expect the missing verb to be carried forward from the previous sentence; that would be more normal than leaving readers to supply a wholly new verb like γίγνεται. Hence what I propose we supply after ὁ μέν is: κατὰ δύναμίν ἐστιν. κατὰ δύναμίν ἐστιν ἀλλοιωθείς is a perfectly proper thing to say of Torstrik's infant. The child is now *potentially* (not of course actually) someone who *has been* altered through learning.

Next, I supply after ὁ δ' not just κατὰ δύναμίν ἐστιν, but κατὰ δύναμίν ἐστι μεταβαλών. Hicks *ad* 417a 32 already saw the need to supply a participle from the ὁ μέν sentence as well as a main verb. He chose μεταβαλών, rather than ἀλλοιωθείς, but without explaining why. Three reasons can be given: (a) the construction ἐκ . . . εἰς is standard for μεταβάλλειν (*Ph.* III 5, 205a 6; V 1, 224b 7-10; VI 5, 235b 6, etc.), and already in 417a 31 ἐξ goes with μεταβαλών; (b) the emphasis on opposition in the immediate sequel (417b 2-3) implies that what the ἄλλον τρόπον is other than is (not learning but) changing from an opposite state; (c) μεταβαλών, as the more general term, gives a better lead in to the disjunction 'either not an alteration or a different kind of alteration' (417b 6-7) - it would be odd to say of a transition introduced as an alteration that either it is not an alteration or it is a different kind of alteration.

Such is the construal adopted in the main text of this paper. Call it construal (B). Here is a translation to fit:

> Both the first two are potentially knowers, but the former <is potentially> someone who has been altered through learning, i.e. someone who has repeatedly *changed from an opposite state*, the latter <is potentially someone who has changed> *in another way*, viz. from having knowledge of arithmetic or letters without exercising it to the actual exercise.

It is just possible that this is what Sophonias is saying. It is quite probable that Themistius construed the same way before paraphrasing (legitimately enough) potentiality as lack or στέρησις.

Let me now list the differences between construal (A) and construal (B). (A) spotlights the changes, (B) the results which the two potentialities are potentialities for; (B) articulates the two potential senses of '*P* is a knower' in terms of two different things the knower has a potentiality to be, (A) describes the two types of transition that take *P* from (1) to (2) and from (2) to (3). Neither construal makes for elegant Greek, but to understand Aristotle's Greek philology must ascend to the condition of

philosophy, and the central philosophical point about potentiality is that it is a potentiality to *be*, not to become, unlike one's present self (p. 43, p. 54 above). Until Kosman's 'Motion' this was seldom recognised. Once the point is taken, construal (B) may be recommended on philosophical grounds, as well as because it is more economical (I submit) in its philological demands.

There is a second philosophical reason for preferring construal (B). From a technical point of view the predicate at 30 is ἐπιστήμονες, not κατὰ δύναμιν ἐπιστήμονες. The correct parsing of the sentence is not 'Both are potentially-knowers', but 'Both are-potentially knowers', with κατὰ δύναμιν modifying the copula (εἰσίν understood). Not only does Aristotle in his logic standardly treat the modal adverbs 'necessarily' and 'possibly' as copula-modifiers, but metaphysically (to come closer to present concerns) potentiality and actuality are for him modes of *being* (*Metaph.* V 7, 1017a 35-b 2; VI 2, 1026b 1-2; IX 1, 1045b 33-4; XII 5, 1071a 3-5). The triple scheme presents three different ways of *being* a knower, and it is the two ways of being-potentially a knower that our passage distinguishes. Accordingly, κατὰ δύναμίν εἰσιν should be treated as a unit and carried forward as a unit from 30 to 31 and 31-2. If this means allowing the adjective ἐπιστήμων to extend to knowing in sense (3), Aristotle implies that it may so extend when he writes λέγομεν . . . ἐπιστήμονα καὶ τὸν μὴ θεωροῦντα, ἂν δυνατὸς ᾖ θεωρῆσαι (*Met.* IX 6, 1048a 34-5; cf. 8, 1050b 34-1051a 2, perhaps *EN* VII 3, 1147b 6, and Alex. *Quaest.* III 25-6, Them. 55.23-4, Philop. *De Aet. Mundi* 71.12-13).

My third reason for advocating construal (B) is structural. It offers a steadily developing exposition. First the triple scheme with its two types of potentiality (417a 22-9); then a further articulation (not a mere repetition, as Torstrik complained) of the two potentialities as potentialities for being the results of two types of alteration (417a 30-b 2); finally an account of the alterations themselves which are the actualities of these potentialities (417b 2-7). Construal (A) merges the second stage with the third and thereby misses one of the finer details in Aristotle's gradual unfolding of his contrast.

The only other scholar to have seen that the passage requires rethinking in the light of the point that potentiality is potentiality to be is Mary Louise Gill. She translates (p. 176) as follows:

> Now both of the first are potential knowers, but the one, having been altered through learning and often changed from an opposite state <is a potential knower in one way>, the other from having arithmetical or grammatical knowledge but not exercising it to the exercise <is a potential knower> in another way.

Construal (C), as this may be called, starts by challenging Hicks' claim that we cannot supply κατὰ δύναμίν ἐστιν ἐπιστήμων. Hicks' objection is met by shifting ἀλλοιωθείς and μεταβαλών to subject position, agreeing with ὁ μέν (it remains unclear whether ὁ δ' also has a participle attached). The result is interpreted by Gill to mean that both ὁ μέν and ὁ δ' have the potentiality to be knowers *in sense (2)*; they have the same potentiality but in different ways. In consequence, Gill denies (pp. 178-80) that the first potentiality is lost when the learner becomes a knower in sense (2).

Aristotle denies it too, according to my account in the main text - but later at 417b 12-16 and not (*pace* Gill) for all potentialities whatsoever. In any case, the objection to construal (C) is that, once the past participle ἀλλοιωθείς is moved to subject position, Torstrik's infant causes trouble again. The newly born have the potentiality to be knowers in sense (2), but the alteration that achieves this goal should be in the future, not the past tense.

Appendix 2: 417b 5-7

> θεωροῦν γὰρ γίνεται τὸ ἔχον τὴν ἐπιστήμην, ὅπερ ἢ οὐκ ἔστιν ἀλλοιοῦσθαι (εἰς αὐτὸ γὰρ ἡ ἐπίδοσις) ἢ ἕτερον γένος ἀλλοιώσεως.

Hicks, followed by Tricot and Barbotin, would supply ἐπιστῆμον as complement to γίγνεται, with θεωροῦν denoting the manner of becoming: 'For it is by exercise of knowledge that the possessor of knowledge becomes such in actuality'. The more usual construal takes θεωροῦν as complement to γίγνεται: 'the possessor of knowledge in sense (2) comes to be actively knowing in sense (3)'. Hicks says that γίγνεται is 'an odd verb to use, if we bear in mind ἅμα νοεῖ καὶ νενόηκεν'. Indeed it is. The oddity is part and parcel of a deliberate strategy whereby II 5 *refrains* from invoking the idea of unqualified (complete) as opposed to incomplete actuality, or of ἐνέργεια in a sense that excludes κίνησις. Instead, Aristotle intends to keep both perception and intellectual learning within the scope of physics by refining the ordinary scheme of *De Generatione et Corruptione* I 7 and *Physics* III 1-3.

Gill pp. 222-6 departs further from the usual construal of these lines by denying that Aristotle makes any reference to the transition from (2) to (3). Taking as the antecedent of ὅπερ not γίγνεται understood as referring to transition, but either θεωροῦν or θεωροῦν γίγνεται understood as mere periphrasis for θεωρεῖ, she holds that the activity itself (3), not the transition to it, is what is here said to be either not an alteration or at least another kind of alteration. My objection is that on anyone's account of

the earlier lines 417a 30-b 2 (see Appendix 1), they include a contrast between the transition from (1) to (2) and that from (2) to (3). In which case it is strained not to let θεωροῦν γίνεται refer to the latter transition.

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