MATHEMATICAL RESEARCH IN PERSPECTIVE

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Abstract: Mathematics is concerned with shapes of objects, chances of events, arrangements of objects, movements of particles, and numbers of all types. It therefore encompasses almost every branch of human knowledge. Its strong relationship with anthropology has caused its rapid growth into various dimensions. The rate of increase in the volume of mathematical knowledge, the increase in its complexity, and sophistication forced mathematicians to work in specialized areas of their interest. The creation of specializations within mathematics has accelerated to the point where it became necessary to classify these specializations globally and systematically. This article sheds light on the vertical and horizontal immensity of mathematical knowledge. It also describes briefly the reasons for classification and the usefulness of this classification into 85 main branches and 3,625 sub-branches.

Key Words*:* By-symmetry, Discrete, Continuous, Absolute, Relative, Static, Dynamic, Arithmetic, Music, Geometry, Astronomy.

Mathematics is one of the oldest disciplines of knowledge. It is perhaps as old as the concept of by-symmetry. According to H.Weyl, old figures, carvings and drawings in caves depict that the concept of by-symmetry used to exist before the concept of numbers. The concept of numbers was most probably a gradual awareness, which may have developed some 300,000 years ago. Because of its long history, mathematics is rich in substance.

Since mathematics concerns shape, chance, arrangement, movement, and number, it encompasses almost every branch of human knowledge. As civilizations developed mathematics also started growing. The growth was rapid due to its strong relationship to anthropology. Its development was both vertical and horizontal and consequently it had to be split into different groups. I. Stewart says that by Pythagoros' time, mathematics was already divided into ten various sub-disciplines, namely, Discrete, Continuous, Absolute, Relative, Static, Dynamic, Arithmetic, Music, Geometry, and Astronomy.

Knowledge continued growing at a phenomenal pace. According to the experts, the first doubling of knowledge took place in 1750 to be followed by the second doubling in 1900, and a third doubling in 1950. Since 1950, a redoubling of knowledge has been occurring each decade. As knowledge grew manifold, mathematics also grew faster than perhaps its contemporary branches of knowledge. The rate of increase in the volume of mathematical knowledge, the increase in its complexity and sophistication forced mathematicians to work in a specialized area of their interest. The creation of specializations within mathematics has accelerated to the point where it became necessary to classify these specializations globally and systematically. Not only was this inevitable but it has also helped researchers in many ways. Therefore, the result of this remarkably useful endeavour is that mathematics is now classified into 85 main branches and 3,625 sub-branches.

Due to the standardization of subject classification, not only has repetition and plagiarism in mathematical research been minimized but unimportant digressions from mainstream of mathematical research have been curtailed as well. Instances like those of S. Ramanujan reproving one third of the entire Number Theory would not have happened, or the bitterness of national feeling would have been avoided on the issue of G.W. Leibniz being accused of plagiarizing Calculus, I. Newton being attributed as inventing it first; or the complicated and sordid controversy between proponents of whether G.

Cardano betrayed the trust of N.F. Tartaglia might never have occurred, if these renowned mathematicians had access to Mathematical Reviews or Zentralblatt fur Mathematik.

As most people in the mathematical research community are aware, there is a revolution taking place in the way information – in particular mathematical research – is being produced and disseminated throughout the world. Although research in mathematics has become extremely technical, it is ever growing. For the past two hundred years, original mathematical research was disseminated primarily through refereed journals. By one estimate there are now about 40,000 to 47,000 research papers produced every year. This number excludes unrecognized research papers, which are published in some sub-standard obscure mathematical and/or scientific journals.

With the passage of time, it has become impossible to read all papers in one's field of research. Therefore, there was a need to make available short reviews of papers published all over the world so that it can become convenient for the researchers to select papers of their interest for study by reading their reviews first.

In 1931, O. Neugebauer founded Zentralblatt fur Mathematik and later in 1939 O. Neugebauer, J.D. Tamarkin, and O. Veblen founded yet another such journal called Mathematical Reviews. These publications were taken over by Springer-Verlag and the American Mathematical Society respectively. During most of the twentieth century these journals have aided mathematicians in finding and evaluating the exponentially growing amount of research literature.

Mathematical Reviews and Zentralblatt fur Mathematik are the journals of record which review and abstract the published mathematical research literature. Reviewers are assigned from amongst 12,000 mathematicians around the world. Some 40,000 to 47,000 reviews or abstracts are published each year. By one estimate there are about 1,500 mathematical journals written in some 100 languages which contain reviewable research papers. Mathematical Reviews and Zentralblatt f¸r Mathematik are published every month, each issue containing on the average about 3,500 to 3,900 abstracts or reviews. Anyone who looks at a monthly issue of, for instance, Mathematical Reviews, in the early 1940s is immediately stuck by the dramatic difference in size between it and one of the current issues of Mathematical Reviews. Since their founding, these publications have aimed to serve researchers and scholars in the mathematical sciences by providing timely reviews or summaries of articles and books that contain new contributions to mathematical research, and by providing indexes and accurate bibliographic information.

Items in these two publications are classified using the 1991 Mathematics Subject Classification (MSC'91), which can be found in the 1995 Annual Index and on e-MATH. An author 'lookup' feature is available on e-MATH (http://www.ams.org/committee/ publications/author-lookup.html); for a given author name, it provides a list of Mathematical Reviews numbers and Current Mathematical Publications issues for papers since 1941 and 1985 respectively.

Each review of a paper not only highlights the major result(s) in the paper but also provides the following useful information: name of the author (and co-author(s) if any), address, the name of the journal where the research paper has been published, Mathematics Subject Classification Number, Number of reviewed papers so far and sometimes, Reviewer's comments. It also means that the paper is published in one of the 1,500 journals which are considered worth inclusion in the Mathematical Reviews and/or Zentralblatt fur Mathematik.