

## Aristotle on ‘First Transitions’ in *De Anima* II 5

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In *De Anima* II 5, 417a21–b16, Aristotle makes three distinctions between types of transitions, affections, and alterations. First, he distinguishes between transitions such as from being able to know to knowing which a subject is able to undergo because his ‘kind and matter’ are of a certain sort (let us call these ‘*first transitions*’) and transitions such as from knowing to contemplating (417a27–b2). Then he contrasts affections involving ‘a kind of destruction of something by its contrary’ with affections involving ‘the preservation of that which is so potentially by that which is so actually’ (let us call these ‘*preservative affections*’) (417b2–5). Finally, he opposes alterations ‘toward privative conditions’ to alterations ‘toward a thing’s dispositions and nature’, e.g., learning (for the lack of a better name, let us follow Myles Burnyeat<sup>1</sup> in calling these ‘*unordinary alterations*’) (417b14–6).

The purpose of this paper is to determine the nature of first transitions. ‘First transition’ or πρώτη μεταβολή is Aristotle’s own term, and it occurs at 417b17, where he says, ‘The first transition (πρώτη μεταβολή) in that which can perceive is brought about by the parent, and when it is born it already has [the faculty of] sense-perception in the same way as it has knowledge. Actual sense-perception is so spoken of in the same way as contemplation.’<sup>2</sup> The analogy, here, between the faculty (δύναμις) of sense-perception and the disposition (ἔξις) of knowledge clearly implies that the term πρώτη μεταβολή denotes the acquisition of either of these things. I will take what I have

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<sup>1</sup> M.F. Burnyeat, ‘De Anima II 5’, *Phronesis* 47/1 (2002) 65.

<sup>2</sup> Translations of *De Anima* II 5 in this paper are, with minor modifications, from D. W. Hamlyn (trans., comm.), *Aristotle. De Anima. Books II and III (with passages from book I)* (Oxford, 1968). Other translations of Aristotle in this paper are, with minor modifications, from J. Barnes (ed.), *The Complete Works of Aristotle: The Revised Oxford Translation*, (Princeton, 1995).

called 'first transitions', then, to include acquisitions of faculties such as sense-perception as well as acquisitions of dispositions such as knowledge.

Some<sup>3</sup> will think that I have set an easy task for myself, because first transitions are just ordinary alterations, such as Aristotle describes, for example, in *Generation and Corruption* I 4. This view would be mistaken, however, because first transitions should be identified with unordinary alterations and these, as the name implies, are not ordinary. That first transitions are the same as unordinary alterations is at least plausible *prima facie*, because Aristotle gives learning as an example of each. In another paper,<sup>4</sup> moreover, I have offered an argument for this claim that in outline goes like this: There is a strong textual precedent<sup>5</sup> for taking Aristotle, when he says unordinary alterations are 'toward a thing's dispositions and nature', to mean that they are 'toward a thing's natural dispositions'.<sup>6</sup> And if unordinary alterations are alterations toward a thing's natural dispositions, they must also be preservative affections.<sup>7</sup> To say that something is a natural disposition is to say that whatever is able to possess it owes this ability to being a member of a natural kind. And if a thing's membership in a natural kind is not lost when a natural disposi-

<sup>3</sup> See e.g., M.F. Burnyeat, 'De Anima II 5', 54; Stephen Everson, *Aristotle on Perception* (Oxford, 1997), 89–96; Robert Heinaman, 'Actuality, Potentiality and *De Anima* II.5', *Phronesis* 52/2 (2007) 148, 167.

<sup>4</sup> John Bowin, 'Aristotle on Various Types of Alteration in *De Anima* II 5', *Phronesis* 56/2 (2011) 150–1.

<sup>5</sup> In *Nicomachean Ethics* VII 12, the phrase 'disposition and nature' (1152b36: ἐξέως καὶ φύσεως) and the reverse epexegesis 'the natures and the dispositions' (1152b27–8: αἱ φύσεις καὶ αἱ ἐξεις) clearly mean 'the natural dispositions' (τὰς φυσικὰς ἐξεις). The claim, in this passage, is that being healed is pleasant only incidentally, because what is pleasant in itself is not being healed, but the activity of our residual 'disposition and nature' (ἐξέως καὶ φύσεως). That this 'disposition and nature' is the natural disposition health is confirmed at 1153a14, where Aristotle says that pleasure, in itself, is the activity of our 'natural disposition' (κατὰ φύσιν ἐξέως). That τὰς ἐξεις καὶ τὴν φύσιν at 417b16 means τὰς φυσικὰς ἐξεις is also suggested by the fact that it is opposed to τὰς στερητικὰς διαθέσεις. When Aristotle opposes στερήσεις to ἐξεις in the *Categories* and the *Topics*, he invariably means to oppose φυσικὰς ἐξεις, i.e., natural dispositions or faculties like sight, to their στερήσεις at times when they should be present, e.g., blindness in an adult human (*Cat.* 10 passim, and *Top.* I 15, 106b21–6, II 2, 109b19, II 8, 114a7–13, V 6, 135b28–36, *Top.* VI 9, 147b26). We also have the testimony of Simplicius that in the lost work *On Opposites*, Aristotle thought of this as the primary way in which στερήσεις and ἐξεις are opposed (*In Cat.* 402,30–5).

<sup>6</sup> This is also the interpretation of Burnyeat ('De Anima II 5', *Phronesis* 47/1 (2002) 63) and Hicks (R.D. Hicks (trans., comm.), *Aristotle, De Anima. With translation, introduction and notes* (Cambridge, 1907), 357), as well as the ancient commentators.

<sup>7</sup> This is also the interpretation of Burnyeat ('De Anima II 5', 63) and Mary Louise Gill (*Aristotle on Substance: The Paradox of Unity*, (Princeton: Princeton University Press 1989), 179).

tion is acquired, it follows that neither is the ability to acquire this disposition, since the reason for this ability's existence is the thing's membership in its natural kind. An unordinary alteration, then, is a process of acquiring a natural disposition that preserves the ability that it actualizes. But if this is what distinguishes unordinary alterations from ordinary alterations, then first transitions are also unordinary alterations because first transitions are described as transitions to a disposition that a subject is able to possess 'because his kind and matter are of a certain sort' (417a27), which I take to mean 'because he is a member of a certain natural kind'.<sup>8</sup>

'First transition' and 'unordinary alteration', then, are just different names for a single type of process, viz., the process of acquiring a natural disposition or faculty that preserves the ability that it actualizes. And according to Aristotle, this is a special sort of alteration, or not an alteration at all, since he hesitates even to say that his standard example of this type of alteration is a genuine case of being affected.<sup>9</sup>

That which, starting from being potentially such, learns and acquires knowledge by the agency of that which is actually such and is able to teach either should not be said to be affected, as has been said, or else we should say that there are two kinds of alteration, one a change to conditions of privation, the other to a thing's dispositions and nature. (*DA* 2.5, 417b12–6)

We can also see how special this sort of alteration is supposed to be from the fact that preservative affections (and therefore first transitions) are not just described as preservative. They are also contrasted with 'a kind of destruction of something by its contrary':

Being affected is not a single thing either; it is first a kind of destruction of something by its contrary, and second it is rather the preservation of that which is so potentially by that which is so actually and is like it in the way that a potentiality may be like an actuality. (*DA* II 5, 417b2–5)

The opposition of 'preservation' to 'destruction', here, makes it clear that an exclusive disjunction is implied: being affected is either 'a kind of destruction of something by its contrary' or a 'preservation of that which is so potentially', but not both. So a preservative affection, and therefore a first transition, in addition to being preservative, is also not 'a kind of destruction of something by its contrary'. A first transition is not, in other

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<sup>8</sup> For the claim that first transitions are preservative affections, see also M.F. Burnyeat, *Notes on Eta and Theta of Aristotle's 'Metaphysics': A Study Guide* (Oxford: University of Oxford Faculty of Philosophy, 1984) 136.

<sup>9</sup> I infer that all alterations are affections from the doctrine of *Generation and Corruption* I 7 that to be altered is to be affected by something so as to become like it (324a10–11). cf. Iamblichus apud Simplicium in *Cat.* 326,15–18.

words, an ordinary alteration as it is defined in *Physics* I 9 (192a21–2) and in *Generation and Corruption* I 4 (319b28–31).<sup>10</sup>

But a problem arises here because, if a first transition is either not an alteration at all or is an alteration that is not 'a kind of destruction of something by its contrary', what are we to make of the claim, at 417a31–2, that a potential knower becomes an actual knower, 'having been altered through learning, i.e., having repeatedly changed from a contrary disposition' (διὰ μαθήσεως ἀλλιωθεῖς καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἐξεως)? How, in other words, is this consistent with a first transition not being 'a kind of destruction of something by its contrary'? To make matters worse, learning, which here is an example of a first transition, is one of Aristotle's favorite examples of an ordinary alteration, and it shows up repeatedly in this role in his attempts to define change.<sup>11</sup> So how can Aristotle consistently say in *De Anima* II 5 that acquisitions of natural dispositions and faculties such as knowledge or perception are either not alterations at all, or are alterations that are not 'a kind of destruction of something by its contrary'?

### The case of learning

Let us consider, first, the case of learning. Burnyeat points out that a non-standard concept of learning is canvassed in *Physics* VII 3 that might explain why Aristotle hesitates to call it an alteration, viz., one in which learning is described not as the temporally extended process of gaining knowledge, but as the cessation of this process. Setting aside, for now, the issue of why Aristotle should want to characterize learning in this way, we can see that since the cessation of an alteration is not itself an alteration, *Physics* VII 3 shows us that whether or not learning is an alteration at all can depend on how we describe it. Burnyeat proposes a similar strategy for explaining how learning can be an alteration 'from contrary dispositions' (417a31–2) under one description, but an alteration that is not 'a kind of destruction of something by a contrary' under another. He points out that at 417a27–b2, Aristotle characterizes both the person who can

<sup>10</sup> For the closely related claim that alteration is paradigmatically a change between contraries see e.g., *Physics* VI 10, 241a32: ἐξ ἐναντιῶν γὰρ τινῶν ἢ ἀλλοίωσις; *Physics* VIII 3, 253b30: εἰς τοῦναντίον γὰρ ἢ ἀλλοίωσις; *Physics* VIII 7, 260a33: ἀνάγκη οὖν ἀλλοίωσιν εἶναι τὴν εἰς τὰναντία μεταβολήν; *Cael.* I 12, 283b21–2: ἀλλοιοῦται δὲ τοῖς ἐναντίοις; See also *Physics* V 2, 226b1–8, VIII 7, 261a34–5, and *GC* I 4.

<sup>11</sup> The following passages are instances where Aristotle uses learning as an example of 'ordinary alteration': *Phys.* III 1, 201a18, III 3, 202a32–3, 202b2–5, 11, 16–17, 20, V 1, 224b13, V 2, 225b33, 226a15, V 4, 227b13, 229b4, VIII 5, 257b5; *GC* I 3, 319a16; *Metaph.* θ 6, 1048b24.

learn and the person who has learned as knowers (*ἐπιστήμονα*), though in different senses, the former potential and the latter actual. Describing the subjects of learning in this way suggests the possibility of describing the process of learning in a way that does not imply the opposition of termini, viz., where the termini of the process are marked by the same word 'knows'. So learning is an ordinary alteration when it is described as proceeding from termini that are opposed, i.e., 'from contrary dispositions' such as ignorance and knowledge, but a preservative and unordinary alteration when it is described as proceeding from termini that are not opposed, i.e., from knowing to knowing, though in different senses, viz., potentially knowing in the former case and actually knowing in the latter.<sup>12</sup> So in Burnyeat's view, first transitions are *not* to be identified with unordinary alterations, because first transitions are described as proceeding between 'contrary dispositions', while unordinary alterations are not. Unordinary alterations, on this view, are a subset of first transitions under a different description.<sup>13</sup>

But a little thought shows that this is not a solution to our problem. First, it is the description of first transitions and not unordinary alterations that characterizes both the person who can learn and the person who has learned as *ἐπιστήμονα*. We were trying to dissolve a contradiction between the description of a first transition as the acquisition of a natural disposition or faculty, and therefore as a preservative affection, and the description of a first transition as involving change between 'contrary dispositions'. This seems to just reinforce the conflict by giving us another reason to think that first transitions are described as preservative. And second, this way of understanding preservative affections creates a new problem, because, if the termini of an unordinary alteration are genuinely not opposed, then it is not a change, as all changes proceed between opposing termini (*Phys.* VIII 7, 261a32–3). And because all alterations are changes, the event in question cannot be an alteration. Moreover, if alteration implies the assimilation of an agent to a patient, as *Generation and Corruption* I 7 argues, and as Aristotle reaffirms by invoking that text in *De Anima* II 5 (417a1–2), then the absence of opposing termini disqualifies an event from being an alteration on this ground as well. If the event in question has termini that are not opposed to one another, i.e., if its

<sup>12</sup> M.F. Burnyeat, '*De Anima* II 5', 62, cf. 55.

<sup>13</sup> Although Burnyeat does not put the matter in exactly these terms, this is, in fact, what he proposes when he says that learning may be a first transition or an unordinary alteration depending on whether one 'considers' the *terminus a quo* of learning to be a state that is destroyed, i.e., ignorance, or a state that is preserved, i.e., first potentiality knowledge (M.F. Burnyeat, '*De Anima* II 5', 62). Since alterations like warming and cooling feature the 'destruction of something by its contrary' without this possibility of redescription, I infer that, under Burnyeat's interpretation, unordinary alterations are a *proper* subset of first transitions under a different description.

*terminus a quo* and *terminus ad quem* are not dissimilar, then it is impossible to characterize it as an assimilation. We should expect from any sort of assimilation, if it is to be an assimilation at all, an initial dissimilarity, and therefore opposition of termini. So again, if the termini of an unordinary alteration are genuinely not opposed, it cannot be an alteration. But this was supposed to be an account of how learning *is* an alteration, though of a special sort, not how it is no alteration at all. We have already explained how it is not an alteration at all by appealing to *Physics* VII 3. It is no good, on the other hand, arguing that the termini of the process of learning *are* genuinely opposed on the ground that while both termini satisfy the same predicate 'knows', one means potentially knowing while the other means actually knowing. Though being potentially F and being actually F *is* an opposition, it is one that every genuine change shares according to *Physics* III 1–3. So instead of telling us what is special about learning, on this suggestion, 417b2–5 just reiterates that it is an alteration.

Burnyeat is right, I think, to hold that Aristotle's account of learning should be made consistent by distinguishing ways in which learning is described. I will show that the way forward, however, is not to take first transitions to *be* changes from contrary dispositions, but merely to *involve* them. What this means, exactly, will become clearer once we have a serviceable interpretation of preservative affections, and the key to this, I think, is to recognize that 417b2–5 contrasts preservative affections with affections that proceed between *contraries* (τὰ ἐναντία), *not* opposites (τὰ ἀντικείμενά). Contrariety is not the only sort of opposition the termini of a change can have. In *Physics* VIII 7, 261a32–3, Aristotle says that though all changes except circular motion proceed between opposites, not all changes proceed between contraries. And though he says in *Physics* I 7 that all changes proceed to a form from a privation of that form, at *Metaphysics* Iota 4, 1055b15–6, Aristotle claims that though every contrary is a privation, not every privation is a contrary because 'that which is deprived may be deprived in several ways'. This suggests the possibility that learning, when described as an alteration to a thing's dispositions and nature that does not involve a destruction of something by its contrary – that is, as an 'unordinary alteration', as Burnyeat calls it – lacks contrariety but *not* opposition of termini because it is a transition to a form from a privation of that form that is not the form's contrary.

Changes in the category of substance fit this description because substances have no contrary.<sup>14</sup> But apart from a few odd exceptions,<sup>15</sup> one will

<sup>14</sup> Aristotle often says, substance has no contrary. See *Cat.* 5, 3b24–5, *Phys.* V 2, 225b10–1, *Metaph.* K 11, 1068a11, N 1, 1087b2–3.

<sup>15</sup> For example, at *Cat.* 5, 3b31–2, 6, 5b11–2, Aristotle says that particular quantities like 'four foot' have no contrary, and at *Top.* IV 3, 123b35–7 he says that a particular

be hard pressed to find anything in the category of quality that lacks a contrary. Barring this option, then, what we need is an alteration to a quality that has a contrary from a privation of that quality that is not its contrary, and *Metaphysics* Iota 5 seems to suggest just this possibility. In this chapter, Aristotle calls the neutral state of being neither of two contraries in a thing that is receptive of those contraries a 'privative negation' (ἀπόφασις στερητική). Here, Aristotle reasons that since we normally ask 'whether' a quantity is greater than, less than, or equal to another, being equal to another quantity must be incompatible both with being less than it and being greater than it. And if equality is incompatible with both of these properties, it must be opposed to both of them in some way. But, since 'one thing cannot have more than one contrary' (*Metaph.* Iota 4, 1055a19–20), equality cannot be contrary to both. But neither can it be contrary to one but not the other, 'for why should it be contrary to the greater rather than the lesser?' (1056a5–6). It remains, then, for 'the equal' to be opposed to both 'the greater' and 'the lesser' as either a negation or as a privation (1056a15–6). 'The equal' is certainly a negation, insofar as it is neither 'the lesser' nor 'the greater', but it cannot be simply a negation, because if this were so, everything would be such that it is either equal or unequal, but only quantities can have these properties (1056a20–4), so it must also be a privation in that it is 'determinate or taken along with its receptive material' (1055b7–8). The equal, Aristotle concludes, is opposed to both 'the lesser' and 'the greater' not as a contrary, but as a 'privative negation' (1056a17–8). So Aristotle implies that when a thing changes from having a quantity that is equal to another to having a quantity that is either greater than or less than another, or when a thing changes from having a quantity that is either greater than or less than another to having a quantity that is equal to another, it proceeds from a form to a privation or from a privation to a form, respectively, where the form and privation are not also contraries. The fact that Aristotle immediately (at 1056a24–7) applies his concept of a privative negation to what is neither good nor bad and to what is neither black nor white suggests that an analogous principle should hold for changes in the category of quality: An alteration from a privative negation, viz., a neutral state of being neither of two qualitative contraries F or G in a thing that is receptive of these contraries, to a state of being either F or G is an alteration to a quality from a privation of that quality that is not the quality's contrary.

Philoponus provides us with a way to apply the concept of a privative negation to learning based on a distinction about the sort of ignorance

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disease like ophthalmia lacks a contrary, though presumably complete magnitude and disease in general do not.

from which the process of learning proceeds.<sup>16</sup> According to Philoponus, there is a difference between the transition from a mere lack of knowledge to knowledge, and the transition from a false opinion to knowledge, because whereas the former proceeds from a privation to a form, the latter proceeds from a contrary form to a contrary form. Because the mere lack of knowledge is a neutral state of being neither of two contraries, viz., knowledge and false opinion, in a thing that is receptive of those contraries, viz., νοῦς, it is a privative negation. And because a privative negation is not a contrary of either of the two contraries it is a privative negation of, knowledge is not a contrary of a mere lack of knowledge, and the replacement of the latter by the former is not 'a kind of destruction of something by its contrary'. So learning, if it proceeds from a mere lack of knowledge, is an example of an unordinary alteration.

This sits well with the characterization of learning in *De Anima* II 5 as an unordinary alteration because there it is said to take place 'through the agency of one who actually knows and has the power of teaching' (417b12–3). Learning from a teacher, one hopes, will in most cases prevent one from falling into error. Several other passages make the attribution of this doctrine to Aristotle even more plausible. The first is the claim in *De Anima* III 4 that 'the part of the soul with which the soul knows' is 'impassive' or ἀπαθής and 'can have no nature of its own, other than that of having a certain capacity', viz., a capacity of receiving a form. This seems to suggest that, prior to receiving a form, νοῦς is in a formless neutral state. Now being a blank slate like this is clearly a type of ignorance, but it is a type of ignorance, according to Aristotle, that is different from being in error. The latter, claims Aristotle in *Posterior Analytics* I 16, is ignorance 'in virtue of a condition (διάθεσις)' while the former is ignorance 'in virtue of a negation (ἀπόφασις)' (79b23–4).<sup>17</sup> The idea seems to be that while believing a falsehood is a condition of having a form, though a false one, being a blank slate is not having a form at all. Now in order to be an ἀπόφασις στερητική, ignorance in virtue of an ἀπόφασις needs to be neither of two contraries that νοῦς is receptive of, so false opinion must be contrary to knowledge. And we can find, in fact, reasonably clear evidence that Aristotle thinks that they are. *De Anima* III 2, 427b10–11, for instance, tells us that thinking incorrectly (τὸ μὴ ὀρθῶς νοεῖν) is the contrary of both true opinion and knowledge. And *De Interpretatione* 14 seems to assume that true and false opinion are contraries, because it tries to determine what sort of false belief is most contrary to a true belief by considering in which cases the believer in the false belief is most deceived. We need not consider the controversial subject of exactly how Aristotle

<sup>16</sup> In *DA* 300, 11–17; *Aet.* 72,1–4.

<sup>17</sup> This text is suggested by Ps-Simplicius *ad loc.*, in *DA*, 121,35–122,7.

takes this to work,<sup>18</sup> because the point for my purposes is just that false beliefs *are* held to be contrary to true beliefs because a certain sort of false belief is opposed to true belief as its unique and primary contrary. So if, as *Posterior Analytics* I 2 tells us, knowledge is an opinion that we have established as necessarily true by means of determining, through a demonstrative syllogism, why it is necessarily true, then the contrariety of true and false opinion will imply the contrariety of knowledge and false opinion.

We have a viable way, now, to understand how learning is not ‘a kind of destruction of something by its contrary’. But we still have not addressed the apparent contradiction between Aristotle’s two descriptions of a first transition; on the one hand as the acquisition of a natural disposition or faculty, and therefore as a preservative affection, and on the other hand as involving change between ‘contrary dispositions’ (417a31–2). Philoponus attempts to resolve this conflict by claiming that Aristotle is speaking loosely when he calls ‘the change from being in potentiality to being in act’ an alteration, and that he does so pending the introduction of the more exact distinctions set forth in 417b14–6.<sup>19</sup> But this cannot be all there is to it because, in any case, it is not the word *ἀλλοιωθεῖς* at 417a31 that is troubling, but its exegesis *καὶ πολλάκις ἐξ ἐναντίας μεταβαλῶν ἕξεως*. The problem is that this phrase seems to point us toward a sense of *ἀλλοιωθεῖς* that would be appropriate if Aristotle were using the term precisely and not loosely, as Philoponus understands it. Philoponus, that is, claims that while the transition from a mere lack of knowledge to knowledge ‘more closely resembles coming to be than alteration’<sup>20</sup> (pre-

<sup>18</sup> I prefer L.M. De Rijk’s (*Aristotle. Semantics and Ontology. Volume One. Philosophia Antiqua*, 91/1 (Leiden: Brill 2002), 347–51) interpretation, because it saves Aristotle from the ‘astounding confusions’ and inconsistencies of which Dancy (*Sense and Contradiction: A Study in Aristotle* (Dordrecht: Springer 1975), 143–52) and Ackrill (*Categories & De Interpretatione* (Oxford: Oxford Clarendon Press 1963), 153–5) accuse him. De Rijk’s view, very briefly, is that what are opposed as the content of beliefs in *De Int.* 14 are assertibles (i.e., what are expressed by ‘that-clauses’) and not assertions, so Aristotle need not be contradicting what he has said elsewhere about the contrariety of assertions. Moreover, since the content of a belief can be an incomplete assertible (e.g., ‘not being good’), it is possible to read a sentence like ‘the good is not good’ so that ‘the good’ has wide scope. So rather than believing a contradiction, which, as Aristotle himself says, would make a deceived person no different than a vegetable (*Metaph.* Γ 4, 1008b11–2), the deceived person believes of a given good thing, e.g., temperance, that it is not good. *This*, on De Rijk’s interpretation, is the sort of false belief that is the unique and primary contrary to a true belief.

<sup>19</sup> *In DA* 300, 17–8.

<sup>20</sup> Philoponus cites *Physics* as the source for this doctrine (72,5), and as Michael Share (*Philoponus, Against Proclus On the Eternity of the World* 6–8. Ithaca: Cornell University Press, 2005, p. 107, n. 251) points out, an obvious possibility is that he has *Physics* V 1 in mind. In *Physics* V 1, Aristotle talks of changes from ‘non-subject’ to

sumably because it proceeds, as coming to be does, between opposites that are not also contraries), a change between contrary dispositions such as false opinion and knowledge is an 'alteration in the strict sense' (*Aet.* 72.4).

At any rate, the grammar of the sentence at 417a30–b2 suggests a different way to resolve the conflict:

While both are potentially knowers, the former <becomes an actual knower>, having been altered through learning (διὰ μαθήσεως ἀλλοιωθεῖς), i.e., having repeatedly changed from a contrary disposition (καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἕξεως), the latter <becomes an actual knower> in another way, viz. from having knowledge of arithmetic or letters without exercising it to the actual exercise'.

This sentence consists of an implied main verb and predicate adjective, which according to the usual interpretation, is 'becomes an actual knower' (γίγνεται ἐπιστήμων),<sup>21</sup> the participial clause 'having been altered through learning' (διὰ μαθήσεως ἀλλοιωθεῖς), and an epexegetis of this participial clause 'i.e. having repeatedly changed from a contrary disposition' (καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἕξεως). The word ἀλλοιωθεῖς, here, is clearly a circumstantial participle, and as such it describes the circumstances under which becoming an actual knower takes place, not the process of becoming an actual knower itself. If we take Philoponus' suggestion about the

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'subject' and from 'subject' to 'subject' where 'subject' means 'what is affirmatively expressed', and in the light of his characterization of accidental change in the next chapter as 'change from one form to another' (225b24), it seems plausible to take 'subject' to mean form and 'non-subject' to mean privation. The main point of the chapter, moreover, seems to fit Philoponus' purpose to an extent, viz., the point that while substantial comings to be *must* be described as contradictory changes from a 'non-subject' to a 'subject', alterations *may* also be described in this way and called a 'sort of coming to be' (225a14, γένεσις τις), i.e., a coming to be of an accidental property. I say 'to an extent' because this does not justify a *preference* for calling the transition from a mere lack of knowledge to knowledge a 'sort of coming to be' and the transition to knowledge from false opinion an 'alteration'.

<sup>21</sup> See Ross, Hicks, Alexander and Philoponus, *ad loc.*, for the orthodox reading. Burnyeat advocates an alternate reading, in which κατὰ δύναμιν ἐστίν is implied instead, on the grounds that it is more economical than supplying γίγνεται ἐπιστήμων, that it accords with the Kosman reading of Aristotle's definition of change such that change is governed by a potentiality to be in the *terminus ad quem*, and that it offers a series of contrasts that are all concerned with ways of being in potentiality. But none of these considerations is decisive. Because Aristotle's prose is notoriously elliptical, the preference for economy should not hold much weight. As for the second point, while it is true that Burnyeat's reading confirms the Kosman reading of Aristotle's definition of change, it is also true that the traditional reading does not contradict it, and even if one agrees with Kosman's interpretation, Aristotle should not be required to confirm it at every opportunity. Finally, that Burnyeat's reading makes 417a31–2 a contrast between ways of being in potentiality is of dubious benefit, because on Burnyeat's own admission, the philosophical intent of the passage is to contrast ways of changing.

types of ignorance from which the process of learning proceeds, changing ἐξ ἐναντίας ἕξεως will mean changing from true to false opinion or *vice versa*, but the πολλάκις in καὶ πολλάκις ἐξ ἐναντίας μεταβαλὼν ἕξεως seems to suggest that this is a motion back and forth, viz., an oscillation. If this is the correct way to read the epexegetis of the participial clause, then the contrast between what the main clause and the participial clause describe would seem to be a contrast between the acquisition of the settled disposition (ἕξις) of knowledge as such that a human is able to undergo ‘because his kind, his stuff, is of this sort’, and an oscillation between true and false opinion that accompanies it. Now because, as I said, it seems natural to take ‘because his kind, his stuff, is of this sort’ to mean ‘because he is a member of this natural kind’, then the implied γίγνεται ἐπιστήμων must be taken to describe an unordinary alteration, or rather, *either* no alteration at all *or* an unordinary alteration, since 417b13–4 expresses an ambivalence about how learning is to be classified.

I have already suggested, following Burnyeat, that the sense in which learning is not an alteration at all can be found in *Physics* VII 3’s claim that it is not a motion, but a cessation of motion in the soul of the learner. This can be shown to follow from the view, also found in *Physics* VII 3, that acquiring knowledge consists in coming to stand in a cognitive relation with an object of knowledge, and that this relational change is somehow similar to the process of bodies coming into contact (247b8). The claim that knowledge is a relational property is familiar from *Categories* 7, which seems to class knowledge among the relatives because it consists in a relation between a knowing subject and an object of knowledge. The point of the analogy with contact, however, relates to Aristotle’s claim in *De Anima* III 6 that one thinks of what is ‘undivided in form’ in an ‘undivided time’, which implies that we apprehend formal unities, i.e., objects of knowledge, either all at once or not at all. When we apprehend a geometrical line as a formal unity, for instance, we do not partially grasp one of its parts and then partially grasp another, and if we do grasp parts of a line we fully grasp each of the parts as successive formal unities in successive times. Since contact between bodies is also all or nothing like this, the point of the analogy with contact is that knowledge, like contact, does not admit of degrees and is a change between contradictories (τὰ κατὰ ἀντίφασιν). Just as bodies are in contact or not, a knower either stands in a cognitive relation with an object of knowledge or he does not. Since there is no *tertium quid* between knowing and not knowing, it follows that the acquisition of knowledge, conceived of in this way at least, must be instantaneous.<sup>22</sup> To complete the deduction, it follows that if it is

<sup>22</sup> See e.g., *Phys.* V 3, 227a9–10, VIII 8, 264b1–4, *Metaph.* Γ 7, 1011b23, Iota 7, 1057a33–4.

instantaneous, then the acquisition of knowledge must coincide with one of the boundaries of the period of motion described in *Physics* VII 3 rather than with the period of motion itself, and since it is implausible that knowledge has been acquired at the earlier boundary, it must be acquired at the later.

Given this understanding of how learning is not an alteration, and the interpretation of unordinary alteration on offer, it remains to understand what motivates Aristotle to imply that learning is either a relational change or an unordinary alteration. Part of the motivation, I think, is that learning, under both of these descriptions, is thought to be accompanied by, and, in fact, to mark the end of learning described as an ordinary alteration. *De Anima* II 5, 417a31–2 seems to imply that learning, taken as an unordinary alteration, can be accompanied by but is not identical to learning described as an oscillation between true and false belief. *Physics* VII 3 seems to imply that this same oscillation accompanies the acquisition of knowledge understood as a relational change. Here, the restless motion in the soul of the learner is described as an impairment like sleep, disease, or drunkenness. And since an impairment, in this case, must be what inclines one to err, then the cessation of this motion must consist in overcoming the temptation to affirm a 'contrary error' which, as *Posterior Analytics* I 2, 72b1–4 implies, is what someone must do in order to have knowledge *simpliciter*.

In the light of the fact that the acquisition of knowledge, under both of these descriptions, marks the end of a period of motion, I think it is plausible to take these descriptions to correspond to different aspects of learning when it is conceived of as an assimilation of the noetic faculty to an object of thought or knowledge. In *De Anima* III 4, Aristotle seems to think of knowing and thinking as analogous to perceiving in the sense that each involves an assimilation with its respective object; the sense faculty with the object of sense and the noetic faculty with the object of thought or knowledge. In each case, the end result of the assimilation is a relation, and in particular, an isomorphism between the faculty and the object of that faculty. Viewing noetic assimilation as the reception of a form in a thing where it was previously absent would be, it seems, to view it as an unordinary alteration, since an unordinary alteration is a transition to a form from a privation of that form that is not the form's contrary. Viewing it as the emergence of an isomorphism between the object and the faculty of knowledge, however, would seem to make learning a relational change. But either way of viewing learning is consistent with it being the cessation of a motion because both are instantaneous, and this follows from the fact that both are changes between contradictories that are not also contraries. Learning as a relational change is a change between contradictories for reasons already discussed. Learning as an unordinary alteration is a change between contradictories that are not also contraries

because it is a transition to a form from an absence of that form, which implies that it is a change from being not-F to being F or from not having a form to having it.

### Other natural dispositions and faculties

*Physics* VII 3, then, gives some color to the claim that learning, while not itself an ordinary alteration, is nonetheless accompanied by ordinary alteration. But this is not all that the chapter is concerned with, claiming, as it does, that a similar claim holds for substantial generation and the loss as well as the acquisition of dispositions in general, whether natural, unnatural, bodily, or psychological. The broader scope of the discussion in *Physics* VII 3 presents an opportunity to generalize some of the claims Aristotle makes about learning to apply to other first transitions. In particular, we can see how coming to be a substance and coming to be virtuous in body or soul are, like learning, either not alterations or are unordinary alterations, but are in any case accompanied by ordinary alterations.<sup>23</sup>

*Physics* VII 3 claims that acquiring an excellent bodily or an excellent ethical disposition, like acquiring knowledge, is not an alteration because it is a relational change. Bodily virtues are relational because they consist in a certain proportion of hot and cold elements ‘in relation either to one another within the body or to the surrounding environment’, which disposes the body well with regard to its ‘proper affections’, i.e., affections that are likely to harm or benefit it. Aristotle does not tell us exactly what the relational nature of ethical virtues consists in, but we can guess, based on the implied analogy with bodily virtues, that it is supposed to be a certain proportion of emotional and appetitive elements in relation either to one another within the soul or to the surrounding social environment, which disposes the agent well with regard to his ‘proper affections’, i.e., pleasure and pain. It is clear, however, that acquisitions of bodily and ethical virtues may also be described as unordinary alterations, i.e., as alterations to a thing’s dispositions and nature that are not destructions by contraries. To see this in the case of ethical virtue, we need only avail ourselves of the doctrine in *Nicomachean Ethics* II 6 (1106b36ff.) that ethical virtues consist in a mean, and the claim at *Physics* VIII 7, 261b19-20, that the mean, like the equal, is the opposite, but not the contrary of both ‘that which surpasses it and of that which it surpasses’. As such, the

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<sup>23</sup> Aristotle also implies, in *Physics* VII 3, that a similar thing can be said of acquisitions of vices, but because he defines vices as *φθοραί* and *ἐκπτώσεις* of virtues, acquisitions of vices in this chapter seem to be no more than losses of virtues. I briefly consider Aristotle’s treatment of these sorts of changes at the end of this paper.

mean is a 'privative negation' of both excess and deficiency, and since virtue of character consists in a mean with respect to actions and passions (*NE* II 6), this sort of virtue is also a privative negation, but not a contrary<sup>24</sup> of both excess and deficiency in actions and passions. Courage, for instance, is the 'privative negation', but not the contrary of both cowardice and rashness, temperance is the 'privative negation' but not the contrary of both insensibility and self-indulgence, and liberality is the 'privative negation' but not the contrary of both prodigality and meanness (*NE* II 7). As for bodily virtue or health, Aristotle says at *Physics* VII 3, 246b5, as he does elsewhere,<sup>25</sup> that this consists in a *συμμετρία* of hot and cold elements, and it is clear that this, like the mean, is also a 'privative negation' of both excess and deficiency. From this we can infer that when a person acquires a virtue, whether of the body or of the soul, he proceeds between dispositions that are opposed but not contrary to one another, and, hence, do not involve 'a kind of destruction of something by its contrary'.<sup>26</sup>

Now when Aristotle speaks of relational changes, we are used to understanding these as non-intrinsic because they involve relations between independently existing substances (*Phys.* V 2, 225b13), and of the changes identified in *Physics* VII 3 with the acquisition of bodily and psychological virtues, only changes in relations to the subject's physical or social environment are non-intrinsic in this sense. So Aristotle seems to be stretching the normal sense of the term 'relational' by applying it, as he does in *Physics* VII 3, to changes in relations between internal elements. But this does no harm in the context, because Aristotle's intention there is merely to argue that acquisitions of virtues supervene on alterations of internal elements, and there is no reason to suppose that a change needs to be non-intrinsic to be supervenient. For as in the case of learning, Aristotle claims,

<sup>24</sup> In the light of this, we shall have to take Aristotle's claim at *NE* II 8, 1108b14–5 that the mean in which virtues consists is contrary to both extremes as loose talk. One might object to this that *Metaphysics* Iota 5 only applies to 'perfect' or 'complete' contraries since he argues against intermediates being perfect contraries at 1056a12–5, but in any event, if it holds quite generally of contraries that 'one thing cannot have more than one contrary' (*Metaph.* Iota 5, 1055a19–20) the 'contraries' of *NE* II 8, 1108b14–5 will fail this test.

<sup>25</sup> Cf., *Top.* VI 2, 139b21, VI 6, 145b8, *PA* II 2, 648a37–b11.

<sup>26</sup> Aristotle also argues, in *Categories* 10, 12b26–13a36 that the loss of a natural faculty is a change from a *ἔξις* to a *στέρησις* but not also a change between contraries because, while reciprocal change is always possible between contraries, it is not possible to regain a natural faculty like sight once one has lost it. Aristotle seems to ignore, in *Categories*, the distinction between dispositions (*ἔξεις*) and faculties (*δυνάμεις*) that he makes in *NE* II 5 and *EE* II 2, lumping both under the heading *ἔξις*. In *Categories* 10, when contrasted with *στέρησις*, *ἔξις* appears to mean a natural *δύναμις*, like *ἡ ὄψις*, while in *Categories* 8 and 15, *ἔξις* is more broadly construed to include things like virtue and knowledge.

in *Physics* VII 3, that acquisitions of bodily and psychological virtues are necessarily accompanied by alterations, expressing himself, as he does in *De Anima* II 5, using circumstantial participles of ἀλλοιοῦσθαι.<sup>27</sup> In the case of the body, these alterations are warmings and coolings that attend the acquisition of bodily fitness, and in the case of the soul it is pleasures and pains that are ‘alterations of the sensitive part’.

Aristotle also uses a participle of ἀλλοιοῦσθαι to claim that substantial comings to be are necessarily accompanied by alterations:<sup>28</sup>

Moreover it would seem absurd actually to ... speak of a man or house or anything else that has come into existence as having been altered. Though perhaps it is necessary that in every case of coming to be something is being altered (ἀλλοιουμένου τινός), e.g., the matter being condensed or rarefied or heated or cooled, nevertheless it is not the things that are coming into existence that are altered, and their becoming is not an alteration. (*Phys.* VII 3, 246a4–9)

He then goes on to claim that neither the acquisition of a bodily or psychological virtue nor the coming to be of a substance is an alteration, because they are both completions or τελειώσεις:

Again, dispositions, whether of the body or of the soul, are not alterations. For some are virtues and others are vices, and neither virtue nor vice is an alteration: virtue is a sort of perfection (τελειώσις τις) (for when anything acquires its virtue we call it perfect (τέλειον), since it is then really in its natural state: e.g. a circle is perfect (τέλειος) when it becomes really a circle and when it is best, while vice is a perishing of or departure from this. So just as when speaking of a house we do not call its arrival at perfection (τελείωμα) an alteration (for it would be absurd to suppose that the coping or the tiling is an alteration or that in receiving its coping or its tiling a house is altered and not perfected (τελειούται)), the same also holds good in the case of virtues and vices and of the things that possess or acquire them. (*Phys.* VII 3, 246a10–b2)

The idea seems to be that just as becoming virtuous, considered as a τελειώσις, is to be distinguished from the various bodily and psychological alterations that lead up to it, in the same way, the coming to be of a house, considered as a τελειώσις, is to be distinguished from the various alterations, e.g., chiseling, tueling, pointing, coping, and tiling that lead up to it. The way these events are related, viz., the τελειώσις and the process leading up to it, can be inferred from Aristotle’s treatment of the concept

<sup>27</sup> ‘But perhaps it is necessary that [dispositions of the body] come into being and perish as certain things are being altered.’ (246b14–15); ‘It is necessary that [dispositions of the soul] come to be as the perceptive component undergoes alteration.’ (247a6–7); ‘This is clear: when something undergoes alteration then it is necessary that it [the subject at issue] should also lose and acquire [virtues and vices of the soul].’ (247a17–8).

<sup>28</sup> ‘But perhaps it is necessary that in every case of [substantial] coming to be something is being altered.’ (246a6–7)

τέλειος in *Metaphysics* Δ 16: According to Aristotle, something is complete (τέλειος) when no part which should be present is missing, so a house is complete when one has assembled all of its parts, and a human being is complete 'when in respect of its proper kind of excellence it lacks no part of its natural magnitude'. This suggests that the alterations that lead up to a completion (τελείωσις) constitute that completion as parts constitute a whole, or as matter constitutes form. The message of *Physics* VII 3, at any rate, is that substantial coming to be, when considered as a τελείωσις, is not an alteration at all. It could also be described as an unordinary alteration, i.e., as an alteration to a thing's dispositions and nature that does not involve a destruction of something by its contrary, because substantial generation involves the acquisition of a form that has no contrary. That substantial coming to be is to be classed with learning as an unordinary alteration is already implied by the claim at *De Anima* II 5, 417b16–7 that when the newborn child has acquired the faculty of sense-perception as a result of its embryological development, it 'has sense-perception in the same way it has knowledge'. It is also implied by Aristotle's claim in *Physics* VIII 4, 255a24–b31 that when water transforms into air, the lightness of air is a disposition relevantly similar to knowledge.

Aristotle does not explicitly say that learning is a τελείωσις of the soul in *Physics* VII 3, but one may infer it from what he says there. As Simplicius (*In Phys.* 1065,7–8) points out, the passage quoted above appears to reduce *all* dispositions of the body and soul to virtues and vices,<sup>29</sup> and since knowledge is a demonstrative disposition or ἐξίς ἀποδεικτική (*NE* VI 3, 1139b31–2) and obviously not a vice, it must be a virtue, and therefore a τελείωσις of the soul. Just as the alterations, then, that lead up to the completion of a house constitute but are not identical to this completion, so the alterations that lead up to the acquisition of knowledge constitute but are not identical to the acquisition of knowledge.

As for how knowledge is a τελείωσις of the soul, Alexander plausibly suggests that it is a τελείωσις in the sense of a perfection of the faculty that differentiates a human being as a human being. Since, as Alexander says, 'a human being in the proper sense is one who both possesses the dispositions and is active in accordance with those in respect of which a human being is a human being most of all and in the proper sense,' the acquisition of knowledge can be viewed as an extension of substantial coming to

<sup>29</sup> Indeed, the paragraphs that follow appear to effect a division of the genus discussed in this paragraph (i.e., bodily and psychological dispositions). First, Aristotle considers bodily dispositions in general (246b4–20), then dispositions of the soul in general (246b20–247a7). Then he effects a division of dispositions of the soul into dispositions of character (247a7–19), and intellectual dispositions, i.e., knowledge (247b1–248a9).

be.<sup>30</sup> That Aristotle intends to cast the acquisition of bodily and psychological virtues in this way, at any rate, is evident from his analogy, in *Physics* VII 3, with the perfection of a circle. The circle is most a member of its geometrical kind when it is perfectly circular, so if the coming to be *simpliciter* of a circle is the coming to be a member of a geometrical kind, then becoming more perfectly circular is, in a sense, an extension of becoming a circle. Likewise, presumably, a man is most a member of his natural kind when he is perfectly virtuous or perfectly knowledgeable, so if the coming to be *simpliciter* of a man is the coming to be a member of a natural kind, then becoming more perfectly virtuous or knowledgeable is, in a sense, an extension of becoming a man.

The apparent conflict between saying that learning is a paradigm of alteration as defined in the *Physics* and saying that it is either an unordinary alteration or no alteration at all, then, dissolves when we realize that the acquisition of knowledge as such requires the latter description while the process that leads up to and constitutes it requires the former. A similar conflict exists in the case of substantial generation, and a bonus of my analysis is that it can be resolved in the same way. Given that Aristotle distinguishes alteration from coming to be in *Generation and Corruption* III and IV by claiming that the former involves the persistence, and the latter the emergence of an underlying substance, and that the emergence of a substance in a coming to be constitutes the completion of the coming to be, substantial coming to be should, as a rule, be instantaneous. But we ordinarily talk about coming to be as an extended process, and, in fact, in *Physics*, Aristotle provides an alternate way to describe coming to be that conforms with this way of talking. In *Physics* VI 6 237b9ff. and VI 9, 240a16ff., he describes coming to be, so that it may be either an extended process or an instantaneous completion, depending on whether what is described is the coming to be of the form/matter composite or of the form.<sup>31</sup> The tension, here, stems from Aristotle's desire to incorporate the

<sup>30</sup> See Alexander, *Quaest.* 82,14–6, cf. 84,28, where Alexander says that learning is a γένεσις πως; Cf. Philoponus, who glosses Aristotle's μεταβολή ἐπὶ τὰς ἕξεις καὶ τὴν φύσιν at 417b16 with μεταβολή εἰς τελειότητα καὶ τὴν φύσιν at in *DA* 304,24, and claims that 'these changes too are perfections in a way' (304,27), where the 'too' refers to his earlier characterization of the switch from disposition to activity as 'leading ... to perfection' and 'not properly called affection or alteration but rather coming to be' (301,10–11).

<sup>31</sup> In *Physics* VI 6 237b9ff. and VI 9, 240a16ff., Aristotle claims that, although the coming to be of a substance in one sense occurs instantaneously at the completion of its coming to be, in another sense it does not, since the coming to be of its material parts is infinitely divisible, and this is the case because its matter is infinitely divisible, and in VI 9, he says, as a general principle, that while a thing is changing between contradictory termini, such as being and not being, a changing thing is never wholly

ordinary but conflicting intuitions that coming to be is both an extended process undergone by what is coming to be, and that what comes to be first emerges as a subject at the end of this process. But the conflict dissolves if we take the extended process as the process that constitutes, but is not identical to the substantial coming to be. Just as the process of learning may be described as either an extended process or the completion of an extended process depending on whether it is described as the oscillation between states of truth and error or as the 'settling down' or cessation of this oscillation at the stage where knowledge has become a stable disposition (ἐξίς),<sup>32</sup> so the coming to be of a substance may be described as either an extended process or as the completion of an extended process depending on whether it is described as the coming to be of the composite or of the individual form.<sup>33</sup>

### First potentiality

It is almost universally assumed that when, in *De Anima* II 5, Aristotle distinguishes between transitions such as from being able to know to knowing which a subject is able to undergo 'because his kind, his stuff, is of this sort', and transitions such as from knowing to contemplating, he is distinguishing between ordinary alteration and a special sort of alteration that he intends to associate with perception. Under my interpretation, however, the former sort of transition is either not an alteration at all, or an unordinary alteration that is accompanied by and, indeed, constituted by ordinary alteration but is not identical to it. It follows from this that whereas on the usual interpretation, the potential governing this sort of change, or a 'first potentiality' as the ancient commentators call it, is a potentiality for an ordinary change, on my interpretation it is a potentiality for a change that is either not an alteration or an unordinary altera-

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in either state, since some of its parts are always in the *terminus a quo* and some parts are always in the *terminus ad quem*. The possibility of substantial coming to be being described as an extended process also seems to be implied in *Physics* III 1, since the definition of κίνησις there includes substantial coming to be and destruction, and this definition, as an incomplete actuality, entails that the process takes time.

<sup>32</sup> M.F. Burnyeat, 'De Anima II 5,' 64, claims that 'none of this is on display in *De Anima* II 5,' but, I claim, this is precisely what is entailed by πολλάκις ἐξ ἐναντίας μεταβαλλῶν ἐξέως at 417a31–2.

<sup>33</sup> Cf. Croese (*Simplicius on Continuous and Instantaneous Change*, PhD diss. (Utrecht: Leiden-Utrecht Research Institute 1998), 87–97) on the claim that the γένεσις of the form is instantaneous, and also *Metaph.* Z 7, 1032a17–19, 22–25, Z 8, 1033a24–b19, Z 9, 1034b11, Z 10, 1035a6–9, 1036a16–19, Z 11, 1037a7–10, H 3, 1043a29–b4, 1043b14–8, H 5, 1044b21–4, Λ 3, 1069b35–1070a4.

tion, which we have seen are alternate characterizations of the coming to be and perfection of a substance.

If this is what first potentiality is, we can also, by drawing on *Metaphysics* Θ 7, infer that there will be a *single* first potentiality governing each such coming to be and perfection. I will argue this point, first, for the coming to be of substances, and then for the acquisition of perfections of substances. In *Metaphysics* Θ 7, Aristotle asks: 'Is earth potentially a man? No – but rather when it has already become seed (σπέρμα), and perhaps not even then ... the seed is not yet potentially a man; for it must further undergo a change in a foreign medium. But when through its own motive principle it has already got such and such attributes, in this state it is already potentially a man; while in the former state it needs another principle' (1049a1–17). Aristotle seems to be using 'seed', here, in the sense of *Generation of Animals* I 18, 724b14–8, to mean a mixture of semen (γονή) and the menses (τὰ καταμήνια), since in *Generation of Animals* II 3, 737a7–16, Aristotle says semen itself makes no material contribution to the embryo (τὸ κήμα). So the claim is that while neither earth, out of which the menses are constructed, nor the mixture of the menses and semen, out of which the embryo is constructed, are potentially a man because some 'further change' and 'principle' is needed, the embryo *is* potentially a man because it has an active principle or capacity that can bring this about without some further change or principle. In other words, seed is not potentially a man because *two* processes and principles – one to turn seed into the embryo, and another to turn the embryo into a man<sup>34</sup> – are needed, instead of one, and, as Frede and Makin point out,<sup>35</sup> the implication is that for something to be potentially a man, there must be some *single* process that it can undergo to turn it into a man, a process that is governed by some *single* active capacity residing in an agent. And given the identity of corresponding active and passive capacities asserted in *Metaphysics* Θ 1, this implies that the embryo possesses a unique, passive, first potentiality to become a man if and only if there is such a single process and active capacity that can turn it into a man.

*Metaphysics* Θ 7 also provides justification for corresponding conclusions about the potentials governing the acquisition of dispositions that perfect substances. At 1049a3–5, Aristotle claims that just as not every

<sup>34</sup> And earth is not potentially a man because *three* processes and principles are needed instead of one – one to turn the earth into seed, another to turn the seed into an embryo, and another to turn the embryo into a man.

<sup>35</sup> Michael Frede, 'Aristotle's Notion of Potentiality in *Metaphysics* Θ' in T. Scaltsas, D. Charles, and M.L. Gill, eds., *Unity, Identity, and Explanation in Aristotle's Metaphysics* (Oxford: Oxford University Press 1994), 187–93; Stephen Makin, *Aristotle: Metaphysics Book Theta. Translated with an Introduction and Commentary* (Oxford: Oxford Clarendon Press 2006), 160–5.

sort of matter is potentially a human being, 'not everything can be healed by the medical art or by chance, but there is a certain kind of thing which is capable of it, and only this is potentially healthy.' Frede and Makin take the reference to 'the medical art', here, to imply the same requirement for being potentially healthy as for being potentially a man, viz., that there be some single process of healing governed by some single, active capacity to heal (i.e., 'the medical art') residing in a doctor (possibly himself, in the case of the self-healing doctor) who wishes to exercise it on the sick man (possibly himself), and there is no impediment to him doing so. An analogous case may be made for the acquisition of knowledge: An ignorant man is potentially a learned man, if and only if there is a single active capacity to teach residing in a teacher (possibly himself, in the case of one who is self-taught) who wishes to exercise it on the ignorant man (possibly himself), and there is no impediment to him doing so.

We can also infer, by drawing on certain other texts, that there will be no single potentiality governing each process of destruction or departure from perfection of a substance. With regard to the former process, it is clear that though the embryo possesses a unique, passive, first potentiality to become a man, this does not imply that a man also has a single corresponding capacity to become an embryo, or, what is more likely, a corpse. This is because, as Aristotle says in *Metaphysics* H 5, 1044b34–1045a5, the man is potentially a corpse and the wine is potentially vinegar *only accidentally*, since it is their matter that is potentially these things. The ability to decay belongs just to the matter of the man and the wine, and only accidentally to the organism as a whole.<sup>36</sup>

A similar point can be made about the potentials governing the loss of dispositions that perfect substances. The healthy man is not potentially a sick man in the way the sick man is potentially a healthy man because there exists no single active capacity to make him sick. The healthy man might become a sick man incidentally as a result of an imbalance of natural heat and cold in the body;<sup>37</sup> incidentally because, properly described, this imbalance is something that happens to the body, and only accidentally to the man. An analogous case may be made for the loss of knowledge: The learned man is not potentially an ignorant man in the way that an ignorant man is potentially a learned man because there exists no single active capacity to make him ignorant. *This* is why, as Burnyeat points out,

<sup>36</sup> Cf. *Physics* II 2, 194a30–33, where Aristotle says that the poet was carried away into making an absurd statement when he said '[the dead man] has the end for the sake of which he was born.' For not every stage that is last claims to be an end, but only that which is best.

<sup>37</sup> *An. Post.* I 13, 78b18–20; *Top.* VI 2, 139b20–1, VI 6, 145b7–9; *Phys.* IV 3, 210a20, VII 3, 246b4–10; *Metaph.* Z 7, 1032b7–8, 18–20, 22–9.

knowledge is not a potentiality to be ignorant as warmth is a potentiality to be cold and *vice versa*.<sup>38</sup> The learned man might forget what he knows, becoming an ignorant man incidentally as a result of an imbalance of dryness or moisture in 'the perceptive region';<sup>39</sup> incidentally because, properly described, this imbalance is something that happens to the organ of memory, and only accidentally to the man.

An important inference to be drawn from this is that if there is no unique potentiality governing processes of destruction or departure from perfection of a substance, then these are not really single changes at all, but collections of changes. These are, moreover, diverse collections of changes that owe their diversity to the diversity of the material powers in the bodies that undergo them.<sup>40</sup> The behavior of a material part, insofar as it is a material part, is not governed by a 'single motive principle', but rather by a multiplicity of motive principles arising from the multiplicity of elements present in it, i.e., the cold, arising from earth and water, the hot, arising from fire and air, the wet, arising from water and air, and the dry, arising from fire and earth. The deterioration of memory and health have the appearance of a unified process but this appearance is deceiving, because changes as a result of an imbalance of dryness or moisture in the perceptive region or of natural heat and cold in the body are merely the accidental result of the assertion of disorderly material powers in the face of a waning ability of the soul to control them.<sup>41</sup>

<sup>38</sup> M.F. Burnyeat, 'De Anima II 5,' 62. Thus, the reason for this has nothing to do with the long lasting nature of ἐξείσις, as Burnyeat claims. The fact that the coming to be or perfection of a substance is governed by a single first potentiality while a destruction or loss of perfection does not accounts for the fact that knowledge is not a potentiality to be ignorant.

<sup>39</sup> See *PA* II 7, 653b3–5. An excess of dryness (*Mem.* 1, 450b9–10, cf. *GC* II 2 where hardness is reduced to dryness) or moisture (*Mem.* 2, 453a23–6), will impair memory because they impair the ability of the organ of memory to receive lasting 'impression'.

<sup>40</sup> See *De Anima* I 5, 410b12–5, 411b7–8; *Long.* 2, 465a13–18, 465b27–32; *Long.* 5, 466a17–b2, *Juv.* 23, 479a8–23, *GA* V 1, 780a14–22, V 3, 783a34–b10, V 4 *passim*.

<sup>41</sup> Aristotle does not think of decay as a single unified process because he locates the explanatory basis of change in the natures of particular substances rather than in 'physical systems' or regions of space-time with governing laws (Aristotle's 'conceptual pluralism' as Broadie calls it. See Sarah Broadie (Waterlow), *Nature, Change and Agency In Aristotle's Physics* (Oxford: Oxford Clarendon Press 1982), 91). The four causes, Aristotle's primary tools for explaining natural things, are designed to explain phenomena by reference to these individual natures. Since decay is not explained in terms of the properties of a single physical system, but instead, in terms of the accidental interaction of independent material natures, it has only an accidental and derivative unity and an accidental and derivative explanation. Properly speaking, Aristotle says, time does not make (ποιεῖ) things decay. Decay only 'happens to occur' as time progresses (*Phys.* IV 13, 222b25–7).