Aristotle's Account of Time

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I. Time and Movement

Aristotle begins his positive account of time in Physics Δ by saying (218b9) that time most appears to be a kind of change or movement, yet this cannot be quite right for two reasons: (i) that any change or movement has a particular location in space, whereas time does not, and (ii) that movements are fast or slow while time is not. Nevertheless, he goes on (218b21-219a10), time is 'not without movement', and in support of this claim he offers the argument that we notice that time has passed when and only when we notice that some movement has occurred. The premise is false, and the argument is inadequate. The argument is inadequate because, of course, time may pass without our noticing it (as when we are asleep), and there is no obvious reason to think that during all that time there has been movement, even if we grant that when we do notice the passing of time that is because we notice some movement. But the premise is false anyway, because we notice that time has passed not only when we notice that things have changed but also when we notice that they have not: that is, to be aware of rest, no less than to be aware of movement, is equally to be aware of the passing of time.1 A useful example is this. Lying in bed at night one may be listening to the ticking of a clock, and be noticing no other change. Then one will — if one is giving the matter any attention — be aware that some time passes between each tick and the next. One may perhaps be aware that the same (or maybe a different) amount of time passes between each tick and the next. But one will also be aware that during those times between the ticks nothing (noticeable) happens. I do not think that Aristotle's doctrine can be rescued on this point, and I comment on it further at the end.

Having satisfied himself that time passes when and only when there is movement, Aristotle infers without any evident warrant that time must be a property of movement and shortly after concludes that in fact it is a 'number' (ἄριθμός) of movement. I think it fairly evident that this must mean something like 'time is a quantity of movement (viz. its duration)', but
I shall look into this very unexpected use of 'number' in the next section. For the moment, I just assume that the thesis is that time is some quantity of movement, in order to look further into Aristotle's account of the temporal nature of this quantity. It is, he says, a quantity of movement 'in respect of before and after' (κατὰ τὸ πρῶτερον καὶ ὑστερον). But what does this mean?

There is first the question whether this phrase is even supposed to be introducing a specification of the particular way in which time is a quantity of movement. Apart from the one sentence in which this definition is given (219b1-2, repeated 220a 24-5), Aristotle usually speaks as if time is the only quantity of movement. But it is plain that this will not do. How much or how great a movement is need not be taken as a question about its duration, and in two places in Aristotle's own text this is evident. In 218b15-16 he explains a fast movement as one where a thing 'moves much in little time', where obviously the muchness of the movement is explicitly distinguished from the amount of time it takes. Again, in 220b26-32 he remarks that we also measure a movement by its distance, and a distance by the movement over it. One might further add that another relevant quantity is the speed of the movement, and of course in the seventeenth century there was a famous dispute as to whether the momentum or the kinetic energy should be accepted as giving 'the quantity of a motion'. If Aristotle's doctrine is to be acceptable, then, one must suppose that in his definition 'time is the number of motion with respect to before and after' the phrase 'with respect to before and after' is doing some work. In fact it must be supposed to be picking out the temporal aspect of motion as opposed to its other quantifiable aspects. Unfortunately it is not at all clear how it manages to do this.

Aristotle has begun by recalling his usual doctrine that every movement is from one terminus to another, and adding that the stretch covered by the movement is continuous, and so therefore is the movement, and so therefore is the time (219a 10-13). All these claims except the last are false for some movements (changes), but I do not propose to cavil about that now. Let us take it for granted that the kind of movement we primarily have in mind in this passage is the continuous movement of a body on a direct course from one position to another. Then, introducing the apparently important concepts of before and after, Aristotle says that these are notions which apply primarily in place, where they signify position, and that they are thence transferred to movement, and thence to time (219a14-19). So we have apparently three different kinds of before-and-after to reckon with — in place, in movement, and in time. Furthermore, Aristotle uses the phrase 'the before and after' substantivally, as if it