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Lesson 56: Properties of Motion

The Constituent Factors of Motion

Noting that which has already been discussed regarding motion, it becomes clear that the occurrence of motion hinges on three things which may be called the constituents of motion:

1. The unity of the source of abstraction of motion. Contrary to other types of change, motion is abstracted from a single existent. Hence, every motion is a single entity in which no actual parts are to be found.
2. The fluidity and extension of motion in the expanse of time. Since that which is gradual does not occur without a correspondence to time, motion is not abstracted from instantaneous things and fixed existents, which are outside the realm of time, and it is not attributed to them.
3. Infinite divisibility. Just as every extension is infinitely divisible, so is motion. Each potential part of motion is the changing predecessor (mutaghayyir) in relation to the potential part which follows it, and the part which follows, with respect to the part which precedes it, is its changed successor (mutaghayyirun ilayh).

The Features of Motion

In addition to the three things mentioned above, which are grasped through meditation on the essence of motion, and which are necessary for all motions, there are other things which may be called the features of motion. Noting the differences among them, specific kinds of motion may be considered, the most important of which are the following:

1. **The channel of motion.** It is possible for an existent to have numerous aspects of capacity for change. For example, it is possible for an apple to fall from a tree with a spatial or translative motion, and likewise it is possible for it to rotate or to gradually change color. However, each of these motions has its own specific 'channel' (bastar) which distinguishes it from other motions.

For example, the channel for the motion of the apple toward the ground is space, and this motion is spatial or one of displacement, or motion in the category of where ('ayn). The channel for the gradual change in its hue is color, and this is considered to be a change in the category of quality. The channel for its rotation is position, and it is taken to be a change in the category of position.

2. The course of motion. It is possible for something to move in various ways through a single channel. For example, the spatial movement or displacement of a star is possible in either a circular or an elliptical shape, or the motion of a ball from one point to another may be in a straight or a curved line. In this way another concept may be obtained which is more specific than the previous one, and this may be called the course (madar; literally, orbit, here used in the sense of the course of motion) of motion.

However, it must be noted that the expression madar has a broader meaning here than its literal meaning, the place of circling, just as the expression 'curve' has a broader meaning in mathematics than in ordinary usage, and it is possible for the curve which shows the course of a given change to be a straight line.

3. The direction of motion. It is also possible for motion in a single course to take place in various ways. For example, the motion of a top rotating on its axis may be from left to right or from right to left. Therefore, another feature must be considered for motion, and this is called the direction of motion.

4. The speed of motion. Speed is a concept which is obtained from the relation between the time and displacement of motion. For example, it is possible for a body to travel a certain distance in one minute or in two minutes. The distinguishing aspect between these two motions is speed.

5. Acceleration. It is possible for the speed of motion to gradually increase or decrease, as it is possible for the speed to remain constant. In the first case, the motion is becoming faster, or possesses a positive acceleration. In the second case it is becoming slower or possesses a negative acceleration, while in the third case it is said to be constant, or without acceleration, or as possessing zero acceleration.

6. The agent of motion. Among the things which differentiate types of motion is difference in the type of agent of motion. For example, there is a difference in kind between motions which have voluntary agents and those with natural agents, although there may be no difference externally.

Likewise, multiple individual agents cause multiple individual motions, just as the multiple forces which successively come about by the two engines of an airplane causes the multiplicity of its motions, even if the two above mentioned motions are contiguous and without any temporal gap, and from a superficial point of view there seems to be but a single motion.

The Requirements of Motion

Philosophers have considered six things to be requirements of motion: origin (mabda'), end (muntaha), time, distance, subject (mutaharrak) and agent (muharrrik).

1 & 2. Origin and end. Some of the definitions of motion suffice to warrant the requirement of an origin and end for every motion. For example, 'the gradual emergence of actuality from potentiality' implies that at the beginning a potentiality should exist and at the end of the motion and actuality. Hence, potentiality and actuality may be considered the origin and end of motion.

It appears that motion does not essentially require a relation to an origin or end, and hence, the assumption of infinite motion without beginning or end is not an irrational one. Accordingly, some ancient philosophers considered the motions of the celestial spheres to be without beginning or end in time, and so they had to take quite some pains to associate some origin and end with them.

It may be said that origin or end are specific to limited motions, and that origin or end are implied by their limits, not implied by the motion itself, as every limited extension has an origin or end. Perhaps the source of the plausibility of considering motion to have an origin or end is that a means is thereby sought to determine the direction of motion.

Anyway, origin or end cannot be considered requirements of all motions. It is necessary to mention that those who consider motion to require an origin or end do not take them to be within the motion itself, because every part of motion is extended, and no matter how small a part is imagined, it will be divisible, and again it will have to have a beginning part. If a part of motion is called the origin or end of motion, this will be a relative attribution to the motion itself.

Taking potentiality and actuality as the origin and end of motion involves a certain laxity, for the terms origin and end are abstracted from the limits of motion, like point for line and moment for time, and they are considered to have an aspect of non-being. This is contrary to potentiality and actuality (especially the latter) which cannot be considered cases in which there are aspects of non-being.

Furthermore, the requirement of potentiality and actuality has not been established for motion, and it may be said that in order to abstract the concept of motion it is not necessary to take into account anything more than the gradual existence of a substance or accident. Therefore, another distinctive aspect of the first definition of motion (gradual change) is established.

3. Time. It was previously indicated that it is impossible for a thing to be gradual without a correspondence to time. For this reason, the corresponding extension in time was considered to be one of the fundamentals of motion. Since time and motion are analytic accidents of fluid existence, they may be considered to be two sides of the same coin.

4. Distance. By the 'distance' of motion philosophers mean a category to which the motion is related, such as the relation of rotation to the category of position, and the relation of translative motion to the category of space.

Distance is like a canal through which a moving thing flows. If it is assumed that the extension of motion is cut, and it comes to rest, then it may be said that the mentioned body is in the canal.

Therefore, distance corresponds to the channel of motion. However, a subtle distinction may be drawn between distance and the channel of motion, namely, that the channel of motion is also applied to the specific whatness, such that every supposed part of motion can be considered to be an individual of that species. However, distance is commonly used as a term for the highest genus or category, and it is like an extended canal which embraces partial canals.

To explain further, motion as we know it is obtained from the extension of the existence of a substance or accident through the expanse of time, and it is possible that the existent which is the source of the abstraction of motion is perfected through the process of motion, such that from a part of it a specific whatness is abstracted, and from another part, another whatness.

For example, if it is assumed that the color of an apple gradually changes from green to red, from a part of this motion the accidental whatness of green will be abstracted, while from another part the accidental whatness of red is abstracted, both of which are considered kinds of color. Color in turn is considered a sensory quality, and sensory quality belongs to the category of 'quality.' The distance of this motion is the very category of quality. But the channel of the motion is also applied in the case of the transformation of an individual of one specific quality to another individual.

For example, the motion of a body from one place to another does not require the occurrence of kinds within the category of place, rather, one individual is constantly transformed into another individual, regardless of the laxity in the use of 'individual' for the potential parts of motion, and likewise the laxity in the use of 'category' for the abstracted concept of place.

In any case, observing that changes from one kind to another in the process of motion are not permissible, philosophers considered categories to be channels of a general sort for motion, for motion never violates the limits of the categories, and they called the channels 'distance.'

It should not be left unsaid that some philosophers considered specific difference between potential parts of motion to be not only permissible but necessary. However, it seems that specific difference can only be taken to obtain at the beginning or end of motion, because the abstraction of several whatnesses from the potential parts of motion implies the ability to consider a definite boundary for each of them.

This indicates that the given motion is really a composite of several motions, however much it may seem superficially to be a single motion. For example, although the transformation of the color of an apple from green to yellow and from yellow to red seems to be a single process, if these colors and perhaps other colors which are intermediaries between them were different in kind, certain cut-off points in the motion would be abstracted, and the assumption of numerous cut-off points is like the assumption of the appearance of points in a line and implies numerous cuts even if no temporal separation between the cut-off points is assumed.

5. **Subject:** Another thing that philosophers have considered to be necessary for motion is the subject of motion or the object moved (mutaharrik). However, it must be noted that the expression 'subject'

(mawdhu‘) is employed in the intellectual sciences in various senses, the most well known of which are indicated by the logical term, which is usually contrasted with ‘predicate,’ and the philosophical term, which is used in the case of substance insofar as it is the locus of accidents.

The first term is a secondary logical intelligible, and is applied to the first part of every predicative proposition, and even the concept of ‘contradiction’ in the proposition ‘contradictions are impossible’ is the subject of the proposition. It is clear that ‘subject’ in this sense is not relevant to the present discussion.

The second term is specific to the subjects of accidents, and if motion is also an objective accident, as was imagined by Shaykh Ishraq, it will be in need of a subject. However, we have come to know that motion is not a kind of objective accident, but a kind of analytic accident of flowing existence.

Hence, the establishment of a subject for all motions will only be correct in a third sense, which includes the source of the abstraction of analytical accidents. According to a famous expression in philosophy, a subject is only needed in the case of accidental motion in the respect in which it is an accident and not in the respect in which it possesses motion.

6. The Agent or Mover: The sixth thing which philosophers have considered to be necessary for motion is a mover or agent of motion. However, it must be borne in mind that the agent, meaning the generative cause (‘illat-e hasti bakhsh, literally, ‘existence granting cause’) is not specific to motion. Every existent which is an effect needs a generative cause.

Basically, motion has no entified specific referent beyond the existence of the substance or accident abstracted from it, and it is the existence of the substance or accident which requires a generative cause. The concept of motion is abstracted from the manner of its existence, and ‘composite making’ (ja‘l ta’lifi) does not apply to it.

In other words, the creation of a flowing substance or accident is the very creation of substantial or accidental motion. However, a natural agent, who is not a producer or creator, and is considered in another sense to be a preparatory cause, is specific to material phenomena all of which possess a kind of change, alteration or motion. But such an agent can only be assumed in the case of accidental motions, and in the appropriate place it will be explained that substantial motion does not need this sort of agent.

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