The Philosophy of Mathematics – Paper III

Now, this "pause to assess interlude" has been necessary to GROUND Mathematics as a human invention with real purposes and real flaws. It is necessary, because in the next stages, Mathematics will grow to claim superiority over the Sciences, and to represent the Essence of Reality.
Obviously, not only is this claim rubbish, it is also dangerous rubbish, and we must tackle the next stage in the developments well primed!

Now, claims that Mathematics is ONLY about quantity will be vigorously debied by mathematicians, because in the last period of development, it has seemingly extended into quite different territories. Now, such arguments are often used to counter the claim (by myself and others) that Mathematics is, though wonderful, NOT equipped to "explain". It may be sophisticated and highly developed, but it is still a means of **description**, and NOT a means of ***explanation***.
We obviously have to be clear what we mean by these terms, so before we address the "modern" extentions of Mathematics, we must clarify WHY it is an inadequate means of understanding Reality. Mathematics is about Form – and a limited area of Form too! There is another type of Form, that is NOT included in Mathematics, and to define the actual nature of the subject we will have to nail both terms and contrast them.

Elsewhere, I have written many papers on Mathematical Form, which I often label Pure Form, and to begin its more detailed definition I will say what it is NOT. Many times I contrast mathematical formulae with Analogy, and clearly make them out as "opposites" in important ways. What is the difference?

Mathematics takes extracted/isolated relations from Reality and abstracts them into formulae. These are generally to do with quantities, and hence we say that Mathematics is about Quantitative Form.

Analogies are very different.
They map previously studied and accepted situations onto new areas of study. They attempt, by this means, to explain new situations in terms of old situations. They build new understanding on old understandings. They are not Mathematics. They look for, and find, similar Qualitative Forms. They do not deal with a single relation as Mathematics does, but systems of relations and the processes involved in such systems. The uses in language of metaphor and simile, shows that Mankind is very adept at recognising Analogies, and it must be the case that ***qualitative, process forms*** must recur in Reality whenever similar conjunctions of processes exist.

Now, Modern Physics has dumped Analogy, because it says that NO useable Analogies from our everyday experience even EXIST to be applicable to their specialist area, and having done so, are left with ONLY quantitative relations as dealt with in Mathematics. They limit their toolkit to Mathematics alone, and, indeed, often sneer at attempts to "explain". One dominant school even insist that "explaining" is impossible in their area of study, and the only reliable methods must be purely mathematical.
Now, there is a lot more to this debate, which we will no doubt return to regularly as we proceed, but let us see how far we have got up to this point.

We now have TWO different kinds of Form – that contained within Mathematoics, and the other to do with "systems", qualities and processes typified by **analogies**, which for a great deal of time have been the explanatory srm of Physics and a great many other Special Sciences.

We can now, to a certain extent at least, allow ourselves to begin to undermine this dichotomous situation with regard to Form by addressing the most recent developments in Mathematics. A favourite area of mine (remember I am a mathematician) has for a considerable time been in the extension of Number Theory beyond Numbers!
Throughout my education I have puzzled over certain ideas, that have been included into mathematics because they can be dealt with by mathematical methods, yet which are NOT Numbers.

The most famous is **i** – the so-called square root of **-1**.
Of course, there is NO number, which when multiplied by itself, gives the answer **-1.**
So it isn't a number! So, what is it?

It is an **operator**! - which actually means "***turn anticlockwide through 90^o*** in special circumstances – certainly not a number then. And, if it is not a number what can "multiplied by" mean when applied to such an operator? Only numbers can be multiplied, hence "multiplied by" must mean something else.
It means "***do the operation***".

Thus "***do the operation***" followed by "***do the operation***" can be formally agreed to be symbolised as

$$\mathbf{i \times i \quad or \quad i^2}$$

though, of course, it is not what it looks like.

Thus $\mathbf{i^2}$ can be clearly defined as "***turn anticlockwise through 90^o***" followed by "***turn anticlockwise through 90^o***" , which is the same as ***turn anticlockwise through 180^o*** - which in a special type of co-ordinate system would be the same as the operator **-1** or "***negate the horizontal coordinate***".

Now, you will have to forgive the originators of all this for their inclusion of these messy operations into normal Mathematics, but it meant that the users did not have to learn anything new. They could use normal mathematical methods to handle this new area. AND, very important, they didn't even have to think about what it all meant. It became a simple extension of mathematical manipulation, and you could get anybody to do it.

We will come across this again. Mathematicians are nothing if they are not pragmatic. And the more you can pack into its manipulations without appreciably adding to its complexity in use – **the better**.

To be continued

(938 words)