Pluralism in Mathematics

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Abstract:

One of the ancient intellectual activities pursued from the beginning of civilizations is mathematics. A careful glance at mathematics would reflect a great diversity. These diversifications may be observed at least from the following angles:

(i) Difference in procedures
The classicist (Platonic) viewpoint is that mathematical entities are there, outside the human mind, and the task of a mathematician is to discover their laws. The ontology of mathematical entities is not dependent on the creations of the human mind, rather the latter serves as the epistemic instrument to derive knowledge of these objects. On the other hand, non-classicists engage in constructing mathematical entities. Thus, a diversification stems from the approach taken regarding the ontic status of the mathematical entities, depending on the nature of involvement of human mind in mathematical activities. Diversification is observed within the non-classicist approach, such as, construction of mathematical entities may be performed in different ways: (a) *with* or *without language*; and (b) *axiomatically* or *non-axiomatically*. Differences are also generated from the perspective of construction of mathematics either solely as a tool or as an abstract object.

(ii) Difference in the underlying axioms
Axiomatic presentation of mathematics has given rise to various basic branches, for example: (a) Euclidean and Non-Euclidean geometries; and (b) Cantorian and Non-Cantorian set theories.

(iii) Difference in the underlying logics
From the logic-based approach, mathematics has been diverse depending on the use of the underlying logic. Diverse mathematics have been developed based on the development of different kinds of logics such as: (a) Classical Logic; (b) Intuitionistic Logic; (c) Paraconsistent Logic; (d) Many-valued Logic; (e) Fuzzy Logic; etc.

(iv) Difference in the foundations
All the above aspects are considered in any discussion about the differences in foundations of mathematics. Apart from the above inclusions, there has been another kind of diversification due to differences in the foundation of mathematics caused from (a) Category Theoretic approach; and (b) Many Worlds approach.

(v) Difference in interpretations
Thus, due to the above stated reasons, differences have cropped up regarding (a) the ontology of mathematical entities and (b) the nature of mathematical truth.

Since mathematics has no unique, particular "goal" so to say, there is no unique path of its development. In our view, the time is ripe to look beyond the explanation of the

past history of mathematics and speculate on the various possibilities of mathematical developments of future times. In this presentation, I will address some of the above mentioned issues concerning pluralism in mathematics.