Laval théologique et philosophique

The Category of Quantity

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Volume 19, Number 2, 1963

URI: https://id.erudit.org/iderudit/1020042ar
DOI: https://doi.org/10.7202/1020042ar

See table of contents

Publisher(s)

Laval théologique et philosophique, Université Laval

ISSN

0023-9054 (print)
1703-8804 (digital)

Explore this journal

Cite this article

Scholz, D. F. (1963). The Category of Quantity. *Laval théologique et philosophique*, *19*(2), 229–256. https://doi.org/10.7202/1020042ar

The Category of Quantity

1. Because quantity itself is relatively well known to us, an analysis of its genus is not too difficult. This fact alone makes it interesting to us. Further, an examination of this genus is useful in coming to an understanding of Aristotle's procedure in the *Categories* as a whole. For these reasons it would seem appropriate to reflect a little upon Aristotle's treatment of quantity in the *Categories*.

2. Though this work comes first among the logical works of Aristotle which we possess, an analysis of the predicables (as given by Porphyry) is presupposed to it. In the *Categories*, Aristotle considers the ten ultimate genera under which we place the things we know first. For a proper appreciation of what Aristotle does in the *Categories*, it must be understood that in this work it is not his intention to invent a small number of genera under which we can arrange those things which we know. Rather, he simply considers the genera already there. In other words, in this work (as in the rest of his logic) he proceeds by reflecting upon things *qua* known, considering the order into which the mind puts things in knowing them. By reflection it is discovered that we place the things first known under one or another of a certain number of ultimate genera. Aristotle's intention in the *Categories* is to enable us to come to a knowledge of these genera permitting us to set them clearly apart one from another.

3. Plainly, since these ultimate genera are known by reflection upon our knowledge of natural things, the genera have a remote foundation in these things. Thus, for instance, the distinction between the genus substance and the genus quantity has some foundation in things existing entitatively (as opposed to intentionally). But, although it is presupposed to the logical treatment we are considering here, this remote foundation is not the subject of the *Categories*. This work proceeds from the fact that we conceive some things as being so different that we can find nothing (no matter how general) which we conceive as being common to them essentially. These, then, we conceive as belonging to distinct genera, genera which cannot be reduced one to another. There are other things we conceive as having something essentially common. These belong to the same genus. In this work then, we consider the ultimate genera of things as we conceive them, and by induction we discover these genera to be ten in number.

4. The first genus Aristotle considers is that of substance. Immediately after, he begins his treatment of the category of quantity.

St. Albert the Great tells us why the treatment of quantity comes immediately after that of substance and before the treatment of the other accidents.[1] Of all the accidents, he tells us, only quantity and quality are predicated of substance absolutely.[2] But quantity precedes quality because without quantity, a substance is not considered as receptive of qualitative forms, at least it is not of the third and fourth species of quality, e.g., the passive qualities (such as color) and figure and form.[3] Therefore, because quantity is in substance prior to quality,[4] quantity must be treated before all the other predicamental accidents.

5. Aristotle begins his treatment of quantity (πόσος) in the following way : " To Quantity let us turn next. This is either discrete or continuous." [5]

6. The fact that Aristotle begins his treatment of quantity in this way immediately raises a problem. In those categories which he considers in any detail, he seems to begin by giving a definition of the genus. Thus he begins his treatment of substance by defining first and second substance.

Substance in the truest and primary and most definite sense of the word is that which is neither predicable of a subject nor present in a subject ; for instance, the individual man or horse. But in a secondary sense those things are called substances within which, as a species, the primary substances are included : also those which, as genera, include the species.[6]

He begins his treatment of relation by this definition :

Those things are called relative, which, being either said to be of something else or related to something else, are explained by reference to that other thing.[7]

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1. St. Albert the Great, *De Praedicamentis*, tract.III, ch.I.

2. St. Thomas makes the same distinction, *In III Phys.*, lect.5, n.322(15), where he describes only quantity and quality as accidents predicated of substance absolutely.

3. "... unde et qualitates fundantur super quantitatem, sicut color in superficie, at figura in lineis vel in superficiebus." St. Thomas, *In III Phys.*, lect.5, n.322(15). This is the same doctrine as that of St. Albert.

4. Relation is also treated before quality in the *Categories*. St. Thomas gives the reason why quantity must be treated before relation when he says : " Relationes igitur quaedam fundantur super quantitatem ; et praecipue super numerum, cui competit prima ratio mensurae, ut patet in duplo et dimidio, multiplici et submultiplici, et alliis huiusmodi." *In III Phys.*, lect.1, n.280(6).

5. Aristotle, *Categories*, ch.VI (Oxford University Press).

6. Aristotle, *Categories*, ch.V.

7. *Ibid.*, ch.VII.

And he begins his treatment of quality by a definition also :

> By ' quality ' I mean that in virtue of which people are said to be such and such.[1]

Yet, Aristotle does not begin to consider quantity by giving a definition of it. St. Albert takes up this problem in his commentary on the *Categories* and this is what he says.

> Because there are many divisions of quantity, we must first manifest quantity through its division, because if we were to manifest it through a definition, we would be able to say only that it is the measure of substance, and since the notion of measure is not the same in the continuous and the discrete, and in that having position in its parts and in that not having position in its parts, we do not have one notion of quantity taken as defining the genus. For since, as Aristotle says (*X Metaph.*, tex. com. 3 and 4), everything is measured by the smallest thing of its genus, it must be that as the measured things differ, so also the measures differ, and in the same way the notion of measuring differs in them. Therefore, not having a definition of quantity in a given genus, that it might be revealed in some way, it must be made manifest through division of things posterior to it.[2]

7. What St. Albert says here first only tends to deepen the mystery. If the only possible definition of quantity (the measure of substance) does not have a single meaning, how can quantity be a genus? It would seem that under this circumstance, quantity must be predicated of its inferiors either purely equivocally or analogously. In either case, quantity as a genus is destroyed, for a genus is predicated of its inferiors neither equivocally nor analogously.

8. That quantity is not predicated equivocally of the continuous and discrete is evident, for we predicate quantity of the two because of what they have in common, namely quantity. We mean the same thing when we predicate quantity of the continuous and the discrete. That quantity is not predicated analogously of the continuous and the discrete seems already evident from the fact that neither the continuous nor the discrete is called " quantity " with reference to the other in such a way that one would be considered as having the nature of quantity more than the other.

9. Let us summarize the problem as it now stands. Quantity is predicated of the discrete and continuous univocally, it is their genus. Yet this genus does not have one definition. Why should this be so? How can there be a univocal name without oneness in definition?

10. Once we realize the kind of genus quantity is, we can see why this should be so. For there could be no essential definition of quan-

1. *Ibid.*, ch.VIII.

2. St. Albert, *De Praedicamentis*, tract.III, ch.I.

tity, since quantity has no genus, whereas the more universal would have to be ' being ', and ' being ' is not said of the ten categories univocally.[1] But this is true of the other categories as well ; yet some of them have nominal definitions, as we said above. Therefore, this alone is not a sufficient reason for the lack of nominal definition. But if we consider the kind of knowledge we have of quantity as a genus, we can easily see that our knowledge of it is so potential and vague, the genus so common, that we cannot provide a suitable definition. Aristotle, therefore, makes the genus known by its inferiors, continuous and discrete quantity.

11. Further, among the categories, this is not true of quantity alone. For instance, the category preceding quantity, namely substance, is made known from its inferiors. Having defined first substance as what is neither predicable of a subject nor present in it, and having explained that those things which, as species, contain first substance are also called substance, Aristotle goes on to say that those genera which include these species are called substance also.[2] The ultimate among these genera is the category of substance. Hence, we can see that the category of substance is made manifest or defined by its inferiors. The same thing holds true of quantity.

12. However, one problem still remains before we can proceed. St. Albert said above that if we were to assign a definition to quantity, it would be " the measure of substance." [3] He also pointed out that the notion of measure is not the same in the continuous and the discrete. If, then, quantity is a genus, and therefore univocal, how can its definition be anything but one. Aristotle solves this problem in his *Metaphysics*. Having given the modes of one and reduced them to one notion, indivisible being, he states :

> . . . but it (one or unity) means especially ' to be the first measure of a kind ', and most stricly of quantity, for it is from this that it has been extended to the other categories. For measure is that by which quantity is known ; and quantity *qua* quantity is known either by a ' one ' or by a number, and all number is known by a ' one.' Therefore all quantity *qua* quantity is known by the one, and that by which quantities are primarily known is the one itself ; and so the one is the starting-point of number *qua* number. And hence in the other classes too ' measure " means that by which each is first known, and the measure of each is a unit in length, in breadth, in depth, in weight, in speed . . .

1. " Ad horum igitur evidentiam sciendum est quod ens dividitur in decem praedicamenta non univoce, sicut genus in species, sed secundum diversum modum essendi." St. Thomas, *In III Phys.*, lect.5, n.322(15).

2. Par.6 above.

3. Par.6 above.

In all these, then, the measure and starting-point is something one and indivisible, since even in lines we treat as indivisible the line a foot long. For everywhere we seek as the measure something one and indivisible ; and this is that which is simple either in quality or in quantity. Now, where it is thought impossible to take away or to add, there the measure is exact (hence that of number is most exact ; for we posit the unit as indivisible in every respect) ; but in all other cases we imitate this sort of measure. For in the case of a furlong or a talent or of something comparatively large any addition or substraction might more easily escape our notice than in the case of something smaller, so that the first thing from which, as far as our perception goes, nothing can be substracted, all men make the measure, whether of liquids or solids, whether of weight or of size ; and they think they know it by means of this measure.[1]

13. It is not our intention to give a complete analysis of this passage. For our purpose, one thing only need be noted : quantity is made known by a measure. A thing is apt to be a measure to the extent that it is indivisible. In quantity, the indivisible or measure is the unit. This is evidently true of discrete quantity, where every number is finally measured by the unit. Continuous quantity also has for a measure something one. For the measure of any continuous quantity is one mile or one foot or some such unit and all other continuous quantities are made known through these quantities. But these measures lack the exactness or sheer indivisibility possessed by the unit, the principle and measure of number, since a mile or a foot can further be divided, the particular quantity of each being taken as a unit by no more than custom or convention. Thus the measure of continuous quantity imitates the measure of discrete quantity imperfectly, falling short of the notion of measure to be found first in numgers.[2]

14. Now we are in a position to see that the term " measure " in the statement " quantity is the measure of substance " applies differently to discrete and continuous quantity ; measure is utterly indivisible as applied to discrete quantity whereas in continuous quantity the measure is indivisible by convention. Hence, it is true that " measure of substance "[3] applies first to discrete quantity and second

1. Aristotle, X *Metaphysics*, ch.I, 1052 *b* 18.

2. "Assignat autem rationem, quare mensuram oportet esse aliquid indivisibile ; quia scilicet hoc est certa mensura, a qua non potest aliquid auferri vel addi. Et ideo unum est mensura certissima ; quia unum quod est principium numeri, est omnino indivisibile, nullamque additionem aut substractionem suscipiens manet unum. Sed mensurae aliorum generum quantitatis imitantur hoc unum, quod est indivisibile, accipiens aliquid minimum pro mensura secundum quod possibile est. Quia si acciperetur aliquid magnum, utpote stadium in longitudinibus, et talentum in ponderibus, lateret, si aliquod modicum subtraheretur vel adderetur ; et semper in maiori mensura hoc magis lateret quam in minori." St. Thomas, *In X Metaph.*, lect.2, n.1945.

3. St. Albert's expression cited above, par.6.

to continuous quantity, and therefore is not a definition of something generically one. However, this entire analysis of measure has been a metaphysical one, and therefore goes beyond the logical notion of quantity. Logic does not advert to the fact that discrete quantity has a perfect measure, and continuous quantity an imperfect one. However, the question may arise as to whether measure might be taken univocally in logic, so that " measure of substance " might be taken as a definition of the genus quantity. For our purpose it may be left in doubt whether measure could be taken univocally, for in any case " measure of substance " could hardly be taken as a definition of the category since, as we shall see below, time is logically one of the species of quantity and time is not a measure of substance, but of motion. St. Albert was therefore right in excluding " measure of substance " as the logical definition of quantity.

15. It is clear, then, why Aristotle proceeds as he does in the *Categories*. He gives no definition of quantity because the notion is is far too confused (potential) to be made known by a definition. Therefore, to make known the nature of quantity logically considered, he assigns its species, about which more can be known inasmuch as they are less vague.

16. Once he has divided quantity into discrete and continuous, and before proceeding to explain the members of this division, Aristotle gives still another division of quantity.

> Moreover, some quantities are such that each part of the whole has a relative position to the other parts : others have within them no such relation of part to part.[1]

17. The following is the reason St. Albert provides to show why Aristotle gives the latter division and why in second place :

> And because to have position in its parts occurs to the continuous or continuous quantity, and because it also happens that something continuous does not have position in its parts, it follows that the terms of the first division could not be explained until the others were made plain.[2]

At first this explanation does not seem very illuminating but, in fact, it does contain the solution. As said above, the genus quantity is so potential that it can best be explained or understood in terms of its inferiors. The more of these that can be set apart, the more clearly will the genus of quantity stand revealed. Therefore, in order to make this genus known Aristotle divides it in two different ways. There appears to be little difficulty as to why it should be divided into

1. Aristotle, *Categories*, ch.VI, 4 *b* 20.
2. St. Albert, *De Praedicamentis*, tract.III, ch.I.

continuous and discrete, for at first glance these two seem to be species of quantity. Why this second division is particularly illuminating and is therefore used by Aristotle will be made clear below where we consider this division in detail.

18. Having given the two above divisions, Aristotle then considers their parts, and first the parts of the first division, that of quantity into discrete and continuous. He then considers the second division, that of quantity into quantities the parts of which have position and those which do not. In considering the division of quantity into discrete and continuous, first he divides each into its species (again because in doing so he will make the continous and discrete more known) ; second he considers each part of the division separately. He divides the discrete into number and speech, the continuous into line, surface, body, time and place.

19. After dividing the discrete and continuous into their respective species, Aristotle considers the nature of discrete quantity. We need say little concerning the discrete here other than to say that for Aristotle the parts of discrete quantity do not have a common term. Thus two fives make ten. Each of these fives may be considered a part of ten. But the two do not have a common boundary, they are not united in this way. Yet they are one in such a way that they make ' one ' ten and not ' twice ' five. Obviously, speech is also discrete, since within it there are short periods of time in which there is no sound.

Having considered discrete quantity Aristotle takes up continuous quantity. But instead of showing what continuous quantity in general is, he begins by considering severally each species. And among these he first considers those quantities which first seem to us to be quantities, namely line, surface and body. Among these he proceeds from the simplest to the most complex. He therefore begins by considering line :

> A line, on the other hand, is a continuous quantity, for it is possible to find a common boundary at which its parts join. In the case of the line, this common boundary is the point.[1]

Here Aristotle states what is common to all continuous quantity, namely, that its parts have a common term. He also states what is proper to a line, that the common term of its parts is always a point. Once this has been said, nothing further need be said about line since he has shown how the continuous is distinguished from the discrete, for the parts of the one have, and the parts of the other do not have, a common term.

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1. ARISTOTLE, *Categories*, ch.VI, 5 *a*.

20. Having shown that the parts of a line have a common term, he then shows it of the more complex continuous quantities : surface and body. But neither of these offer any real difficulty, for just as the parts of a line are united at a point, so the parts of a plane are united at a line and the parts of a body at a surface or line.

21. Having considered the most evident continuous quantities, he then applies what he has determined to those which are less evident : time and place. Perhaps he treats time first because it is more plainly different from the previously considered continuous quantities and hence more known as distinct from them. This is what he says about time :

> Time, past, present and future, forms a continuous whole.[1]

This is not much but it is sufficient. The past and the future are united or joined by the now (or present) which, being an indivisible, is both the term of the one and the principle of the other and thus is common to the two of them. The same thing is true of the parts of the past among themselves, and the parts of the future among themselves also, for they are united by an indivisible which either once was a now or will be a now. Hence, just as the parts of a line are united by a point, so the parts of time are united by an instant.

22. After considering time, Aristotle takes up place (τόπος). This is what he says :

> Place, likewise, is a continuous quantity : for the parts of a solid occupy a certain place, and these have a common boundary ; it follows that the parts of place also, which are occupied by the parts of the solid, have the same common boundary as the parts of the solid. Thus not only time, but place also, is a continuous quantity, for its parts have a common boundary.[2]

Before we can proceed to show how place is continuous, we must determine what it is. From what Aristotle says here, it seems that the parts of place and the parts of a body are together, so that where the parts of the body are, there we find the parts of place. The parts of bodies have common boundaries, and wherever we find boundaries of the parts of bodies we find the boundaries of the parts of place. If both a place and the body it contains are continuous quantities, and the two have a common boundary, how are they to be distinguished one from the other ?

23. St. Albert has this to say on the subject :

> But now it must be seen how place is a continuous quantity. There is place where the parts of the placed body are contained, which place is the

1. *Ibid.*, ch.VI, 5 *a* 6.
2. *Ibid.*, ch.VI, 5 *a* 7.

distance in which the whole quantity of the body is extended so that there is nothing of the body or of the parts of the body outside that distance according to the length, width and depth of the body. For there is as much distance as there is body, and neither less nor more, but it is of equal measure with the whole body, as the distance of the diameters of the bodies which are extended within the space of the diameters of the place and of the body, is one and the same in being with the local distance, as is proved . . .[1]

It seems from what Aristotle and St. Albert have said above, that logical place is not a body, for place interpenetrates with bodies and we do not think that one body can interpenetrate with another. But if place is not a body, and if we find a place wherever we find a body, and parts of place where we find parts of a body, what can place be? Why do we distinguish it from the body with which it seems to be coextensive?

24. To answer this question we must explain something we have indicated previously, namely that the immediate foundation of our present consideration is second intentions, not things physically existing. The categories are here taken as subjects of logic. Logic considers them as founded upon things *qua* known. Logic deals with the order which reason puts in its own act,[2] and with things existing outside the mind only insofar as reason puts an order in its act of knowing them. Thus, if the intellect should apprehend or consider the same magnitude in two different ways, it would be possible for reason, in considering these two different apprehensions (first intentions), to take them as two and to order them as two (giving rise to distinct second intentions), even though the physical reality, in this case the existing magnitude which is the foundation of the first intentions, is actually only one. Thus, the same physical reality may be the remote foundation for two distinct logical species.

25. This is precisely what has happened here. For we tend to consider the same magnitude from two different points of view. If we wish to determine the magitude (length, width and depth) of a body we measure it from one of its surfaces to its opposite surface. When we have done this, we believe we know the size or magnitude of the body. However, sometimes we are interested in knowing the distance from one innermost surface of the container of a body to the opposite innermost surface of the container. In such a case our aim is not to measure the contained body, but rather a certain space within the container. A common example of this sort of thing is found in the buying of furniture. For instance, if someone wishes to buy a refrigerator, he

1. St. Albert, *De Praedicamentis*, tract.III, ch.V.

2. " Ordo autem quem ratio considerando facit in proprio actu, pertinet ad rationalem philosophiam, cuius est considerare ordinem partium orationis adinvicem, et ordinem principiorum adinvicem et ad conclusiones." St. Thomas, *In I Ethic.*, lect.1, n.2.

measures the place where he intends to put it to discover the size of the refrigerator he can buy ; he does not want to measure the air in the place now, nor does he consider the magnitude he is measuring as beginning and ending with the surfaces of the air next to the containing surfaces of the container. Rather, he considers the magnitude to begin and end at the surface of the container (whether that be a wall or whatever else). Hence, though the distance from one inner surface of the container to the opposite is the same (as expressed in feet, inches etc.) as the distance from the one corresponding outermost surface of the contained body to its opposite, yet in reason these are taken as two. Further, because reason takes this magnitude as being two, we can consider the order which reason makes in considering these two distinct notions of a magnitude. Thus it happens that we have two distinct yet co-existant species of magnitude.

26. Now it is easy to see that the parts of place or space have a common term and therefore are continuous since it is a magnitude coextensive with the magnitude of a body and the parts of bodies have been shown to have a common term.

27. But it might be objected that time and place are quantities only accidentally, for metaphysics treats them in that way. Therefore, it seems they should not be treated in the category of quantity. For in the *Metaphysics*, Aristotle says :

> Of things that are quanta incidentally, some are so called in the sense in which it was said that the musical and the white were quanta, viz. because that to which musicalness and whiteness belong is a quantum, and some are quanta in the way in which movement and time are so ; for these also are called quanta of a sort and continuous because the things of which these are attributes are divisible. I mean not that which is moved, but the space through which it is moved ; for because that is a quantum movement also is a quantum, and because this is a quantum time is one.[1]

However, St. Thomas shows this is only an apparent contradiction of what was said in the *Categories*.

> But it must be known that the philosopher in the *Categories* posited time to be a quantity *per se*, while here (in the *Metaphysics*) he posits it to be a quantity *per accidens*, because there he distinguished the species of quantity according to the diverse notions of measure. For time has one notion of measure, which is extrinsic measure, and magnitude another, which is intrinsic measure. And therefore it is posited as another species of quantity. But here he considers the species of quantity according to the being of quantity. And therefore he does not posit as species of quantity here those which do not have the being of quantity except from another, but he posits them as quantities *per accidens*, as motion and time. But

1. Aristotle, *V Metaphysics*, ch.XIII, 1020 *a* 25.

motion does not have another notion of measure than time and magnitude. And therefore neither here nor there is it posited as a species of quantity. But place is posited as a species of quantity there, not here, because it has another notion of measure, but not another being of quantity.[1]

These remarks are sufficiently clear. We need make no comment upon them other than to say that we have here also a confirmation of the distinction we made previously between the magnitude of a body and its place or space as being different ways of regarding the measurement of a magnitude.

28. When Aristotle has finished his treatment of the first division of quantity (into discrete and continuous) he then considers the second division of quantity, that into quantities having parts in position and those not having parts in position. From the beginning of his consideration of this division, it is plain that the treatment of the preceding division (continuous and discrete) is presupposed to it, for in considering this present division he proceeds by applying it to each of the species of the preceding division. Aristotle begins by considering those species of quantity whose parts do have position, for those which do not have this character can best be known to be such by comparing them to those which do have it.

> Quantities consist either of parts which bear a relative position each to each, or of parts which do not. The parts of a line bear a relative position to each other, for each lies somewhere, and it would be possible to distinguish each, and to state the position of each on the plane and to explain to what sort of part among the rest each was contiguous.[2]

This seems sufficiently plain for the present. It is also plain that the parts of a plane and solid, and a place or space likewise, have position relative to each other in this way. These, then, are the species of quantity the parts of which have position.

29. Before we consider the species of quantity which do not have position we must consider one small problem. We have been using the word "position" here. Yet, there is another of the categories which is sometimes referred to as the category "position".[3] What is the relation between these two uses of the word, or does it mean the same thing in both cases?

30. When considering position in the category of quantity, Aristotle uses the words θέσις (meaning *position*) and κεῖται (a form of κεῖμαι, which verb means *to be in a position*). Now, the word he uses when referring to the category "position" is κεῖσθαι, which is

1. St. Thomas, *In V Metaph.*, lect.15, n.986.

2. Aristotle, *Categories*, ch.VI, 5 *a* 15.

3. St. Albert calls this category "positio" (*De Sex Principiis*, tract.VI, ch.I).

the infinitive of the verb *κεῖμαι*, the category then being *to be in a position*. Further, when treating the category of relation he says :

> It is to be noted that lying and standing and sitting (which belong to the category *to be in a position*) are particular positions (*θέσεις*), but position is itself a relative term. To lie, to stand, to be seated, are not themselves positions (*θέσεις*) but take their name from the aforesaid positions.[1]

Thus it is clear that *θέσις* and *κεῖμαι* are used when referring both to position in the category of quantity and to the category *to be in a position*. Our problem, then, is reduced to the question whether these words have different meanings in the two cases we have considered.

31. Merely by considering an instance of each, we can easily see difference. First consider the position *sitting*. Here there is a definite relationship between the parts of the body, the legs are arranged in such a way, etc. But this is not sufficient to constitute sitting. For a man might well have the parts of his body arranged as they are in sitting, and yet not be sitting, a man who is falling, for instance. We would not say that such a man was sitting. What is lacking in the case of a falling man is a certain reference to something outside of him, namely what he is sitting on, his place as it were.[2] On the other hand, if we refer to the position of a part of a line (as we did in considering the category of quantity), there is reference only to the other parts of the line, no reference to things outside the line. Hence we can see that the notion of position in the category *to be in a position* adds a reference to place to the notion of position in the category of quantity.

32. This doctrine is expressed by the unknown author of *De Natura Generis*, who says :

> For this position (that dividing the category of quantity) differs from the position which is the category because the position which is the category gives the order of the parts of the whole thing to its place, but this position gives the order of the parts existing in the whole to each other.[3]

What is more, St. Thomas states this doctrine quite explicitly.

> . . . position (situs) as it is posited as a category expresses the order of parts in place, although as it is posited as a difference of quantity it expresses only the order of parts in a whole.[4]

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1. Aristotle, *Categories*, ch.VII, 6 *b* 11.

2. In fact this is place taken materially.

3. *De Natura Generis*, ch.XX, n.65. This is an authentic work of St. Thomas according to Grabmann but spurious according to Mandonnet.

4. St. Thomas, *In IV Phys.*, lect.7, n.475.

33. Now that we have seen the nature of position in a more detailed fashion we are ready to consider those species of quantity the parts of which do not have position. First Aristotle considers number, and this is what he says :

> But it would be impossible to show that the parts of a number had a relative position each to each, or a particular position, or to state what parts were contiguous.[1]

The parts of a number cannot have relative position each to each. Let us take the number 6 for instance, and its parts 2, 2 and 2. How could one say that one of these 2's is in a particular position with reference to any other 2 ? If the middle 2 were put on the end it would make no difference, whereas if the middle part of a line were removed from the middle and put on the end, the original line would cease to be one line, but would become two lines. Plainly, this difference between lines and numbers is due to the fact that the parts of a line do have position, whereas the parts of a number do not.

34. If it is difficult to understand the instance of the parts of 6 given above, this is simply because, quite correctly, we do not think of the parts of numbers as having position.

35. Next, Aristotle considers time, saying :

> Nor could this be done in the case of time, for none of the parts of time has an abiding existence, and that which does not abide can hardly have position. It would be better to say that such parts had a relative order, in virtue of one being prior to another. Similarly with number : in counting, ' one ' is prior to ' two ', and ' two ' to ' three' and thus the parts of number may be said to possess a relative order, though it would be impossible to discover any distinct position for each.[2]

Likewise, the parts of time cannot be said to have position with reference to each other, for only what is can have position, while the parts of time are either past or future. Yet the parts of time are related to each other in some way, for the past is always before the future, and of two different parts of time one is always prior to the other. Thus there is an order in its parts, but the parts do not have position. The same thing is true of number in a certain respect, for in counting there is a definite order of the counts, for in counting to 5 one does not count 1, 3, 2, 4, 5, but 1, 2, 3, 4, 5. Thus, 2 always comes after 1 and before 3. But this is not the same thing as to say that the parts of number have an order among them. For 1, 2, 3, and 4 may separately be parts of 5, but not together, since together they make 10. Of these

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1. ARISTOTLE, *Categories*, ch.VI, 5 *a* 22.

2. *Ibid.*, ch.VI, 5 *a* 26.

numbers, let 2 and 3 or 1 and 4, for instance, be the parts of 5, but as parts of 5 they could just as well be considered as 3 and 2, or 4 and 1. Hence, the parts of a number, as such, do not even have an order among them, while the parts of time do have one.

36. Having treated time, Aristotle says that just as the parts of time cannot have position, because they pass out of existence, so with the parts of speech, which is plain since we can only speak over a period of time.

37. Now, we can see the order in which Aristotle considered those species of quantity which do not have position. He began with number because its parts obviously do not have position. He treated time after number because it is less obvious that its parts do not have position, since they have order. He treated time before speech because the parts of speech lack position since they follow each other in time.

38. Because we have now considered the division of quantity with reference to position in its parts, we are able to see the utility of this division for a logical consideration of quantity. As we saw previously, in his commentary of the *Metaphysics* St. Thomas points out that in the *Categories,* Aristotle distinguishes the species of quantity by the various conceptions of measure. But it is plain that we have a very different notion of measure concerning those quantities the parts of which have position than of those whose parts do not have position ; for in the former, the measure can be directly placed alongside the measured when measuring, while in the latter this is impossible. Thus in the former the notion of measure is more clear, in the latter more obscure. Perhaps it is for this reason that Aristotle makes such a division, i.e., so that by distinguishing the various notions of measure, we can see more clearly the difference between the various species of quantity distinguished by the various notions of measure, and hence come to a more distinct knowledge of the category of quantity.

39. After he has shown the *per se* species of quantity, Aristotle considers *per accidens* quantity. By considering *per accidens* quantities and by seeing what makes them such, we can come to a more distinct knowledge of what it is to be a *per se* quantity according to the logical conception.

40. This is what Aristotle says on this subject :

> Strictly speaking, only the things which I have mentioned belong to the category of quantity : everything else that is called quantitative is a quantity in a secondary sense. It is because we have in mind some one of these quantities, properly so called, that we apply quantitative terms to other things. We speak of what is white as large, because the surface over which the white extends is large ; we speak of an action or a process as lengthy, because the time covered is long ; these things cannot in their own right

claim the quantitative epithet. For instance, should anyone explain how long any action was, his statement would be made in terms of the time taken, to the effect that it lasted a year, or something of that sort. In the same way, he would explain the size of a white object in terms of surface, for he would state the area which it covered. Thus the things already mentioned, and these alone, are in their intrinsic nature quantities ; nothing else can claim the name in its own right, but, if at all, only in a secondary sense.[1]

This passage of Aristotle is relatively clear. Yet there is one thing we must call attention to here. In explaining that color and action are only *per accidens* quantities, he says that we call them quantities with reference to something else, in the case of color, surface, in the case of action, time ; the proof Aristotle gives for this being merely that in measuring each, the measurement we take is really that of another ; in measuring color we measure its surface, in measuring action we arrive at a time. Thus color and action do not have notions of measure distinct from the *per se* species of quantity we have considered. We can see, thus, in Aristotle himself a confirmation of St. Thomas' statement in the *Metaphysics*, namely that the species of quantity in the *Categories* are distinguished by different notions of measure.

41. When he has distinguished quantity into its various species and distinguished those from quantity *per accidens* (that he may exclude these from his consideration) he begins to consider the properties of quantity And it is evident why he considers these only after the species of quantity, for obviously one cannot know the properties of something as properties without a distinct knowledge of that thing, and we have shown previously that quantity can be made known only through its species.

42. Now, there are three properties of quantities : they have no contraries, do not admit of variation in degree, and equality and inequality are predicated of them.

43. First Aristotle treats the first of these.

Quantities have no contraries. In the case of definite quantities this is obvious ; thus there is nothing that is the contrary of ' two cubits long ' of of ' three cubits long,' or of a surface or of any such quantities.[2]

It seems that no comment on this remark is necessary However, Aristotle proceeds to consider two objections. The first is :

A man might, indeed, argue that ' many ' was the contrary of ' few,' and ' great ' of ' small.'[3]

1. Aristotle, *Categories*, ch.VI, 5 *a* 37.

2. Aristotle, *Categories*, ch.VI, 5 *b* 11.

3. *Ibid.*, 5 *b* 13.

In opposition to Aristotle, it might be argued that many is the contrary of few, and great of small, for many and few seem to be the extremes in number and great and small the extremes in the species of continuous quantities.

44. To refute this objection, Aristotle gives several arguments. The first argument against this position is as follows.

> But these are not quantitative, but relative : things are not great or small absolutely, they are so called rather as the result of an act of comparison. For instance, a mountain is called small, a grain large in virtue of the fact that the latter is greater than others of its kind, the former less. Thus there is a reference here to another, for if the terms ' great ' and ' small ' were used absolutely, a mountain would never be called small or a grain large. Again we say that there are many people in a village, and few in Athens, although those in the city are many times as numerous as those in a village : or we say that a house has many in it, and a theatre few, though those in the theatre far outnumber those in the house. The terms ' two cubits long,' ' three cubits long,' and so on indicate quantity, the terms ' great ' and ' small ' indicate relation, for they have reference to another.[1]

45. In this refutation, Aristotle does three things, first he gives the reason why this argument does not stand ; second he gives five instances by means of which the validity of his answer to the objection can be seen ; third he draws his conclusion. This is Aristotle's reason. " Many " and " few," " great " and " small " are correlative terms. They are said of a thing not by virtue of its quantity taken absolutely,[2] but to be understood, each must be compared or referred to the other. Thus the great is such only with reference to the small, and the small with reference to the great. Quantity, on the other hand, is said absolutely.[3] Therefore they do not belong to the category of quantity but to the category of relation.

46. He then gives two kinds of instances as a confirmation of his argument. First he gives instances of " great " and " small," " many " and " few." Then he cites instances of true quantities. In all the instances of the first kind, what is smaller absolutely is called greater and what is greater absolutely is called smaller. The first example he gives is that a grain of sand may be called great and a mountain small. Yet it is evident that a mountain is actually larger than a grain of sand. The second instance is that one might say that there are many people in a village because it is among the largest

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1. *Ibid.*, ch. VI, 5 *b* 15.

2. " Cum enim dico *homo est pater*, non praedicatur de homine aliquid absolutum, sed respectus qui ei inest ad aliquid extrinsecum." St. Thomas, *In III Phys.*, lect.5, n.322 (15).

3. *Ibid.*

of villages, and few in Athens because there are cities with a much larger population (or because most of the population has temporarily left the city). The third instance is like this one. One might say there are many people in the house, but few in a theater, though the number of the former is smaller than the number of the latter. From these instances it can be seen that " great " and " small," " many " and " few " are relative, for they do not follow things simply according to their quantity. If one calls a grain of sand large, it is so only in comparison with a smaller grain of sand, or some other very small thing. This is true of all the other instances too. Hence we see that in predicating " great " or " small " or the like of something we take it as something relative, not as a absolute.

47. If one contrasts these instances with the last two, " two cubits long " and " three cubits long," one readily sees the difference. Though these last are made known by another (i.e. one cubit which is their measure) and thus are referred to this other, the other (one cubit) need not be referred to them but is known by itself. Thus " two cubits long " and " three cubits long " are not purely relative. They are absolute in the sense that they are referred to something taken as absolute.

48. Obviously, by this argument Aristotle does not mean to imply that " great " and " small," etc., have nothing to do with quantity ;[1] " great " and " small," do refer to quantity, being relations of quantity, but they are predicated relatively and therefore belong to the category of relation. Aristotle, therefore, concludes that they belong to the category of relation, not to that of quantity.

49. After Aristotle has shown that these terms are relative, and that therefore the objection does not stand, he gives two arguments to prove that even if considered as pertaining to the category of quantity and not to that of relation, they could not be contraries, and that one could therefore not infer from them that there are contraries in the category of quantity. The first argument he gives is this.

> Again, whether we define them as quantitative or not, they have no contraries : for how can there be a contrary of an attribute which is not apprehended in or by itself, but only by reference to something external.[2]

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1. " Quaedam vero rationes sunt, quantum ad utrumque extremum, res naturae : quando scilicet est habitudo inter aliqua duo secundum aliquid realiter conveniens utrique. Sicut patet de omnibus relationibus quae consequuntur quantitatem, ut magnum et parvum, duplum et dimidium, et huiusmodi : nam quantitas est in utroque extremorum." St. Thomas, *Ia*, q.13, a.7. c.

2. Aristotle, *Categories*, ch.VI, 5 *b* 30.

According to this argument, even if " great " and " small ' were in the category of quantity, neither could be known without reference to something outside itself. From this Aristotle concludes that they are not contraries. But how the conclusion follows from the fact that neither can be known without reference to something outside itself is not evident.

50. Let us see what St. Albert has to say concerning this argument.

> Further, this is shown also by reduction to the impossible. For it may be granted by someone that those things which have been said are quantities. Then it follows that they are not contraries. For how can that which cannot be grasped through itself and absolutely, but must always be grasped in relation to another, be understood that it may be something contrary to that upon which it depends, since those things which are truly contrary are most distant of those which are under the same genus, and one of them may not depend upon the other, and contrariety is another genus of opposition than the opposition of relatives. On account of this, even if it were conceded that those things which have been said are quantities, still it would not follow that quantity has contrariety, because they are not contraries, but are opposed according to relation.[1]

We are now prepared to see more clearly the difference between this argument and the preceding one. The preceding argument showed that " great " and " small," " many " and " few " belong in the category of relation, not quantity. The present argument shows that even if they be quantitative terms they cannot refer to contraries since one contrary can be known without reference to its contrary, whereas these terms cannot.

51. To understand this argument several distinctions must be noted. Aristotle makes the first one in the seventh book of his *Metaphysics*.[2] For the sake of greater detail we will present St. Thomas' commentary on this passage.

> Now, the form present in the soul differs from the form which is in matter. For in matter the forms of contraries are diverse and contrary, but in the soul there is one form (species) of contraries in a certain way. And this is true because forms exist in matter on account of the being of the things informed, but forms in the soul exist according to the knowable or intelligible mode. Now, while the being of one contrary is removed by that of the other the knowledge of one opposite is not removed through that of the other but more is supported by it. Hence the forms of contraries in the soul are not opposed. Rather " the substance," i. e., the whatness, of a privation is the same as the substance of its opposite, as the form (ratio)

1. St. Albert, *De Praedicamentis*, tract.III, ch.XI.
2. Aristotle, *VII Metaphysics*, ch.VII, 1032 *a* 32.

of health and of illness are the same in the soul. For illness is known through the absence of health. But the health which exists in the soul is the form through which health and illness are known, and consists " in the science," i., e. in the knowledge, of both.[1]

Thus the way in which contraries exist in the intellect and in matter must distinguished. For the existence of one contrary in any given material subject excludes the presence of the other. But the two exist together in the soul. It is by knowing one that one knows the other. In this respect there is a certain similarity between our knowledge of contraries and that of correlatives.

52. However, in the *Categories*, as we have seen, Aristotle argues that one contrary can be known without reference to its contrary. Therefore, having seen how the knowledge of one contrary is the same as that of its contrary, in order to understand his argument we must now see how a thing can be known without reference to its contrary. Perhaps the distinction required here can best be understood by contrasting contraries and correlatives. A relative term can be understood only in comparison to its correlative. Thus, " double " can only be understood as it is compared with " half," of which it is the double. The whole being of a relative is with reference to its correlative [2] and hence all understanding of it is " to another." But this is not entirely true of contraries. While it is true that in knowing one contrary one knows the other in the way outlined by St. Thomas above, still one can surely consider white in some way without adverting to its being the contrary of black, or truth without adverting to its being the contrary of error.

Pairs of opposites which are contrary are not in any way interpendent, but are contrary the one to the other.[3]

Though one can know a contrary in its very contrariety with respect to another only by knowing this other thing simultaneously, one can know contraries without adverting to the things of which they are contraries. Nor does this contradict the position of St. Thomas cited above, namely that the form of contraries is the same in the soul, for one can know one contrary (at least confusedly) through its form in the soul without adverting to its being a contrary of its contrary. The fact that the two are known, in a sense, by the same form does not exclude one from being known in some way without reference

1. St. Thomas, *In VII Metaph.*, lect.6, n.1405. See also *Ia IIae*, q.54, a.2, ad 1.

2. " Those things are relative whose very being it is to stand in reference to something else in some way." Aristotle, *Categories*, ch.VII, 8 a 32. Translation by Dr. A. E. Babin in *The Theory of Opposition in Aristotle*, p.9. See also St. Thomas, *In V Metaph.*, lect.18, n.1004.

3. Aristotle, *Categories*, ch.X, 11 *b* 32.

to the other. Thus, one can know what truth is, in some way, without adverting to what its contrary (error) is.

53. Perhaps now we can understand Aristotle's argument. Contraries can be known in some way without adverting to those things of which they are the contraries. Since " great " and " small," " many " and " few " cannot be known independently in this way, they cannot be contraries.

54. Having presented his first argument against the objection proposing that " great " and " small " are contraries and that for this reason there should be contrariety in quantity, Aristotle gives a second argument against this position by reducing it to the absurd.

> Again, if ' great ' and ' small ' are contraries, it will come about that the same subject can admit contrary qualities at one and the same time, and that the same things will be contrary to themselves. For it happens at times that the same thing is both small and great. For the same thing may be small in comparison with one thing, and great in comparison with another, so that the same thing comes to be both great and small at one and the same time, and is of such a nature as to admit contrary qualities at one and the same moment. Yet it was agreed, when substance was being discussed, that nothing admits contrary qualities at one and the same moment. For though substance is capable of admitting contrary qualities, yet no one is at the same time both white and black. Nor is there anything which is qualified in contrary ways at one and the same time.[1]

Here Aristotle states two absurd consequences of the position that " great " and " small " are contraries, first there will be contraries in the same subject at the same time, second contraries will be contrary to themselves. Then he gives an argument to show the first. This argument requires little comment. Since the same thing can be " great " and " small " at the same time, if " great " and " small " are contraries, the same subject will have contraries at the same time and in the same respect (for if they are truly contraries they must be in the same respect). But this is absurd. Since this absurdity follows from the supposition that they are contraries, they cannot be contraries.

55. Next Aristotle shows the second absurd consequence indicated above. This is his argument.

> Moreover, if these were contraries, they would themselves be contrary to themselves. For if ' great ' is the contrary of ' small,' and the same thing is both great and small at the same time, then ' small ' or ' great ' is the contrary of itself. But this is impossible. The term ' great,' therefore, is not the contrary of the term ' small,' nor ' many ' of ' few.' And even though a man should call these terms not relative, but quantitative, they would not have contraries.[2]

1. Aristotle, *Categories*, ch.VI, 5 *b* 32.

2. *Ibid.*, 6 *a* 4.

From the beginning it must be realized that this argument is different from the preceding one, in which it was shown that it is impossible for " great " and " small " to be contraries because a subject cannot have contraries at the same time. Here he shows that if one is willing to grant that " great " and " small " are contraries something even more absurd follows, namely, that contraries are contrary to themselves, which is ridiculous.

56. Concerning this argument, the difficulty is in seeing how it follows from the presence of two contraries in the same subject that each of these contraries is contrary to itself. Therefore, we will show first that this absurd conclusion follows from the premises, second why we have difficulty in seeing the consequence.

57. As to the first, let us suppose that a single subject is " great " and " small " simultaneously and that these are contraries. But " contrary forms are in those things simply in which they are, because they are not forms of comparison, as Avicenna says, but are absolute qualities."[1] If " great " and " small " were considered relative forms, the same subject could be both great and small, but it would be so in different respects, " great " and " small " in the same subject could be distinguished from each other. But because they have been supposed to be contraries, and not relatives, " great " and " small " in the same subject cannot be distinguished the one from the other by different respects. They cannot be distinguished from each other at all. The quantity of the subject is simply " great " and simply " small." If it is simply both, not being so in merely one respect or another, then " great " must be " small," and " small " " great." Therefore, since " small " is contrary to " great," " great " and " small " must each be itself and its contrary, thus being contrary to itself. Because this is plainly not true, the supposition must be false, " great " and " small " are not contraries and therefore the original objection is to be rejected ; one cannot argue that there are contraries in quantity from " great " and " small," nor can one so argue from " many " and " few " since they cannot be contraries for the same reason.

58. If one reflects upon this argument, he can see why it is a little difficult to follow. It reduces to the absurd the position that " great " and " small " are contrary terms and not relative ones. However, we naturally continue to think of these terms as relatives in the course of the argument. Hence the argument does not seem to make any sense. When we realize that according to the suppositions of the argument we must deny all properly relative aspects to " great " and " small " our difficulty in following the argument disappears.

1. St. Albert, *De Praedicamentis*, tract.III, ch.XI.

59. In considering the four arguments against the first objection, one can see a certain order among them. In the first Aristotle argues against " great " and " small," " many " and " few " belonging to the category of quantity at all. In the next two he argues that even if it be granted that they are in the category of quantity, they cannot be contraries. Finally, he argues that if one is willing to accept them as contraries existing simultaneously in the same subject (which has been proved impossible), something even more disasterous follows.

60. Now that Aristotle has answered this objection to his position that there are no contraries in quantity, he considers a second objection.

> It is in the case of place that quantity most plausibly appears to admit of a contrary. For men define the term ' above ' as the contrary of ' below,' when it is the region at the center they mean by ' below ' ; and this is so because nothing is farther from the extremities of the universe than the region of the center. Indeed, it seems that in defining contraries of every kind men seem to take the definition of the other contraries from these, for they say that those things are contraries which, within the same genus are separated *by the greatest possible distance.*[1]

In this paragraph Aristotle gives a second objection to the position that there are no contraries in quantity. This objection concerns a particular species of continuous quantity, place or space (τόπος), whereas the previous one dealt with quantity in general.

61. In order to understand this objection we must understand the ancient notion of the universe. The universe was said to be in the shape of a sphere, with the earth in the precise center. From this view of the universe it seems to follow that the distance from the earth to the heavens is an ultimate or extreme distance, for one cannot go further from the center than the heavens, which contain all things under them and outside of which there is nothing. Since those things are contraries which are most distant in the same genus,[2] and since the above part of place (the heavens) and the below part of place (that at the center of the earth) are mot distant, and are obviously in the same genus, it seems to follow that these are contraries. A confirmation of this argument is the fact that our very definition of contrariety seems to have been taken from contrariety in space, for we say that " those things are contraries which, within the same genus, are separated by the greatest distance."[3] If our definition of contraries

1. Aristotle, *Categories*, ch.VI, 6 *a* 11.

2. See par.60.

3. See par.60. Also, " Since things which differ may differ from one another more or less, there is also a greatest difference and this I call contrariety. That contrariety is the greater difference is made clear by induction. For things which differ in *genus* have no way to one another, but are too far distant and are not comparable ; and for things that differ in *species* the extremes from which generation takes place are the contraries, and the distance between extremes — and therefore that between the contraries — is the greatest." Aristotle, *X Metaphysics*, ch.IV, 1055 *a* 4.

is taken from something spatial, contrariety must most evidently be found in space. Therefore, since place (space) is a species of quantity, it follows that it is not true to say there are no contraries in quantity.

62. When Aristotle has given this objection he gives no refutation of it. Rather he presumes the issue to be settled and goes on to the next consideration. Concerning the first part of the objection one might be led to suppose that even in considering the state of science in his day, the objection is silly, since the radius of a circle or sphere is only half its diameter. Therefore it would seem that there is a greater distance than the radius considered in this objection. This view of the objection would explain why Aristotle did not answer it, for according to this view it would be unnecessary to give an answer. Incidentally, this answer to the objection would leave a further objection unanswered, for the terms of the diameter of the universe would then seem to be contraries.

63. But we must not be led astray by this view of the objection, for according to Aristotle [1] the center of the universe is contrary to the highest part of the universe. Indeed, motion up toward the heavens is contrary to motion down toward the center of the universe because the above, the " place " [2] of the heavens, is contrary to the below, the "place" of the earth. In his commentary on the *De Caelo et Mundo* St. Thomas says in explanation :

> But rectilinear motions are contrary to each other because of contrary places (for the motion which is up is contrary to that which is down because up and down bring in difference and contrariety of place).[3]

Thus, for Aristotle and St. Thomas the rectilinear motions are contrary because the places (above and below) are contrary. Hence we can see the objection was not a silly one for Aristotle to propose ; there was a basis for it in the physisal theory of Aristotle himself. St. Albert in commenting on the physical basis for this objection goes so far as to say :

> For that above and below are not most distant according to the properties of place and motion is an intolerable error, destroying the whole philosophy which is about rectilinear motion, which is determined in the third and fourth books of the *De Caelo et Mundo*.[4]

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1. " But the two forms of rectilinear motion are opposed to one another by reason of their places ; for up and down is a difference and a contrary opposition in place." ARISTOTLE, *I On the Heavens*, ch.IV, 271 *a* 4.

2. Taking " place " in the logical sense, of course.

3. ST. THOMAS, *In I De Caelo et Mundo*, lect.8, n.81(4).

4. ST. ALBERT, *De Preadicamentis*, tract.III, ch.XII.

64. Concerning the second part of the objection, anyone who reflects upon what we mean by contraries being the things most distant in the same genus must recognize that this notion first arises concerning some kind of space or extension. Therefore, it seems we cannot avoid the conclusion that there are such things as spatial contraries.

65. In considering this objection one might be led, then, to believe that Aristotle considers the objection well taken, that he does not answer it because he accepts it. In fact, however, as we shall see, there is quite another reason why he makes no comment on it.

66. In order to see what validity the objection actually has, let us consider the nature of space or place again, trying to determine if contrariety could arise from it. As we have said previously,[1] place is coextensive with bodies. It is distinguished from bodies by a different way of considering the act of measuring. In measuring a body, we consider the end-points of the distance measured to be located at the exterior surface of the measured body. In measuring a place (space) we consider the end-points of the distance measured to be located at the interior surface of the containing body. The " how much " of the two distances may be the same, i.e., two feet or some such quantity, but the distances are still conceived as distinct. The very notion of place in the category of quantity consists in this second way of considering the measurement of homogeneous extension. Any reference to heterogeneity takes us outside the notion of place.

67. As we know, contraries are the things most distant in any genus. But within the notion of homogeneous extension there is no definite limit, there is no greatest homogeneous extension, nor is there one which is smallest. Hence, there can be no things which are most distant, no contraries in homogeneous extension. This is not to say that there is no limit to existing extensions. But any discussion of the actual limits of existing extensions, or even their existence would take us outside the considerations of logic since we are considering magnitude taken commonly. The important point for us is that there are no particular limits and no contraries belonging to extension and dictated by magnitude itself. If there are limits and contraries associated with extensions, such as the center and the outermost edge of the universe, they come from something extrinsic to quantity itself, such as figure or form.[2]

68. Since logical place is extension or continuous quantity measured in a certain way, it is plain there can be no limit or contrariety

1. See par.22-26.

2. " . . . licet infinitum non sit contra rationem magnitudinis in communi, est tamen contra rationem cuiuslibet speciei ejus ; scilicet contra rationem magnitudinis bicubitae vel tricubitae, vel circularis vel triangularis, et similium," St. Thomas, *Ia*, q.7, a.3, ad 2.

belonging to it according as it is quantity. There may be a definite limit to the universe as a whole, we may have spatial contrariety arising from the physical limitations of the extensions of the existing universe, and it may be that the terms of all motions including local motions are contraries,[1] but these limitations, and this contrariety come to logical place from something outside our notion of it. Thus we can see there are contraries which are spatial in some way and yet do not belong to space (place) as such. It is from this kind of contrariety, then, that we first get the notion of contrariety.

69. We can now perceive why Aristotle did not refute this second objection, for this answer is similar to the answer to the previous objection. For as it was shown in the previous answer that " great " and " small " do not belong to quantity as such, so here the contrariety does not come from place as such.[2]

70. When Aristotle has shown that there is no contrariety in the category of quantity, and answered the objections against his position, he then takes up the second property of quantity, and this is what he says.

> Quantity does not, it appears, admit of variations of degree. One thing cannot be two cubits long in a greater degree than another. Similar with regard to number : what is ' three ' is not more truly three than what is ' five ' is five ; nor is one set of three more truly three than another set. Again, one period of time is not said to be more truly time than another. Nor is there any other kind of quantity, of all that have been mentioned, with regard to which variation of degree can be predicated. The category of quantity, therefore, does not admit of variation of degree.[3]

This paragraph is quite plain by itself. In it Aristotle shows that there is no variation in degree by taking various species of quantity, and in these species we can easily see that there is no " variation in degree."

71. In dealing with this property, we might begin by eliminating two things from our consideration. First, variation in degree has nothing to do with increase or decrease in quantity. 5 is more than 3,

1. " Since then change differs from motion (motion being change from a particular subject to a particular subject), it follows that contrary motions are motions respectively from a contrary to the opposite contrary and from the latter to the former e.g. a motion from health to disease and a motion from disease to health . . . Similarly we have upward locomotion and downward locomotion, which are contrary lengthwise, locomotion to the right and locomotion to the left, which are contrary breadthwise, and forward locomotion and backward locomotion, which too are contraries." ARISTOTLE, *V Physics*, ch.V, 229 *a* 30.

2. Of course, there is contrariety in place with respect to particular motions also, but this concerns place as it is treated in the *Physics*. See ST. THOMAS, *In V Phys.*, lect.4, n.681 (4).

3. ARISTOTLE, *Categories*, ch.VI, 6 *a* 19.

but this has nothing to do with the property we are discussing here. Second, we are not discussing the " degree " in which one species is said to be quantity compared to the " degree " in which another species is said to be quantity. Each species of quantity must be said to be quantity simply and not to a greater or lesser degree than another. If one were said to be quantity to a greater or lesser degree than another quantity could not be a genus.[1]

72. Exactly what Aristotle is denying of the category of quantity can be seen by considering a case in which this variation of degree is present. We find it present in colors. White and black are contraries, and between them we have various shades of grey. Grey can approach white or black more or less closely. As grey approaches white it can be called white, but in a lesser degree than pure white. The same thing is true of black. If what happens here with white, grey and black is contrasted with quantity, one can readily see what Aristotle is talking about. In order for something to be validly called " three," it must be exactly three. Hence all those things which are called three, are three to the same extent. The same thing is true of three feet, or any other quantity one wishes to take. This is what Aristotle means when he says that in the category of quantity there is no variation in degree.

73. In considering the root of this property we must go back to the property previously discussed. It is because there are no contraries in quantity that there are no variations in degree.[2] If there were contraries, it might be possible for something intermediate to approach one or the other contrary, participating in it in an imperfect way. In this case we could have variation in degree. Thus, this second property of quantity is dependent upon the first. This is probably why Aristotle treats this second property after the first.

74. When Aristotle has examined the second property of quantity, he concludes his analysis of it by manifesting its third property.

> The most distinctive mark of quantity is that equality and inequality are predicated of it. Each of the aforesaid quantities is said to be equal or unequal. For instance, one solid is said to be equal or unequal to another ; number, too, and time can have these terms applied to them, as indeed can all those kinds of quantity that have been mentioned.

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1. We took up the problem of whether quantity is a genus at the beginning of this work.

2. " Huius autem una causa est, quia omne quod suscipit magis et minus, sive intensionem et remissionem, oportet quod sit in eo intensio et remissio ex una duarum causarum, scilicet aut ex actione contrariorum in ipsum, quorum unum confortatur et alterum debilitatur, et sic intenduntur et remittuntur quae causantur ab actionibus eorum : aut sit intensio et remissio a mixtione contrariorum, sicut in doctrina de *Universalibus* dictum est." ST. ALBERT, *De Praedicamentis*, tract.III, ch.XIII.

That which is not quantity can by no means, it would seem, be termed equal or unequal to anything else. One particular disposition or one particular quality, such as whiteness, is by no means compared with another in terms of equality and inequality but rather in terms of similarity. Thus it is the distinctive mark of quantity that it can be called equal and unequal.[1]

To understand what Aristotle is doing in these two paragraphs, we must distinguish between the kind of property we are discussing now and the kind of property we discussed previously. As St. Albert says in his commentary on the *Isagoge* of Porphyry, in order for something to be a property it must flow from a species not a genus.[2] Evidently, therefore, we cannot talk about the *genus* of quantity as having properties in the most strict, predicable sense of the terms. Elsewhere in the same work, St. Albert discusses other things which belong to this notion of property in the most strict sense of the term.[3] Most properly speaking, a property of a species must belong to all its inferiors, always, and to nothing outside of them. Neither of the two previously discussed " properties " of quantity fulfill all of these conditions. For whereas not to have contraries and not to have variation in degree belong to all the inferiors of quantity and always to them, they do not belong to quantity or its inferior alone.[4] On the other hand the present " property " of quantity does fulfill all three of these conditions, it belongs to all quantity, always, and only, Hence, whereas all three properties fall away from the most proper notion of property, flowing as they do from a genus and not from a species, yet this last, that concerned with equality and inequality, is less removed from the most proper notion of predicable property. Therefore, because this property is the kind it is, Aristotle not only shows that it belongs to all the inferiors of the genus of quantity, but he also shows that it belongs to nothing else.

75. Therefore, Aristotle proceeds inductively, first showing that the property belongs to all quantities, second that it belongs to nothing else. There is no need for further comment on the argument itself. As presented by Aristotle it is sufficiently clear.

76. It would seem that this third property should be treated last for two reasons. First, it is dependent upon the second property (which, as we have seen is dependent upon the first), for there cannot

1. ARISTOTLE, *Categories*, ch.VI, 6 *a* 26.

2. " Post tractatum *de Differentia* quae perficit speciem ad esse speciei, intendendum est *de Proprio*, quod ut dicit Boethius, manat de essentialibus speciei jam per differentiam praeconstitutae per intellectum : non enim manat de genere secundum quod est genus, quia tunc esset indistinctum . . ." ST. ALBERT, *De Praedicabilibus*, tract.VI, ch.I.

3. *Ibid.*, ch.II.

4. For instance, they belong to the category *where*.

be equality between things which vary in degree. If one 5 were more 5 than another, we could not talk about equality between them, but only some sort of similarity. Second, it is the most proper property of quantity and therefore best notifies it. Therefore, it is suitable that it come last, that we may proceed from imperfect to perfect knowledge.

77. In reflecting upon the ways in which Aristotle determines the properties of quantity, we can see that he proceeds inductively in all cases, showing the properties of quantity from its species. This might be taken as a sign of what we said at the beginning of our examination of this category, the genus is so general, so potential, that it can be understood only by making reference to something more actual, its species.

78. We have now completed our treatment of the category of quantity. We have seen how it is made known and we have seen its properties. We have judged Aristotle's method in exposing this doctrine to have been the proper one. Perhaps, by analyzing the other categories in this way, one would be able to obtain a relatively distinct knowledge of all of them. This in itself would be no small accomplishment.

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