Mathematics and Philosophy

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Abstract:

As history shows, mathematics at first was a part of philosophy and philosophers used to try to express their ideas by mathematics. Mathematicians always have been faced with two independent categories of questions. Some of these questions were precisely about the mathematics issues and have been discussed inside mathematics and some others were about the whole of mathematics and have had a look to its basics, concepts and reasoning from outside and brought up a lot of general questions about it.

In fact, the first category of questions was about the mathematics and the second one was about the philosophy of mathematics. It’s impossible to answer philosophical questionns just by sense or experience, and it is necessary to think and conclude.

In the present paper, we introduce the most important schools in philosophy of mathematics. Then, we discuss about their strengths or weeknesses, finally, conclude that philosophy of mathematics could change or improve over times, or even go back to its first ideas.

Key words: Philosophy of mathematics, Platonism, logicalism, intuitionalism, realism, formalism.

1. Introduction

“By the Plato era, mathematics has been pushed toward philosophical thinking. Since then, a
A lot of famous philosophers have had at least something to say about mathematics.

This is not for the significance of mathematics on human’s life; agriculture is at least as important as mathematics in every day life but, there is no agricultural philosophy. This framework especially belongs to philosophical issues which attract philosophy attention”. [prof. V.D. Hart]

Philosophy of mathematics is a branch of philosophy that deals with foundations of mathematics existence.

Some of the questions which philosophy of mathematics is to try to answer are as follow as:

1) What is the nature of mathematics?

2) Why is mathematics so successful in explaining the nature?

3) What does the existence or non existence of numbers or other mathematical creatures mean?

4) Do the mathematics shapes happen in our mind or are they real out of our entity?

In responding these questions, different schools and opinions have appeared and in turn, each of them, based on it’s pre-assumptions, has answered some of these questions.

2. Schools of philosophy of mathematics

The main schools of mathematics philosophy are:

2-1 Platonism

As it is clear from the name of this school, it’s points of view are originated from Greek philosopher, Plato. The Platonians believe that mathematical creatures including numbers, geometric shapes, infinite shapes, Hilbert space,… (independent of space, time and our thought), have eternal existence. It means that they have not been created or they don’t disappear, even change into.

For example, number 3, is an odd number, but this is not because we think so, or we accept that, but because it really is.

The mathematician is not an innovator, he just discovers what already exists, by an especial perception process.

Amoung the mathematicians, René Thom and Godel are followers of this school.
2-2 Logicalism

The followers of this school believe that mathematics is a branch of logic. From the point of view of this philosophy, logic becomes the whole of mathematics, instead of being just an instrument for it, and all mathematical concepts should be formulated on logical concepts.

Also, theorems of mathematics should be expressed and proved as theorems of logic. That is, what finally is expressed, just is logic.

Among the founders of this school who we can refer to are Leibnitz, Whitehead, Bertrand Russell and a lot of other mathematicians.

Bertrand Russell

2-3 Intuitionism

The followers of this school believe that mathematical shapes and proofs just exist when can be built from natural numbers, by a determined method and succeedent and finite steps. That is, the infrastructure of mathematics is elementary intuition about natural numbers.

Intuitionism as a school, was claimed by a Dutch mathematician, named Brouwer. But some of its concepts had been expressed before by other mathematicians like Poincare, Kroneker.

This opinion has been remarked within the framework of creatable mathematics. In this school, mathematics is a mental activity which leads to facts discovery. From this point of view, what we can’t approve right or wrong, it is not right neither is wrong.

Michael Damt, and Hermann Weyls are followers of this school.
Formalism

Formalicians believe that there is nothing out of our mind. All mathematical shapes and concepts are made in human’s mind. In this philosophy, mathematics deals with symbolic formal systems. From this point of view, the purpose of mathematics is to create pure form of thoughts, and it should be avoided the function of human’s language, as soon as possible.

They found out that the only method which is to achieve this goal is to apply sign language which is not yet infected by vague notions of space, time and continuity, which their source is nature and taste and complicates pure reasoning. Only, by this way, one can be hopeful that mathematics has been stabled on an strong base of logic.

2-5 Realism

Our intention of realism is viewpoint and opinions of Islamic thinkers, which deal with issues in philosophy of mathematics. This term is from “Principles of philosophy and realism method” (Allame Tabatabae [2]).

In the opinion of this school, mathematics is used in our sciences like physics, chemistry and other knowleges, and is an instrument for them. [4]

In this school, mathematics is a science independent of logic. It can’t say that mathematics is a branch of logic, neither logic is a branch of mathematics.

The relationship between logic and mathematics is for some features such as being symbolic for both of them, not because of their ability of changing into each other.
2-6 Humanism

Recently, an school has been created against traditional philosophical schools which tries to bring mathematics from a whole and unchangeable knowledge frame out and tried to show a different even ontonym picture of mathematics as a historical and social human phenomenon.

This process which it’s innovator is Robin Hirsch, was introduced in early 1980 and considers mathematics as a result of social processes and as a permanently changeable and reviewable science in it’s reasoning and also in it’s concepts.

In fact this school looks at the mathematics as a result of human culture, which has been grown along with the history and time. In their opinion, mathematics is an objective and visual reality which neither is mental nor is material, but it is a non physical reality out of our awareness.

This point of view has suggested in two recent decades, and is in the process of being evaluated and criticized.

Penelope Medi

In recent years, some mathematicians like George Polya and Philip Davis and Penelope Medi associated in developing this school

3. Criticisms to some philosophical schools

Platonian’s philosophy has not any relation to material facts. In this philosophy, mathematics is considered as ideal world which is independent of human’s thoughts, but you can’t hear anything about how mankind can deal with such an abstract world.

A criticism to intuitionism is that intuition of natural numbers is not global. In spite of Kroneker who says “The God created the natural numbers, the rest is human’s work” Piaget believes that “God didn’t have given us the natural numbers, but they are built from proportion and coordination between partiality and sequency in our mind”.

On the other hand, some proofs in classical mathematics are delicate and intelligent and short, but they are not constructable, thus, followers of intuitionism don’t agree with them and instead, they offer another constructable proof which usually is longer, if it would be possible.[3]
The problem in logicalism was that the process for getting theorems from principles was complex and long and boring, and it was not matched with our intuition view of mathematics. Thus, logicalism failed in offering mathematical rules and it’s infrastructural principles. Formalism doesn’t explain how mathematical results are obtained. In this school, mathematicians always know the results, before writing a symbolic proof. Also, Godel’s works, has faced programs of formalism to failure, in proposing mathematics as a whole compatible system.

4. What are the reasons of inattention to mathematical philosophy?

Since no scientific discipline has been involved in genesis of theoretical philosophy, as much as mathematics, there has been created a relation between philosophy and mathematics which is divers and has a long history. Nevertheless, philosophy historians have paid always their best attention to the philosophical issues which deal with theories about existence and spirit or ghost. Recently, some historians have centralized their attention to expressed opinions in other areas like as philosophy of low, philosophy of word,…. There is no doubt that studies such this, is a big step to improve and correct our views and to better reflection of philosophical movements.

In any case, mathematics has received less attention compared with law, linguistics or theosophy. This is because the study of this relations needs abilities and different capability and deep knowledge in this field. Apart from necessary knowledge in linguistics field, one should be expert in history of philosophy and if we notice, can see that these abilities usually don’t gather together and above all, the point that relation between science and philosophy has been regarded with limited optimistic view, shows severe inattention of science historians about such research which we need.[5]

5. Conclusion:

The philosophy of mathematics is to order an systematize unordered data in mathematics, which have been suggested and stocked during the years. According to the used methods, we introduced six important philosophical schools in mathematics, which every one of them has it’s own followers. But philosophy is a function of time, thus, an special philosophy could be abolished or changed after a while, because of new experiences. But as Demolin says “Without mathematics, you cann’t get philosophy, and without philosophy, you cann’t achieve concept and entity of mathematics, too, and without these two, cann’t achieve any fact.”
References