Mathematical Infinity

Bertrand Russell

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MATHEMATICAL INFINITY

IT is surprising and rather disappointing to find in the pages of MIND such a discussion as that of infinity by Mr. E. R. Emmet in the issue of April 1957. The subject of infinite numbers is a technical and not very easy branch of mathematics, and those who have not studied it cannot hope to say anything sensible about it. It is quite clear from Mr. Emmet's discussion that he does not know this theory. The consequence is that some of the things he says are just as foolish as the opinion once held by common-sense philosophers that there could not be people at the Antipodes because they would fall off. One is reminded of Hobbes squaring the circle and of Cook Wilson "proving" the axiom of parallels. I should advise Mr. Emmet, before he again ventures to write on the subject, to study Georg Cantor's articles in *Mathematische Analen*, vols. XLVI and XLIX, and also Frege's *Grundgesetze der Arithmetik* (the *Grundlagen*, though an admirable book, is too elementary for present purposes). Or perhaps Mr. Emmet might content himself with Part III of *Principia Mathematica*, especially *123. Meantime, it may be worth while to point out a few of his mistakes. He speaks (p. 243) of "the number of numbers". He means the number of inductive numbers, or natural numbers as they are sometimes called. This number, he says, "is indefinite, unlimited". He offers no proof that it is indefinite, but makes the gratuitous assumption that all numbers can be reached by counting—*i.e.* by successive additions of 1 starting from 0. He then proceeds to prove various familiar propositions which he supposes constitute objections to the theory of infinite numbers: for example, that there are twice as many inductive numbers as even numbers, and also three times as many, and four times as many, and so on. All these are well-known facts and are demonstrated in the relevant sources. He goes on to say (p. 244), "It is customary to give notice if a word is going to be employed in an unusual sense and to say what that sense is". Can it be because the works to which I have referred Mr. Emmet satisfy this requirement that he has not found them worthy of his notice? He comes to an astonishing conclusion (p. 249): "An indefinite number is not a positive 'thing' that is there, but a negative absence of definiteness." Does Mr. Emmet consider that the natural numbers are positive "things" that are "there"? If so, he is astonishingly Platonic; but if not, I am at a loss to see in what way the number of inductive numbers differs from any other number in respect of being "there". He proceeds, on the same page, to quote three remarks of mine which, he says, are "seen to be nonsensical". His only reason for thinking them nonsensical is that he is ignorant of the mathematical arguments in their favour.

I do not suppose that Mr. Emmet would accuse geneticists or radiologists of talking nonsense merely because they use words he does not understand. I fail to see why mathematicians should be treated differently.

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