CHAPTER 7
PLACE, SPACE, VOID

After treating what pertains intrinsically to motion, the Philosopher now turns to what is extrinsically connected with mobile things. The first is place, which is the measure of mobile things–connected with place is concept of space or void–and then time, which is the measure of motion itself.

PLACE (Book 4, Lesson 1)

Why consider it?

The most basic and obvious of the forms of motion is local motion. This kind of motion cannot be understood without understanding place. Besides there have been some misunderstandings and controversies about the notion of place, which should be settled.

Reasons supporting the existence of place

1. The fact of place is clear from the fact of local motion. For just as the existence of matter came to be known from change according to form, so the existence of place is known from change according to place. Thus, when water is poured out of a vessel, air re-enters. Since, therefore, another body sometimes occupies the same place, it is clear that place is something different form the things that are in place and which are moved according to place. Consequently, place is something: it is a sort of receptacle distinct from any of the things located in it, and it is the term "from which" and "to which" of local motion.
2. The existence of place is also evidenced by the fact of "proper place", i.e. that heavy bodies are carried down and light ones upward; everything gravitates to its own place by a desire of self-preservation. This, however, does not prove that place has the power to attract, except in the sense in which the end is said to attract. Gravitation is also the basis for the concepts of "up" and "down". Other directions, such as "right" and "left", "before" and behind, are based on the position men or animals may be facing. If we were to speak purely mathematically and abstract from gravitation or the position of animals, there would be no basis for saying anything is in a certain direction.
3. Even those who assert that the void or space exists must admit that place exists, since the void is nothing more than a place devoid of any body. Likewise the poet Hesiod speculated that the first thing made was chaos, then the earth as a receptacle for bodies. He thought that place can exist without other bodies, but other bodies cannot exist without place.

7.1.3 Reasons challenging the existence of place (Book 4, Lesson 2)

1. If place is anything it must be a body, since place has three dimensions. But if a body is in a place, then two bodies must be together, which is impossible.
2. The surface of a body should be distinct from the surface of the place which is its receptacle. But two surfaces must be one surface, just like two points which touch; for two points joined together are just one point. Therefore the place of the body will not be different from the body itself.
3. If place is not a body, then it cannot have magnitude and cannot exist.
4. Everything that exists is somehow a cause in relation to other things. But place is not a cause: neither as *matter*, since nothing is made out of it, nor as *form*, since things of different species are in the same place, nor as the *final* cause, since places seem to be for the sake of the things in place rather than they for the sake of the places, nor as *efficient* cause, since place is the terminus of a motion. Therefore place seems to be nothing.
5. Zeno's reason: Whatever exists is in place; hence if place is anything it follows that it is itself in place, and that place in another place and so on *ad infinitum*.

6. Place is neither smaller nor larger than the thing in place. But when a thing in place grows, its place also should grow. However, this seems impossible, for place is an immobile something. Therefore place is not anything.

7.1.4 Reasons supporting that place is form or matter (Book 4, Lesson 3)

First, distinguish between **common** place and **proximate** place. It is true to say that I am in the world, but proximately I am on this chair in this room. Since place, then, seems to be the immediate boundary of a thing, it resembles form, since form limits matter to its own existence and magnitude to a determinate measure.

On the other hand, place seems to resemble matter. That is because it seems to be nothing other than the space enveloped by the boundaries of a container, which has length, breadth and depth. This space does not seem to be the same as any sensible body, because the space remains the same even when various bodies successively enter and leave it. Thus it follows that place is a set of dimensions separate from bodies. Therefore Plato argued that place is matter, since place is different from a body with definite dimensions and a numerical identity (since Plato made numbers and quantity the substance of things). Whether Plato held that place is exactly matter or else "the large and the small", it is clear that he defined place as some kind of receptacle.

If place is either form or matter, it will be difficult to define, since both form and matter are difficult notions and one cannot be know without the other.

Reasons why place should not be form or matter

1. Form and matter are not separate from the thing of which they are components, whereas place is distinct–in the place where air was, water now is. Likewise place is not an accident of a thing, since an accident cannot be separated from the thing. Nor can place be said to be matter, because matter does not contain but is contained by form.
2. Even if something never moves from its place, the very fact that we say it is **in** place shows that place is distinct from the thing and its form or matter.
3. Matter and form are part of the thing moved from one place to another. If matter or form were place, then place would move and be in place, which is nonsense.
4. In corruption the matter and the form are accidentally corrupted. But no explanation can be given of how place is corrupted; hence it cannot be said that matter or form are place.

Distinctions necessary for a definition of place (Book 4, Lesson 4)

Eight ways in which something is said to be **in** something:

1. The way a finger is said to be in the hand and in general any part is in its whole.
2. The way the whole is said to be in its parts. Since this way of speaking is not so common, we must understand that the whole is not something outside its parts, but exists in them.
3. The way "man" is in "animal", and any species in its genus.
4. The way a genus is in its species, such as "animal" in "man". That is because the genus is part of the definition of the species; so both the genus and the specific difference are parts of a whole.
5. The way health is in a balance of temperature, and any form is in matter or a subject, whether the form be accidental or substantial.
6. The way Nigeria is in the hands of the head of state, and anything moved in its mover. Thus we say "It is in me to do such and such", because it is in my power.
7. The way someone's heart is in what he desires and loves, and anything in its final cause.
8. The way something is in a vessel, and in general as a thing is in its place. The same could be said

of being in a certain time, for time is the measure of motion.

Of all these ways, the last is the most proper sense something is said to be **in** something. A thing in place is contained or included by its place and has rest and immobility therein. The nearest to this way is (1) the way a part is contained in an integral whole, as in a conjoined place. Then comes (4) the way a whole is contained in the definition of something, as "animal" in "man". Then (3) there is the way a species in a genus, which contains it an other species as well. Similarly to this is (5) the way form is contained in the potency of matter. Likewise (2) the whole resembles a form in being in its parts. And the way form is enclosed under the passive potency of matter, so (6) the effect is enclosed under the active potency of the agent. Finally (7) it is clear that the appetite rests in the good it desires and loves and is, indeed, fixed in it.

Other suppositions toward a definition of place (Book 4, Lesson 5)

So much is clear about place:

1. That place contains what is in place while remaining distinct from it.
2. Primary [= proximate] place is equal to, and neither greater nor less than the thing in place.
3. Everything in place has a place, although it can move from that place to another.
4. Every body has a gravitational attraction, which accounts for the directions of up and down; its density determines its natural level with reference to neighbouring bodies (e.g. water, oil, air).

A good definition of place should: 1) show what place is, 2) resolve conflicting arguments about place, 3) reveal the characteristics of place, since a definition is used as a middle term to demonstrate its proper accidents, 4) point out the reason why conflicting things were said about it. Such a procedure is the best way of defining anything.

The question of place would never have arisen were there no motion from one place to another. This takes place directly in local motion, and indirectly in growth, whereby a body acquires a larger place.

We must distinguish between **per se** and **accidental** motion. The latter occurs when, for example, we are sitting still in a moving car. The car is moving **per se**, and we are moving accidentally.

We must also distinguish between **primary** place, which is our immediate surroundings, and **common** place which is the larger area where we happen to be (e.g. town, country, continent).

Whenever the container is not separate from the thing contained but is continuous with it, the thing contained cannot be said to be in it as in a place, but as a part in a whole, for example my hand in my body, and it changes place along with the body. But if the container is separate and contiguous to the thing contained it is equal to it in dimension.

The definition of place (Book 4, Lesson 6)

First of all, place cannot be form, since it is extrinsic to what it contains.

Secondly, place is not the same as space, although it might seem to be, since space is thought of as absolute dimensions that do not change, whatever bodies happen to fill it. There cannot be any spatial dimensions apart from bodies and other environing or containing bodies, because if space were something with its own dimensions independent of bodies, then there would be two sets of dimensions that interpenetrate.

Thirdly, place is not matter, although place receives the different things it contains in a way resembling the way matter receives different forms. Yet matter becomes one thing with the form it receives, whereas place remains distinct from what is in it.

Therefore, place must be **the boundary of the containing body**, while the contained body is what is apt to be moved in respect to place.

Place is also in some way **immobile**. That is how a place differs from a **vessel**, because a vessel can be moved, but a place cannot. If I am riding in a car, I am not **per se** in motion, but the car is. I am at rest **per se**, but **per accidens** I am in motion. Therefore I am not staying in the same place. My place is determined not by the vessel which immediately contains me, but by reference to the place that contains the vessel. Thus a boat could be **per se** in motion going upstream on water that is **per se** in motion going downstream (a vessel in a vessel), both at equal speeds so that the boat remains in one place, with reference to the shore of the river. Likewise, the wind blowing on my face is not place, but only in so far as it is in position to the immobile surface I am standing on.

What gives stability to place? Natural place and rest is determined by gravitational force. Abstracting from gravitation, it would make just as much sense to say that a car is moving down the express way as to say that the express way (and surrounding world) is in motion and the car is standing still. On this planet gravitation determines whether we are going to the U.S. or the U.S. is coming to us.

Yet it is true [as Aristotle and Thomas Aquinas did not know] that the earth itself is a vessel carrying us around the sun, and the sun is carrying all its planets somewhere else, so that we cannot determine any fixed point of immobility in the universe–although, apart from gravitation, it would make equal sense to say that the earth revolves around the sun or the sun around the earth. Yet it is sufficient for distinguishing what is in motion from what is at rest to determine **relatively immobile** reference points determined by natural gravity.

Thus Aristotle concludes that *place* is **the immobile surface of that which primarily contains a body**. The word "primarily" designates proper place (the nearest immobile surface, if in a vessel) and exclude common place.

Explanations (Book 4, Lesson 7)

The universe as a whole is not in a place, since there is no outer containing body. Because Aristotle imagined the heavens to be concentric spheres around the earth, he inquires how a sphere moves. We could ask the same question about a ball spinning on a table. The ball is not changing place, and in this sense it is not in motion, but it is in motion by reason of its parts.

[Book 4, Lesson 8] As for some of the problems raised in Lesson 2, they are all solved by the definition of place as the surface of a containing body:

(6) that place should grow as a body grows–This would be so if place were a space co-extensive with the dimensions of the body, but if it is the boundary of the container, the growing body merely takes up more place.

(2) that two touching surfaces are one–This again is a confusion of place with "space" that has dimensions corresponding with the surface of the body. This, however, need not be said if we suppose that place is the boundary of the container.

(1) that place is a body, and so it and the located body are two bodies in the same place–This is a wrong supposition, since place is the surface of a containing body.

(5) that place is in a place *ad infinitum*–Rather, place is in a body not as in a place, but as a surface in a body.

7.1.10 Gravity

Bodies naturally gravitate to other bodies of greater density. We see it in drops of water or mercury coalescing on a table. We see all things about us gravitating to the earth. We observe through tides how the waters of the oceans gravitate towards the moon.

Aristotle and Thomas Aquinas were wrong in thinking that the more noble things (like fire) go up and earth goes down, and in their idea that the sun, moon and other heavenly bodies were incorruptible. Nevertheless they were fundamentally right in seeing gravity as a spontaneous inclination of bodies to be together for the purpose of survival. This idea, however, is inconsistent with another of their erroneous positions, namely, that the sphere of the stars is the first place and containing body of the rest of the lower universe. This is wrong, because we do not look up for a focus of natural place, but down to the earth, or to any other centre of gravity in the universe.

THE VOID

Arguments for its existence (Book 4, Lesson 9)

Change of place would be impossible if there were no void. That is because something cannot be moved into what is full, because a place filled with one body cannot receive another. Otherwise there would be two bodies in the same place. But there is motion. Therefore, there is a void.

Moreover, bodies that can be compressed or condensed seem to do so because the parts are pressed into empty spaces, like foam. Likewise, a body cannot absorb food and grow unless there is empty space into which the food can be taken. Besides, you can pour as much water into a bowl of gari as you can into an empty bowl; that shows that there are empty spaces in the gari.

The Pythagoreans not only posited an infinite void outside the universe, but also attributed the distinction of things in the universe to a void; according to them, numbers are the natures of things, and are distinct from one another by a void. This is using "void" in a quasi-equivocal manner.

The meaning of void & refutation of arguments for its existence (Book 4, Lesson 10)

According to common opinion, the void seems to signify nothing more than a place in which there is nothing. It is thought to be necessary to allow for the possibility of motion.

Yet besides local motion there is also alteration, which would not require a void.

Even local motion does not require a void if we suppose that bodies can contract so as to give way; this is especially evident when things pass through water or air.

Also, compression does not necessarily presuppose a void, but a porous material containing air, as in the case of gari, where the water poured in replaces the air.

Likewise food taken into a body does not require a void in the body, but it is altered and is converted into the substance of the body; this is not just a case of filling the stomach, but of the whole body growing.

Arguments from motion against a separated void (Book 4, Lesson 11)

1. The void is not a cause of motion, because bodies do not move because they are sucked into a vacuum, but because they naturally gravitate to their natural level.
2. The void, if taken as empty space, is something negative and can have no finality about it so as to be a destination of gravitation, unlike place.
3. Rather than being a requirement for motion, the void would actually make it impossible, since in a void there is nowhere to go; so a body would just rest.
4. Similarly, in a void we cannot speak of directions; therefore motion would be impossible, since it is always in some direction.

7.2.4 Arguments from the nature of a void against a separated void (Book 4, Lesson 13)

To say that a body moves in a void presupposes that the void is measurable, which means that it has

dimensions. In that case the dimensions of the moving body and the dimensions of the void would co-exist, and be the same as two bodies in one place.

Besides, there is no experimental evidence of a void; whatever might seem to be a void is just thin air.

Arguments against a void within bodies (Book 4, Lesson 14)

Some philosophers posited a void within bodies to allow for their contraction, so as to permit motion. That is because if there is no empty space in bodies, either there would be a total jam, with no body yielding to another, or anything moving in a straight direction would push everything in its path all the way to the edge of the universe, thus disturbing the heavens.

The same arguments that were used against a separated void apply to a void within bodies, but the phenomenon of expansion and contraction of bodies can be explained otherwise than by a void. Just as something can change from cold to hot, so its volume can alter because of the potency of the matter to different sizes, not by an addition of more matter. Things in a state of compression are heavier and harder than equal volumes of the same thing rarefied or expanded. Thus there is no need to posit a void in bodies to allow for motion.