

From *Physics*, by Aristotle

Written 350 B.C.E

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Book III

Part 1

Nature has been defined as a 'principle of motion and change', and it is the subject of our inquiry. We must therefore see that we understand the meaning of 'motion'; for if it were unknown, the meaning of 'nature' too would be unknown.

When we have determined the nature of motion, our next task will be to attack in the same way the terms which are involved in it. Now motion is supposed to belong to the class of things which are continuous; and the infinite presents itself first in the continuous-that is how it comes about that 'infinite' is often used in definitions of the continuous ('what is infinitely divisible is continuous'). Besides these, place, void, and time are thought to be necessary conditions of motion.

Clearly, then, for these reasons and also because the attributes mentioned are common to, and coextensive with, all the objects of our science, we must first take each of them in hand and discuss it. For the investigation of special attributes comes after that of the common attributes.

To begin then, as we said, with motion.

We may start by distinguishing (1) what exists in a state of fulfilment only, (2) what exists as potential, (3) what exists as potential and also in fulfilment-one being a 'this', another 'so much', a third 'such', and similarly in each of the other modes of the predication of being.

Further, the word 'relative' is used with reference to (1) excess and defect, (2) agent and patient and generally what can move and what can be moved. For 'what can cause movement' is relative to 'what can be moved', and vice versa.

Again, there is no such thing as motion over and above the things. It is always with respect to substance or to quantity or to quality or to place that what changes changes. But it is impossible, as we assert, to find anything common to these which is neither 'this' nor quantum nor quale nor any of the other predicates. Hence neither will motion and change have reference to something over and above the things mentioned, for there is nothing over and above them.

Now each of these belongs to all its subjects in either of two ways: namely (1) substance-the one is positive form, the other privation; (2) in quality, white and black; (3) in quantity, complete and

incomplete; (4) in respect of locomotion, upwards and downwards or light and heavy. Hence there are as many types of motion or change as there are meanings of the word 'is'.

We have now before us the distinctions in the various classes of being between what is fully real and what is potential.

Def. The fulfilment of what exists potentially, in so far as it exists potentially, is motion—namely, of what is alterable qua alterable, alteration: of what can be increased and its opposite what can be decreased (there is no common name), increase and decrease: of what can come to be and can pass away, coming to be and passing away: of what can be carried along, locomotion.

Examples will elucidate this definition of motion. When the buildable, in so far as it is just that, is fully real, it is being built, and this is building. Similarly, learning, doctoring, rolling, leaping, ripening, ageing.

The same thing, if it is of a certain kind, can be both potential and fully real, not indeed at the same time or not in the same respect, but e.g. potentially hot and actually cold. Hence at once such things will act and be acted on by one another in many ways: each of them will be capable at the same time of causing alteration and of being altered. Hence, too, what effects motion as a physical agent can be moved: when a thing of this kind causes motion, it is itself also moved. This, indeed, has led some people to suppose that every mover is moved. But this question depends on another set of arguments, and the truth will be made clear later. It is possible for a thing to cause motion, though it is itself incapable of being moved.

It is the fulfilment of what is potential when it is already fully real and operates not as itself but as movable, that is motion. What I mean by 'as' is this: Bronze is potentially a statue. But it is not the fulfilment of bronze as bronze which is motion. For 'to be bronze' and 'to be a certain potentiality' are not the same.

If they were identical without qualification, i.e. in definition, the fulfilment of bronze as bronze would have been motion. But they are not the same, as has been said. (This is obvious in contraries. 'To be capable of health' and 'to be capable of illness' are not the same, for if they were there would be no difference between being ill and being well. Yet the subject both of health and of sickness—whether it is humour or blood—is one and the same.)

We can distinguish, then, between the two—just as, to give another example, 'colour' and 'visible' are different—and clearly it is the fulfilment of what is potential as potential that is motion. So this, precisely, is motion.

Further it is evident that motion is an attribute of a thing just when it is fully real in this way, and

neither before nor after. For each thing of this kind is capable of being at one time actual, at another not. Take for instance the buildable as buildable. The actuality of the buildable as buildable is the process of building. For the actuality of the buildable must be either this or the house. But when there is a house, the buildable is no longer buildable. On the other hand, it is the buildable which is being built. The process then of being built must be the kind of actuality required. But building is a kind of motion, and the same account will apply to the other kinds also.

Part 2

The soundness of this definition is evident both when we consider the accounts of motion that the others have given, and also from the difficulty of defining it otherwise.

One could not easily put motion and change in another genus-this is plain if we consider where some people put it; they identify motion with or 'inequality' or 'not being'; but such things are not necessarily moved, whether they are 'different' or 'unequal' or 'non-existent'; Nor is change either to or from these rather than to or from their opposites.

The reason why they put motion into these genera is that it is thought to be something indefinite, and the principles in the second column are indefinite because they are privative: none of them is either 'this' or 'such' or comes under any of the other modes of predication. The reason in turn why motion is thought to be indefinite is that it cannot be classed simply as a potentiality or as an actuality-a thing that is merely capable of having a certain size is not undergoing change, nor yet a thing that is actually of a certain size, and motion is thought to be a sort of actuality, but incomplete, the reason for this view being that the potential whose actuality it is is incomplete. This is why it is hard to grasp what motion is. It is necessary to class it with privation or with potentiality or with sheer actuality, yet none of these seems possible. There remains then the suggested mode of definition, namely that it is a sort of actuality, or actuality of the kind described, hard to grasp, but not incapable of existing.

The mover too is moved, as has been said-every mover, that is, which is capable of motion, and whose immobility is rest-when a thing is subject to motion its immobility is rest. For to act on the movable as such is just to move it. But this it does by contact, so that at the same time it is also acted on. Hence we can define motion as the fulfilment of the movable qua movable, the cause of the attribute being contact with what can move so that the mover is also acted on. The mover or agent will always be the vehicle of a form, either a 'this' or 'such', which, when it acts, will be the source and cause of the change, e.g. the full-formed man begets man from what is potentially man.

Part 3

The solution of the difficulty that is raised about the motion-whether it is in the movable-is plain. It is the fulfilment of this potentiality, and by the action of that which has the power of causing motion; and the actuality of that which has the power of causing motion is not other than the actuality of the movable, for it must be the fulfilment of both. A thing is capable of causing motion because it can do this, it is a mover because it actually does it. But it is on the movable that it is capable of acting. Hence there is a single actuality of both alike, just as one to two and two to one are the same interval, and the steep ascent and the steep descent are one-for these are one and the same, although they can be described in different ways. So it is with the mover and the moved.

This view has a dialectical difficulty. Perhaps it is necessary that the actuality of the agent and that of the patient should not be the same. The one is 'agency' and the other 'patiency'; and the outcome and completion of the one is an 'action', that of the other a 'passion'. Since then they are both motions, we may ask: in what are they, if they are different? Either (a) both are in what is acted on and moved, or (b) the agency is in the agent and the patiency in the patient. (If we ought to call the latter also 'agency', the word would be used in two senses.)

Now, in alternative (b), the motion will be in the mover, for the same statement will hold of 'mover' and 'moved'. Hence either every mover will be moved, or, though having motion, it will not be moved.

If on the other hand (a) both are in what is moved and acted on-both the agency and the patiency (e.g. both teaching and learning, though they are two, in the learner), then, first, the actuality of each will not be present in each, and, a second absurdity, a thing will have two motions at the same time. How will there be two alterations of quality in one subject towards one definite quality? The thing is impossible: the actualization will be one.

But (some one will say) it is contrary to reason to suppose that there should be one identical actualization of two things which are different in kind. Yet there will be, if teaching and learning are the same, and agency and patiency. To teach will be the same as to learn, and to act the same as to be acted on-the teacher will necessarily be learning everything that he teaches, and the agent will be acted on. One may reply:

(1) It is not absurd that the actualization of one thing should be in another. Teaching is the activity of a person who can teach, yet the operation is performed on some patient-it is not cut adrift from a subject, but is of A on B.

(2) There is nothing to prevent two things having one and the same actualization, provided the actualizations are not described in the same way, but are related as what can act to what is acting.

(3) Nor is it necessary that the teacher should learn, even if to act and to be acted on are one and the same, provided they are not the same in definition (as 'raiment' and 'dress'), but are the same merely in the sense in which the road from Thebes to Athens and the road from Athens to Thebes are the same, as has been explained above. For it is not things which are in a way the same that have all their attributes the same, but only such as have the same definition. But indeed it by no means follows from the fact that teaching is the same as learning, that to learn is the same as to teach, any more than it follows from the fact that there is one distance between two things which are at a distance from each other, that the two vectors AB and Ba, are one and the same. To generalize, teaching is not the same as learning, or agency as patiency, in the full sense, though they belong to the same subject, the motion; for the 'actualization of X in Y' and the 'actualization of Y through the action of X' differ in definition.

What then Motion is, has been stated both generally and particularly. It is not difficult to see how each of its types will be defined-alteration is the fulfillment of the alterable qua alterable (or, more scientifically, the fulfilment of what can act and what can be acted on, as such)-generally and again in each particular case, building, healing, &c. A similar definition will apply to each of the other kinds of motion.

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