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SPACE, TIME AND PHANTASMS IN ARISTOTLE, *DE MEMORIA* 2, 452B7–25

For whenever one actually remembers he always says in his soul that he heard or saw or thought this before. (*De Memoria* 1 449b22–3)

Aristotle thinks that in order to remember, (1) one must be cognizant of a *phantasma* used as a copy of that of which it is a *phantasma*, and (2) one must be cognizant of the time at which the original (i.e. now remembered) experience occurred (449b22–3, 450b25–451a8). In *De Memoria* 1, he uses the first half, (1), of this schematic account in order to explain certain kinds of mis-rememberings. For instance, he says that mad people sometimes conjure up fantastic images and take them to be memories of past experience; such episodes are mis-remembering, because these people use that which is not a copy as if it were a copy (451a8–11). In *De Memoria* 2, Aristotle returns to the topic of mis-remembering (although it may now be more accurate to call it mis-recollecting[1]) and here he uses the second half, (2), of his schematic account, together with the first, in order to explain additional sorts of mistakes. He claims that we sometimes recall the image of an event and properly use it as a copy, but we get the time wrong (thinking, for example, that an event occurred a week ago, when actually it occurred yesterday), and thus we fail to remember; further, he claims that we sometimes get the time right, but fail to use an image as a copy of the events which occurred during that time. In each case we fail to remember; for in order to remember we must both use an appropriate copy as a copy and (more or less) accurately cognize the time (452b27–9).

In *De Memoria* 1, Aristotle discusses the mechanisms involved in remembering. Here his focus is on the first half of the schematic account: in remembering we employ *phantasmata* which are bodily marks (*tupoi*) that are carved in the matter of the heart or *proton aisthetikon*.[2] Each mark is a sort of picture which represents items such as geometrical figures and particular persons, such as Coriscus (450a1–2, a29–30; 450b29–451a2). With the (re-)introduction of the second half of the schematic account in *De Memoria* 2, Aristotle claims that, in remembering, we not only employ 'the change connected with the thing', we also employ 'the change connected with the

[1] One of the salient differences between remembering and recollecting is that the latter must issue from the deliberative faculty, while the former need not (and for the brutes, which lack a deliberative faculty, certainly cannot) (453a4–13).

[2] In *De Somno*, Aristotle claims that the *arche* of perception is located in the region about the heart (462a1–5). In *De Memoria* 1, he claims that memory traces are τύποι (450a31, b5, 16). The principle evidence that these traces are bodily marks is found in the *De Memoria* 1 account of why some people have poor memories (450b1–11). There Aristotle states that the young and the old do not have good memories, because the former are growing and too moist/soft (ὑγρότεροι, 450b9) while the latter are in decay and too hard/dry (σκληρότεροι, 450b10). He is not speaking metaphorically (i.e. he is not claiming that the young are 'as-if' moist or that the old are 'as-if' dry); for elsewhere he supposes that compared to the rest of us the young are literally moist/soft and the old are literally dry/hard (*De Longitudine Vitae* 5, 466a18–23, b13–15). Thus, he thinks that changes in our bodily constitution explain differences in our ability to retain memories. Since he proposes that such changes can bring about the decay of existing *phantasmata*, he must think that *phantasmata* are marks in the *proton aisthetikon*. I have discussed the subject of the physiological status of *phantasmata* (together with the subject of the physiology of *aisthesis*) in 'Material Alteration and Cognitive Activity in Aristotle's *De Anima*', *Phronesis* 41.2 (1996), 138-57.

time' (452b23–4). Thus, in addition to the type of *phantasma* described as a sort of picture in *De Memoria* 1 (which he now terms a 'change connected with the thing'), he emphasizes the role of a second type: a change connected with the time. I will call *phantasmata* of the former type (like the mark which stands for Coriscus) event-signatures, and those of the latter type (like the mark which stands for a-week-ago) time-signatures.[3] The *De Memoria* 2 account of time-signatures will be my primary interest in this essay.

Here Aristotle uses letters of the alphabet which no doubt refer to points on a diagram. The diagram itself does not appear in any manuscript (strictly, not one of Aristotle's diagrams is preserved within the manuscript tradition), but it has been masterfully reconstructed by J. L. Beare and W. D. Ross, working independently.[4] Since this reconstruction was first proposed, no fewer than four interpretations of the role of the diagram have appeared in print.[5] I shall argue that not one of these interpretations proves to be adequate and I shall offer a new interpretation.

For the purposes of commentary, I divide the Greek text into three sections,[6] provide an English translation and append the diagram (Figure 1) below.

[§A] (452b7–15)

τὸ δὲ μέγιστον γνωρίζειν δεῖ τὸν χρόνον, ἢ μέτρῳ ἢ ἀορίστως. ἔστω δέ τι ᾧ κρίνει τὸν πλείω καὶ ἐλάττω· εὔλογον δ' ὥσπερ τὰ μεγέθη· νοεῖ γὰρ τὰ μεγάλα καὶ πόρρω οὐ τῷ ἀποτείνειν ἐκεῖ τὴν διάνοιαν ὥσπερ τὴν ὄψιν φασί τινες (καὶ γὰρ μὴ ὄντων ὁμοίως νοήσει), ἀλλὰ τῇ ἀνάλογον κινήσει· ἔστι γὰρ ἐν αὐτῇ τὰ ὅμοια σχήματα καὶ κινήσεις. τίνι οὖν διοίσει, ὅταν τὰ μείζω νοῇ, ὅτι ἐκεῖνα νοεῖ ἢ τὰ ἐλάττω; πάντα γὰρ τὰ ἐντὸς ἐλάττω, καὶ ἀνὰ λόγον καὶ τὰ ἐκτός.

[§B] (452b15–22)

ἔστι δ' ἴσως ὥσπερ καὶ τοῖς εἴδεσιν ἀνάλογον λαβεῖν ἄλλο ἐν αὐτῷ, οὕτως καὶ τοῖς ἀποστήμασιν. ὥσπερ οὖν εἰ τὴν *AB BE* κινεῖται, ποιεῖ τὴν *ΓΔ*· ἀνάλογον γὰρ ἡ *AΓ* καὶ ἡ *ΓΔ*. τί οὖν μᾶλλον τὴν *ΓΔ* ἢ τὴν *ZH* ποιεῖ; ἢ ὡς

[3] One might argue that the 'change connected with the time' is not a *phantasma* (i.e. not a bodily mark), but is the duration of the time spent in recalling the event-signature. There are two difficulties with this view. First, it does not seem to provide an explanation of how we can get the time right and fail to recall the appropriate event-signature. Second, it does not fit easily with Aristotle's claim that we can improve our recall speed through training (see 451b16–28 and n. 16, below).

[4] See J. L. Beare, 'Notes on Aristotle's *Parva Naturalia*', *Hermathena* 10 (1897–8), 455–73, and W. D. Ross, *Aristotle: Parva Naturalia* (Oxford, 1955), pp. 249–52.

The superiority of the Beare/Ross reconstruction over that found in Sophonias' commentary is demonstrated by Ross (p. 250). The main difficulties with the version in Sophonias are (i) it requires that mental images are larger than the external objects which they represent, and (ii) within it there are three letters (*N*, *Ξ* and *P*) which do not occur in any extant text.

[5] Besides Beare and W. D. Ross, see Richard Sorabji, *Aristotle on Memory* (Providence, 1972), pp. 18–21, 108–10; John Cooper, review of Sorabji in *Archiv für Geschichte der Philosophie*, 57 (1975), 66–8. The diagram is also discussed in G. T. R. Ross, *Aristotle: De Sensu and De Memoria* (Cambridge, 1906), pp. 275–83, 289—90. While G. T. R. Ross levies criticism against the interpretation that is offered by W. D. Ross, his primary focus is on earlier interpretations by Themistius and Freudenthal. He does not propose a detailed interpretation of his own. Perhaps, this is due to his belief that, by means of the diagram, Aristotle is offering nothing more precise than a 'general illustration of the relation which internal κινήσεις have to external κινήσεις and μεγέθη' (p. 290).

[6] The Greek text is that of W. D. Ross. I diverge by following Sorabji in not bracketing καὶ τὰ ἐκτος at l. 15.

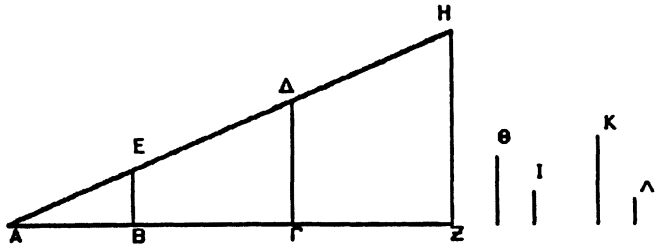

FIGURE 1

ἡ ΑΓ πρὸς τὴν ΑΒ ἔχει, οὕτως ἡ Θ πρὸς τὴν Ι ἔχει; ταύτας οὖν ἅμα κινεῖται. ἂν δὲ τὴν ΖΗ βούληται νοῆσαι, τὴν μὲν ΒΕ ὁμοίως νοεῖ, ἀντὶ δὲ τῶν ΘΙ τὰς ΚΛ νοεῖ· αὗται γὰρ ἔχουσιν ὡς ΖΑ πρὸς ΒΑ.

[§C] (452b23–5)

ὅταν οὖν ἅμα ᾖ τε τοῦ πράγματος γίγνηται κίνησις καὶ ἡ τοῦ χρόνου, τότε τῇ μνήμῃ ἐνεργεῖ. ἂν δ' οἴηται μὴ ποιῶν, οἴεται μνημονεύειν·

[§A] The most important point is that one must know the time, either by a <unit of> measure or indefinitely. Suppose there is something by which one judges more and less <time>. Probably <one judges time> as <one judges> magnitudes. For one discerns things that are large and distant [*τὰ μεγάλα καὶ πόρρω*] not by extending one's thought there, as some have said of sight (for even if they do not exist they can be thought of in the same way), but by virtue of an analogous <inner> change. For in thought there are similar shapes and changes. In what way then will thought differ when it discerns large things, rather than[7] when it discerns smaller ones? For all the inner things are smaller things and analogous to those without.

[§B] Perhaps [*ἴσως*] just as it is possible in the case of forms [*τοῖς εἴδεσιν*][8] to grasp something different but analogous in oneself, so is this possible in the case of distances [*τοῖς ἀποστήμασιν*]. It is just as if someone undergoes the change *AB BE*, and then he produces *ΓΔ*. Since *AΓ* and *ΓΔ* are analogous <to *AB* and *BE*>. So why does he construct *ΓA* rather than *ZH*? Is it that *AΓ* stands to *AB* just as *Θ* stands to *I*? So these changes occur at the same time.[9] If ever one wishes to come to

[7] I have translated *ὅτι* here as if it meant *ἤ* which is awkward, but there is no alternative with this text.

[8] Both Sorabji (pp. 108–9) and G. T. R. Ross (p. 278) suggest that *τοῖς εἴδεσιν* here refers to the sensible forms. I suggest that the reference is limited to certain types of sensible form (perhaps, shape, in light of the earlier discussion: b12); for here *τοῖς εἴδεσιν* is contrasted with *τοῖς ἀποστήμασιν* and, since there ought to be a sensible form for distance, the contrast is lost, unless *τοῖς εἴδεσιν* refers to some other type(s) of sensible form.

Aristotle thinks that perception is the reception of sensible form without matter (see *De Anima* II.12 424a18). When an object is perceived, its sensible form is in the perceiver, but its matter is not. The sensible form in the perceiver must in some cases be analogous to the sensible form in the object. Since the eye is smaller than most visible objects, the perception of magnitude by sight must involve the production of a small-scale analogue within the eye (see Sorabji, p. 109). In the *De Anima*, Aristotle does not explicitly state that small-scale analogues will typically be involved in perception, but his general theory of perception seems to require that he hold such a view.

[9] In the same moment the person is aware of both *AB* and the ratio *Θ*:*I* and thus is able to produce *AΓ* (since *AΓ*:*AB*::*Θ*:*I*).

think ZH, he thinks BE as before, but he <also> thinks $K\Lambda$ instead of ΘI; for these [K and Λ] stand to <one another> as ZA stands to BA.

[§C] So [*οὖν*] whenever the change connected with the thing occurs together with the change connected with the time, then one actually remembers. But if one thinks <himself to be doing this> without <actually> doing this, then he <merely> thinks himself to be remembering.

In §A, Aristotle stresses the need to cognize the time in remembering. He claims that this is done by the same faculty which cognizes spatial magnitude and he suggests that the cognizing of time is accomplished in roughly the same manner as the cognizing of spatial magnitude: through the use of analogous changes (i.e. analogous *phantasmata*). This thesis carries a difficulty which Aristotle thinks must be worked through: how does one manage to have one memory rather than another, given that he would use the same *phantasma* for either one. In order to make clear the nature of the problem, I will elaborate on Aristotle's claim about the great and distant (b9–10): suppose that Socrates had recently seen a 10 ft. rod at a distance of 20 yards and that at some earlier time he had seen a 20 ft. rod at a distance of 40 yards, then owing to perspective, the image of the 10 ft. rod as it had appeared in his eye (and was consequently stored in his *proton aisthetikon*) would be roughly the same as the earlier image of the 20 ft. rod. How then, when Socrates thinks that he is remembering the 10 ft. rod, can he be sure that he isn't actually remembering the 20 ft. rod?[10] As I have developed it, the problem is connected with event-signatures, but it can also be connected with time-signatures. Suppose that Socrates not only had seen Coriscus at the *agora* yesterday, but he had also seen him there a week ago. Further, suppose that on each occasion Coriscus was wearing his favourite cloak (thus, the event-signatures formed in each experience are roughly alike). How then, when Socrates thinks that he is remembering the sight of Coriscus yesterday, can he be sure that he isn't actually remembering the sight of him a week ago?

In §B, Aristotle heralds the solution by claiming that we somehow grasp analogues of the distances (*τοῖς ἀποστήμασιν*, b16–17), and he introduces the figure in order to illustrate how we come to grasp these analogues. Beginning with an image, the triangle ABE, the mind, by applying a certain ratio, $\Theta{:}I$, to the image, takes it to stand for an event $A\Gamma I$ (for $\Theta{:}I{::}\Gamma\Delta{:}BE{::}A\Gamma{:}AB$). And if the mind were to apply a different ratio, $K{:}\Lambda$, to the image, it would take it to stand, not for event $A\Gamma\Delta$, but for another event AZH (for $K{:}\Lambda{::}ZH{:}BE{::}AZ{:}AB$). We might say: he uses ABE *modulo* $\Theta{:}I$ for $A\Gamma\Delta$ and ABE *modulo* $K{:}\Lambda$ for AZH. Thus, if Aristotle were to return to our example involving the rods, he would claim that we remember the 10 ft. and 20 ft. rods by use of the same event-signature (or, more cautiously, by use of indiscernible event-signatures), but in each case a different ratio is applied to the signature. This, he thinks, solves the problem of how we get the distances right.

In §C, Aristotle (once again) addresses the need to grasp both the appropriate event-signature (i.e. the change connected with the thing) and the appropriate time-signature (i.e. the change connected with the time) in order to remember. If we lack either sort of cognitive grasp, he claims, we cannot actually be remembering.

I have shown how the diagram could be used in addressing a problem of perspective involving event-signatures. The question that has troubled scholars for some time

[10] More precisely, the problem is 'what makes it true that Socrates is remembering the 10 ft. rod rather than the 20 ft. rod?'.

is how the diagram could be used to address the analogous problem with time-signatures. Let us now consider the various interpretations which have been offered.

Beare views the problem in the following way: if two non-temporally indiscernible events have occurred in one's experience, then how is one to remember one rather than the other? The answer, as he sees it, is that it is through the grasp of the respective time-signature that we remember one and not the other (p. 463). Along these lines he takes *ABE* to be the event-signature, standing for the real-events *AΓΔ* and *AZH*. And he takes *Θ* to be a time-signature, standing for the real-time *I*, while he takes *K* to be another time-signature, standing for the real-time *Λ* (p. 465).

One merit of Beare's approach is that he aims at keeping event-signatures separate from time-signatures (p. 464, n. 8).[11] But the way he tries to realize this aim proves problematic. First, it is only by transposing certain letters of the codices (*AΓ/AB* at b19 and *ZA/BA* at b22) that Beare is able to rescue his own account from the glaring problem of portraying the time-signatures as having greater magnitude than the real-times that they are to represent.[12] There is, however, no manuscript support for Beare's reorganization of these letters.[13] Second, even if we accept his reorganization of the letters, Beare's approach fails to provide us with a solution to the problem of how one remembers event *AΓΔ* rather than event *AZH*. For he reduces this problem to that of how we remember time *I* rather than time *Λ*, but he does so without providing a solution to the later problem. If *Θ*, *I*, *K*, and *Λ* were offered as internal items, then the problem of how one remembers event *AΓΔ* rather than event *AZH* could be solved. For the ratios *Θ:I* and *K:Λ*, when applied to *ABE*, would distinguish *AΓΔ* from *AZH*. However, on Beare's interpretation, these ratios cannot be generated from internal items. Only the time-signatures, *Θ* and *K*, are offered as items of this sort (*I* and *Λ* are offered as real-times). This means that the problem of how one remembers event *AΓΔ* rather than event *AZH* can be solved only if we first explain how *Θ* is a cause to our remembering time *I* rather than (say) time *Λ*. But, on Beare's interpretation this problem remains unaddressed and, for this reason, his interpretation must be rejected. If the ἀποστήμασιν in question are temporal, then *Θ* and *K* cannot be time-signatures. The time-signatures that are involved must be represented within the diagram itself, while *Θ*, *I*, *K*, and *Λ* are offered as internal items of some other kind.

This brings us to Ross, for he was the first to locate the time-signatures within the diagram. He takes *AB* and *BE* to stand for time-signatures, while he takes *Θ:I* and *K:Λ* to be (internal) ratios of transition.[14] He finds (p. 250) that *AB* stands for the signature of the time which spans from the present to the apparent temporal end of the event which is to be remembered, while *BE* stands for the apparent temporal

[11] For, if these signatures are not in some way separable, then there could not be a time-signature problem in the first place: if awareness of each time-signature is necessarily bound up with awareness of its respective event-signature, then whenever we get the event right, we necessarily get the time right. But, Aristotle supposes that this is not the case.

[12] If *Θ:I::AΓ:AB* and *K:Λ::AZ:AB* and both *AΓ* and *AZ* are larger than *AB*, then *Θ* must be larger than *I* and *K* must be larger than *Λ*. But it is clear from §A that the changes within are smaller than those that are without (see b14–15): the signatures are smaller than the distances that they represent. Thus, Beare transposes *AΓ/AB* at b19 and *ZA/BA* at b22 so that *Θ:I::AB:AΓ* and *K:Λ::AB:AZ*. Since both *AΓ* and *AZ* are larger than *AB*, *Θ* must now be smaller than *I* and *K* must now be smaller than *Λ*.

[13] It should be noted that in his 1908 translation of the passage (reprinted in W. D. Ross [ed.], *The Works of Aristotle*, vol. III [Oxford, 1931]), Beare chooses not to transpose the letters at b19 and b22.

[14] It is odd that Ross claims that his own 'interpretation of the passage is in essentials identical with that of Beare in *Hermathena*, x . . . ' (p. 251). For, while Ross and Beare agree on the

duration of this event. Thus, Ross thinks that Aristotle introduces within the diagram two time-signatures, one capturing the duration of an event and another capturing its temporal distance from the present.

The difficulty with this interpretation has already been pointed out by Cooper (p. 66, n. 2). There is no text-based justification for supposing that Aristotle is introducing two time-signatures for each event. He is clearly concerned with grasping the temporal distance from the present back to the time of the occurrence of the event, but he nowhere indicates a concern with grasping the duration of the said event. In our passage, and again later, he refers to the 'change connected with the time' in the singular (b23–4, 29–30). He never refers to a plurality of such changes. And in concluding the discussion, he speaks only of the grasp of the time between the present and the past event (453a1–2).[15] So, we must conclude (along with Cooper) that Ross complicates the use of the diagram in a way not consistent with the remainder of the text.

Sorabji and Cooper agree for the most part on the interpretation of the diagram.[16] So, here I will treat their views as if they were one. Along with Ross they take $\Theta{:}I$ and $K{:}\Lambda$ to be ratios of transition, and against Ross they think that Aristotle is concerned only with the grasp of the time spanning from the present back to when an event occurred. However, they also propose that the diagram represents signatures for two temporal durations. They suggest that AB stands for the time which spans from the present back to the time of the occurrence of one event and BE stands for the time which spans from the present back to the time of the occurrence of another event. As they see it, Aristotle must be concerned with the relative dating of two past events.

There is a problem with this interpretation and the problem is not unlike that which Cooper himself has pointed out in Ross's account: we have a greater number of time-signatures and thus a greater number of times than is consistent with the claims offered in the surrounding text. Aristotle explicitly states that he wants to explain our ability to remember things like 'he did something three days ago' (*τπίτης ἡμέρας ὁδήποτε ἐποίησεν*; 453a1)[17] and 'he heard or saw or thought this before' (449b22–3).

essentials of the reconstruction of the diagram, their respective views on Aristotle's use of it are markedly different.

[15] In support of Ross, one might suggest that since Aristotle is concerned in the case of spatial distance with both the size of the object and the distance between the object and the observer (see 452b9–11 and 16–17), we should (by analogy) expect him to be concerned in the case of time with both the temporal size of the event and its temporal distance away from the observer. However, the difficulty (again) is that Aristotle nowhere indicates a concern with grasping the duration of events.

[16] The principle difference between their interpretations is that, while Sorabji understands the diagram to stand for 'lines physically imprinted in one's central sense-organ' (p. 19), Cooper suggests that it is a 'representation *on a slate board* of . . . certain imagings, which take a certain time . . . ' (p. 67, his italics). On Cooper's view, the lines AB and BE are presented to Aristotle's students as representations of the times taken by particular acts of imaging (see pp. 67–8). Thus, hypothesizing the ratio $\Theta{:}I$ to be sixty to one, Cooper claims that 'if the imagings AB and BE take respectively fifteen seconds and ten seconds, . . . then the events connected with AB and BE took place respectively fifteen and ten minutes earlier' (p. 68). This interpretation may be misguided; for it does not seem to allow for the possibility of the improvement of imagining speed through repetition. Sorabji's view would seem to be preferable. One merit, of his view, is that the physiology of time-signatures turns out to be akin to the physiology of event-signatures. Regardless, here my criticism focuses on the features that are common in the accounts presented by Sorabji and Cooper.

[17] Aristotle offers this as an example of remembering the time without precision (*μέτρῳ οὐ μέμνηται*; 452b30). W. D. Ross emends the passage to '*τρίτῃ ἡμέρᾳ ὁδήποτε ἐποίησεν*'. However, the dative does not really give an example of remembering *without* precision.

He does not once indicate that he is (directly) concerned with explaining our ability to recall things like 'you did that thing before he did the other thing' or 'Euripides died a few months before Sophocles died'. So, while this interpretation does not give us two time-signatures for each event, it gives us signatures (*AB* and *BE*) for two times (*AΓ* and *ΓΔ* or *AZ* and *ZH*) which are to be judged relative to one another. Thus, on this interpretation, the use of the diagram does not explain how we estimate the time of one event. But this is presumably the task which motivates Aristotle to introduce the diagram in the first place.

Sorabji seems to realize that this interpretation is forced. He complains, ' . . . the mental diagram has more parts than would be needed for dealing with a single time period' (p. 19). And he is well justified in saying this; for if the diagram is introduced as an aid toward explaining our grasp of time, then it is simply too complex for the intended task. In this context, Cooper is himself justified in siding with Sorabji against Ross; for the diagram calls out for a plurality of time-signatures and since Aristotle is clearly not concerned with estimating the duration of events, the better interpretation is one that allows for a plurality of signatures none of which stands for such a duration. Thus, it is reasonable to suppose that if Aristotle uses the diagram for estimating temporal distances, we can do no better than to accept the Sorabji/Cooper interpretation.

One of Sorabji's notes, however, points the way to what I think is a more adequate interpretation. In his note on b16–17 he states, 'the mental diagram . . . could be used for calculating spatial distances more easily that for calculating temporal distances' (p. 109). As I have already shown (in our example involving the 10 ft. and 20 ft. rods), a rather straightforward story can be told about the use of the diagram in representing spatial distances. This, in light of the difficulties that have been found in the previous interpretations, suggests that it may serve us well to re-evaluate the one assumption which has until now been held in common by these interpreters: the assumption that the diagram is meant to be used for estimating temporal distances.

When we look to the text, we see that the diagram need not be used for estimating times. In §A, Aristotle introduces the topic of the grasp of the time and immediately turns to the related topic of the grasp of spatial magnitudes (b7–9). He does not mention time again until §C, when he emphasizes the importance of grasping both the change connected with the thing and the change connected with the time (b23–4).[18] In §B, he speaks of changes (b17 and 20), but he does not explicitly indicate whether he is speaking of changes connected with things or changes connected with times. In addition, he introduces the diagram as an aid toward explaining our grasp of 'the distances' (*τοῖς ἀποστήμασιν*, b16–17) and here 'the distances' is ambiguous between spatial ones and temporal ones. This suggests that the diagram is introduced to explain the grasp of spatial magnitudes.

I contend that Aristotle's presentation is developed in the following way: (i) he begins by stressing the importance of grasping the time in remembering (b7–8); (ii) he then turns to the related topic of grasping magnitudes (b9–17); and (iii) he uses the diagram to address the problem of how one recalls one magnitude as opposed to another, in cases where the respective event-signatures are indiscernible (b17–22). Finally, (iv) he marks the conjoining of the two separate (although related) topics, that

Since the genitive is partive and indefinitely refers to some point within a stretch of time, it makes the example vague enough to suit Aristotle's purposes. So, here I prefer the genitive.

[18] In §B, Aristotle refers to changes which occur 'at the same time [*ἅμα*]' (452b20). Here he is not picking up the topic of the grasp of time, but is addressing the simultaneous grasping of the event-signature and the ratio of transition.

of the grasp of the time and that of the grasp of the magnitude, with the *οὖν* at b23. Viewed in this way, the diagram is presented as having direct bearing only on the problem of how we remember magnitudes. It has no direct bearing on the problem of how we remember times. This interpretation is not only consistent with the text, it frees us from forcing Aristotle to explain either the grasp of temporal durations of a sort in which he shows no interest (*pace* Ross) or the grasp of too many temporal durations of the sort in which he does show an interest (*pace* Sorabji and Cooper). So, I find it more adequate than the previous interpretations.

One might argue that I avoid the problem of having to interpret an overly complex temporal diagram, only at the cost of representing Aristotle as introducing an irrelevantly complicated spatial diagram (given that his stated aim is to analyse our grasp of the time: 452b8). This objection, however, loses some of its seeming force once we consider the link between our grasp of time and our grasp of magnitude. Aristotle twice claims that we grasp time and magnitude in roughly the same manner (450a9–10, 452b8—9). Thus, it is reasonable to suppose that the problem of how we grasp determinate time is akin to the problem of how we grasp determinate magnitude. Yet, since Aristotle is not concerned with estimating the duration of events (and is only concerned with estimating the temporal distance from the present back to the occurrence of an event), the problem of how we grasp determinate magnitude reveals itself to be more complicated than the problem of how we grasp determinate time. This suggests an answer to the question of why Aristotle (after reminding us of the kinship between these two topics: 452b8–9) offers a solution that has direct bearing only on the problem of how we grasp determinate magnitude. This direct solution to the more complicated spatial problem will also be an indirect solution to the less complicated temporal problem (but a direct solution to the less complicated problem might fail to provide even an indirect solution to the more complicated one). As I see it, Aristotle introduces the diagram as an indirect means toward solving the problem of how we grasp the time.[19]

The proposed objection continues to retain some of its seeming force; for Aristotle has devoted a significant part of *De Memoria* 1 to the topic of our grasp of event-signatures. He has even likened these to geometrical diagrams (449b30–450a2). So, one might argue that, since *De Memoria* 1 provides a direct and satisfactory analysis of our grasp of event-signatures, we should expect that in the following chapter, when Aristotle turns to the topic of our grasp of the time, he will offer a direct analysis of our grasp of time-signatures. This objection, however, fails; for *De Memoria* 1 does not in fact provide a satisfactory account of our grasp of event-signatures. What the chapter lacks most conspicuously is an analysis of how we grasp determinate magnitude: the chapter lacks a treatment of the very topic which Aristotle confronts directly in our passage.[20] This suggests that when Aristotle introduces the

[19] The diagram that Beare and W. D. Ross have reconstructed is the spatial diagram. The related (but simpler) temporal diagram would consists of no more than a line $AB\Gamma Z$ and ratios of transition $\Theta{:}I$ and $K{:}\Lambda$, where AB stands for the time-signature and $A\Gamma$ and AZ stand for the real times which are represented through the application of the respective ratios. The temporal diagram is implicit within the spatial diagram.

[20] In *De Memoria* 1, Aristotle offers a brief discussion on the topic of our grasp of magnitude (see 449b30–450a7). However, this discussion is offered within the scope of an analogy with geometry and this limits Aristotle to cases which are strictly relevant to that specific theoretical discipline. In this discussion, he claims that *phantasmata* can be used to represent both objects that have magnitude, but not determinate magnitude, and objects that lack magnitude (perhaps, the geometer's triangle and point respectively). But he fails to mention the third possibility: *phantasmata* can be used to represent objects that have a determinate magnitude. Since this

diagram, he does so not only in order to present an (indirect) analysis of our grasp of determinate time, but also in order to fill a conspicuous gap in his earlier discussion of our grasp of magnitude. In order to complete his account of remembering Aristotle must offer analyses of our grasp of determinate time and our grasp of determinate magnitude. He does so by offering one analysis, an analysis which has (direct) bearing on our grasp of magnitude and (indirect) bearing on our grasp of time.

In closing, it must be admitted that this is a horribly difficult bit of text. So, I offer this account in the same spirit in which Beare offers his own. He writes, '. . . like him [Biehl], I venture to present what after long examination appears to me the best construction of Aristotle's meaning . . . and like him, I fully admit the uncertainty of my results' (p. 460).[21]

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possibility does not explicitly come to light in *De Memoria* 1, the problem of how we recall an object with some particular magnitude as opposed to an object with some different magnitude is left unaddressed in that chapter.

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