

NUMBERS

Naomi's mother remarked to me that, recently, while the family was traveling in the car, her daughter had suddenly exclaimed, as though it was part of a conversation,—“What are numbers anyway ?” And of course, she *was* engaged in a conversation, an internal conversation. So let's take a break from Logic and look at the question.

“What are numbers ?”

By way of preamble we should recognize that many things we discover in the world in which God has placed us are mysterious, realities about which, as Frank Sheed used to say of God's revelation, we may know something, but not everything. Numbers are mysterious. We can say something about them, but cannot hope to plumb them completely.

Numbers seem to be intimately, if indiscriminately, involved in all material, and immaterial, things. For we not only apply them to bodies, but to immaterial things such as our thoughts. And numbers are the very stuff of mathematics, algebra and geometry—all at the imaginative level—as they are in the construction of things, and in the calculations of dimensions, vectors, stresses and strains, where these disciplines are applied in the concrete world.

To see just what we can know of numbers, let's look at Aristotle's analysis of material things. Here are the ten categories of being, *the predicaments*, reproduced from Lesson 9 of our first year. Every material being falls into one or other of these ten categories.

Substance		be-in-self
Quantity]	
Quality]	
Relation]	
When]	
Where]	be-in-other
Action]	
Passion]	
Habitus]	
Situs]	

Is Number A Substance Or An Accident ?

Aristotle says of the followers of Pythagoras that they held “that infinity and unity itself were the substance of the things of which they are predicated... number was the substance of all things”. [*Metaphysics* 5: 987a 13] Now a substance is that which exists in its own right. Does number, as Pythagoras seems to have thought, exist in

this way ? Do we ever see the number 7, for instance, flying through the sky, or the number 5 swimming in the sea ? We may see seven birds flying, or five fish swimming, but never the numbers themselves. So whatever number is, it is not a substance.

Aristotle's analysis helps to point us in the right direction. Number (number in material things that is) only exists *in* things. That is, they are one of the nine species of accident (be-in-other), or a property of one of those nine. But of which one?

Let's go from the bottom up. *Situs* designates the posture of the substantial thing (if it is proper to it to have posture)—sitting, standing, lying, up-side-down, etc. There is nothing in this accident that touches number. A tortoise has four legs. It will not have any less when it is up-side-down!

Habitus designates clothing (if it is proper to a thing to be clothed, or covered). Again number does not affect the substance involved. If it be one, clothing or covering will not make it two or three.

Passion designates receipt of the action of another, as when a boy is pushed by his schoolmate. *Action* designates the conduct of the one pushing. Neither accident involves number. However, if a block of cheese be divided into twelve parts there is number involved, but it is not so much in the being-divided (the *action* and the *passion*—the cutting and the being cut) as in what results, the alteration of its *quantity*. Here is the next clue about number. We will return to it.

When and *where* obviously are not involved in the number of a thing, unless something such as division occurs to it (as with the block of cheese) at some time and in some place. But then their involvement is accidental, *per accidens*, and the dividing could have happened at another time and place and still be one divided into twelve.

Relation is 'be-towards', as when one considers the reality of maker and a thing made. If a girl makes one cake, or if she makes eight separate cakes of the one mixture, it is not her relationship to the cake(s) as maker that affects the numbers involved, but the quantity or quantities into which she divides them.

Quality is the accident which determines the substance to be *of such sort*, as red, or sound-emitting, or hard, or soft, or tasty, or sour, fast or slow, light or heavy, etc. If the cake or cakes are hard or soft, are light or heavy, this will not affect their number as 1, or as 8. So number is not a quality.

It remains that *quantity* is the accident where number is specified. *Quantity* is that accident by which a substance is extended in place, is given a body. The *substance* (substantial form) of a thing—I am speaking of natural things—is of itself immaterial and relies on its accidents, *quantity* for its extension, and the others for its characteristics. The *substance* of a thing calls the shots, so to speak. It specifies, for instance, that a rabbit will have a furry coat, long ears and a twitchy nose. It determines its size, maximum and minimum, its shape, habits and dispositions such

as the sort of food it will eat and the habitat it will favour. But before each of these *qualities* can operate, the *substance* must have a body. And it is *quantity* that gives it the body in which these qualities inhere.

As *substance* (material substance) dictates the *quantity* apt to give it the body proper to it, with that quantity it gives number. A centipede has many legs, rarely exactly 100, a spider 8, an ant 6, a rabbit 4 and a man 2. In each case the number is determined by its substance via its proper *quantity*.

Number is, then, a species of quantity.

Predicamental Number

Division causes multitude, lack of division unity. Number adds measure to multitude and measure is that whereby the quantity, [meaning here the amount or size] of a thing is known. I can draw a line like this—



It is a certain *quantity*, and it is one. If I divide it like this—



I turn the one into a multitude. Applying my mind I add the measure of number and discover that I have turned 1 into 7. Similarly, I can take a block of cheese and divide it with a knife into smaller pieces. I can turn 1 into, say, 12. In each case I am involved in *material* division. But note that the substance does not cease to be cheese. Its division, materially, does not affect its essence, *what* it is.

Let's put those distinctions again:

Measure is that whereby the quantity of a thing is known.

Number adds measure to multitude.

If I want to determine the size of something I apply a measuring tape or ruler to it. The tape or rule is divided quantitatively into consecutive numbers, and by applying it to the thing, I determine its size. Note that it is the last number on the tape or ruler which is determinative. The ultimate unit on the tape gives the number which is its measure. It's that last number that I am looking for.

In all this we must keep in mind the fact that every material being has four transcendental perfections. Each substance, in virtue of it being an existing substance, is *one, something, true* and *good*. This one-ness it has in virtue of its substantial form, its *substance*. This *one-ness* is other than its predicamental number which is determined by the thing's *quantity*.

Transcendental Number

In contrast, let us note that the activity in which I engage with regard to material things is not what I do when, say, I count the number of thoughts in which I have engaged. Nor are material things the object of my mind when I engage in arithmetic, algebra or geometry.

I may go back over the train of my thoughts and count the number of consecutive ideas I have addressed, say, 7. I am not dividing according to a thing's matter for ideas don't have any matter. Each idea is a certain form. Similarly, when I engage in calculations, I am not considering things but the form of number abstracted from things. In these cases I am dividing on the score of form. Here I am applying not predicamental number but transcendental number. So, we can recognize this distinction :

	[matter	-	predicamental number
Number	[
can arise either on	[or		
account of :	[
	[form	-	transcendental number

There is one other item of interest to do with numbers and that is that each predicamental number is one specific being. 8 is *specifically* different from 9 : it is *formally* different from 9, not just *materially* different.



Consider a heap of stones. The heap is one in a secondary fashion only (*secundum quid*) for the heap of stones does not differ specifically from its components. Take one stone away and it continues to be one heap and the stone removed retains in itself the nature stone. However, some one (thing) composed of different elements is nevertheless one simply (*simpliciter*) if it is constituted by some formal principle making it one, as water is one though composed of two elements, oxygen and hydrogen, or a table is one though composed of ten planks. Take one of the elements from water, say oxygen, and it ceases to be water, and the element removed does not retain the reality water. Similarly, remove the planks from the table and it ceases to be a table, and the planks so removed do not retain the character 'table'.

Now a number, though composed from many units as from its elements, is such in virtue of some formal principle besides those units—the principle of ‘nine-ness’ if you like. If one part of the number 9 was lost, the part lost would not retain the character 9, as the parts of the heap of stones yet retain the nature of stone, nor would the parts remaining retain the nature 9.

So 9 is a being truly one and not simply a collection of beings, and it is specifically different from, say, 8—as 8 is specifically different from 7.

Well. The above considerations give us some understanding of numbers, but they are still mysterious !
