MATHEMATICAL PHILOSOPHY IN THE JAINA SCHOOL OF THOUGHT

*L.C. Jain * S.K. Jain ***

"The words or the language, as they are written or spoken, do not seen to play any role in my mechanism of thought. The psychical entities which seem to serve as elements in thought are certain signs and more or less clear images which can be voluntarily reproduced and combined"

-Albert Elinstein, Ideas and Opinions, Calcutta, 1979.

I. Introduction

The word, "Mathematical Philosophy", seem to have originated by Bertrand Russell (1872-1970), the world famous author of the "Principia Mathematica" in the coauthorship of Whitehead. Russell is also known as the creator of the Russell paradox in the fringes of the set theory of the infinities propounded by Georg Cantor (1845-1918) According to him the early Greek geometers passing from the empirical rules of Egyptian land-surveying to the general propositions by which those rules were found to be justifiable, and then to Euclid's axioms and postulates, were engaged in mathematical philosophy. Recently it has been observed that the Jaina School of Mathematics was also engaged in the mathematical philosophy contained the *Karma* theory of the *Purvas* (the second and the fifth) still in possession of the *Digambara Jaina* School with its mathematical manoeuvre through symbolism. This can be seen in the project of the *Labdhisara* (1984-1987) at the Indian National Science Academy, New Delhi. The last worker in this field was the *Pandita Todaramala* of Jaipur (c. 1721-61) on whom an article has already been published in the Indian Journal of History of Science. It was due to his undying credit to have given a guide to the non-universal mathematics of the *Karma* theory contained in the *Dhavalas* and the *Gommatasara*, the *Tiloyapannatti* and the *Trilokasara*. These monumental works are due to the credit of *Virasenacarya* (c. 9th century), *Nemicandra Siddhanata cakravarti* (c. 11th century), *Madha vacandra Traividya* (c. 12th century) and *Kesava Varni* (c. 13th century A.D.), of the *Digambara Jaina* School.

It was already felt by Boole, Frege and Russell that deeper realms of philosophy could be approached only through words or symbols which could express the propositions between the truth and untruth. The parallel to this is the concept of the *Syadvada* in the *Jaina* philosophy. Thus the status of an object being relative to different

* ***Director, Acharya Shri Vidyasagar Research Institute, over Diksha Jewellers, 554 Sarafa, Jabalpur.***
** ***Computer Centre, D.N. Jain College, Gol Bazar, Jabalpur.***

points of view, a single proposition about its state marred the prospects of its description in various aspects in the old philosophies. But the *Jaina* philosophy was free from this mono-ended pursuit and it followed the poly-endedness. This led it to the existential and constructive spheres of the innumerate and the infinities in a proper and simple way through its set theory (rasi siddhanta). The secret of the mathematical philosophy in the *Jaina* School, thus lay in their attempt to give a new shape to the expressions in logic and intuition, through the word *"syat"* in the course of the *parikarmastaka* not only among the finitie sets but also for the innumerate and infinite sets of various comparabilities. Today the problem of the compara bills still unsolved in the modern set theory infinities of various types. In the *Jaina* set theory there are not only the constant sets but also the variable sets scaling the infinites of the *Karma* theory through constructions and other analytical methods. The various types of units, measures and calculations between them were needed of their *Karma* system and cybernetics which was an aggregate of various subsystems and groups of operations to annihilate the *Karma* state matrix. Thus the School had its own formalism of symbolism and its symbolic logic applied in the *Karma* theory became mathematics as in terms of Russell.

2. THE INNUMERATE IN THE JAINA SET THEORY : A PHILOSOPHICAL SUBSYSTEM

The Cantor's theory of sets, faced the contradictions, antinomies, and the inconsistencies as any theory has to face for its survival. His sets included the infinite sets, not of the philosophies, but of proper characteristics that could prove that a set though infinite could be greater than another set and also could be constructed through the principle of generalized induction. Comparability between infinite sets arose a new arena of research, beyond the old philosophical domain in which there was no place to compare infinities as in old mathematical improper infinities for their smallness of greatness. With such a new prospect of the infinities, the *Jaina Karma* philosophy took a start. Through the various sequences ranging from the unity to the supermum set of omniscience (*Kevala Jnana*), the *Jainas* located the terms of various types of sets involved in the calculations of annihilation of the *Karma* perpetual cycle of births and deaths. They filled up the gaps between such types of sets which had the number of members as numerate, the innumerate and the infinite.

Thus the *Jaina* School took a positivistic approach in introducing the innumerate and the infinite. They were meant to explain the endless processes from ab aeterno to ad infinitum, the relations between various sets involved in the realities of life of various types. They had to find, mathematically, a path to perpetual immortality in which there was neither births, rebirths and the agonies of the old age, perpetual and endless bliss, infinite power and knowledge. They

created the indivisible system of units, as the indivisible instant (*samaya*) and the indivisible space *(pradesa)*, against which the Eleatic School of Zeno's paradoxes were not directed. Zeno's paradoxes have an interesting history baffling the Greeks and the mathematician philosophers till Russell who explained through the process of infinite regression or the innumerate regression. The Greeks were thus obliged to leave the pursuits for infinities and had to be satisified with the as small as we please and as great as we please. We state here the miraculous paradoxes of Zeno (the sample of Parmenides, fi. 5th century B.C.) which were regarded by Socrates as truisms rather than the paradoxes :

1. **(Dichotomy):** There is no motion, for whatever is transformed into motion, it will be required to reach the middle (of the distance) before it reaches the end (and for reaching that half part it will have to reach half of the half part, and so on ad infinitium).
2. **(The Arrow) :** If, Zeno states, every object is either at rest or in motion when it occupies the space equal to its own, when that object is in that now (instant) always then the moving arrow is at rest (and not moving).

There are two more paradoxes of Zeno which could be seen in the Jowett's, The Dialogues of Plato, vol.2. The above paradoxes could not be explained without the innumerate processes in the nature of motion of physical objects which could not be divided ad infinitum. Such sequences which could have a finite sum may come under the sets with innnumerate members. According to Socrates the Zeno's paradoxes were not directed against the Pythagorean Schools because they dealt with ultimate units. The *Jaina* Schools also dealt with the *Karma* theory through ultimate units as we have seen already. Even the phases of the bios are dealt with the measure in terms of the indivisible-corresponding-sections (*avibhagi-praticchedas*), calculating the emotions in terms of the tetrads in the ultimate particles of matter bound as *karma* paramanus. These have the configuration (*prakrti*), mass number (*pradesas*), life-time (*sthiti*) and energy-level (*anubhaga*). The innumerate number plays a role in between the finite and infinite.

3. Paradoxes of Cantor's Infinite Sets and Jaina Set Theory

Let us have a look at the paradoxes of Cantor's set theory when it was in its inception. Hausdorff remarks about the work of Cantor, "It is to the undying credit of Georg Cantor that, in the face of conflict, both internal and external against apparent paradoxes, popular prejudices, and philosophical dicta (infinitum actu non datur) there is no actual infinite and even in the face of doubts that had been raised by the very greatest mathematicians, he dared this step into the realm of the infinite". (Set Theory, 1962, New York, p.11). In 1901 Bertrand Russell discovered that a contradiction could be derived from the axiom of abstraction (which was one of the basis of the Cantor's Set Theory). He

considered the set of all things which have the property of not being members of themselves. The paradox can be related through the barber's paradox. There is a barber in a village who shaves all those who do not shave themselves. The problem is as to who shaves the barber. Such a set is contradictory to its very existence. But in the *Jaina Karma* theory the act of indivisible-corresponding-sections of Omniscience could have as its constitutent member as the set itself. In the physical nature of things we have to set a limit even to the measure of the greatest infinite set. The Russell's paradox is called the logical of the mathematical paradox arising from purely mathematical constructions. The barber's paradox may be called the linguistic or the semantical one. Russell's paradox was introduced to show that the obvious, direct axiomatization of intuitive set theory is inconsistent. The set of all things automatically leads to an infinite set and perhaps to the greatest set. Could this set be a member of itself? In the *Jain* theory of *Karma* sets are constructed which have real existence, otherwise the constructs are refuted. Similarly, whenever occasion arises to calculate terms, one gets terms beyond a limit which are avoided as inconsistent. Take for example, the set of the omnisciences of all the accomplished souls. This set will have only one value and that will be the omniscience itself. This solves the Russell's paradox. However, it was unfortunate for the creator of set theory, Georg Cantor, whose foundational edifice fell before him. Attempts to revise the foundations of mathematics were soon at hand and various schools arose in Europe to have the school of logistics, the school of intuitionism, and the school of the formulism.

References for Further Reading

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❑ ***Prof. Laxmi Chandra Jain*** *is a great writer, thinker and Educationalist. Born at* ***Sagar****, M.P. in 1926, he has teaching experience for 33 years. He has done great work in the field of Jain Mathematics and brought out 91 publications. His book "TAO of Jain Sciences" is a significant contribution in this field. He is Hon. Director of Acharya Vidyasagar Research Institute, Jabalpur.*