Postmodern View of Humanistic Mathematics

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Abstract

This article is an investigation of humanism in philosophy of mathematics from the point of view of postmodernism. We claim that humanistic mathematics is compatible with postmodernism which is taking over everything we have, do, or wish.

Omar Khayyam, an Iranian mathematician and poet:
A Book of Verses underneath the Bough, A Jug of Wine, a Loaf of Bread-and Thou Beside me singing in the Wilderness- Oh, Wilderness were Paradise now! Ah, make the most of what we yet may spend, before we too into the Dust descend; Dust into Dust, and under Dust to lie, Sans Wine, sans Song, sans Singer, and-sans End!

Core of General Humanism

Humanism is a naturalistic philosophy informed by science, inspired by art, founded on human experience and motivated by compassion. It says that dogmas, ideologies and traditions should be weighed and tested by each individual and not simply accepted on blind faith. Foundations of humanism can be found in the ideas of classical Greek philosophers such as Epicurus and also in Chinese Confucianism. Let's now declare some main principles of humanism which are consistent with postmodern ideas:

- **Humanism is a philosophy of those in love with life. Humanism is a philosophy for the here and now and affirms that human beings have the right to give meaning to their own lives.**
- **Humanism believes that human beings possess the power or potentiality of solving their own problems by means of critical thinking applied with courage and vision.**
- **Humanism believes in the unending questioning of basic assumptions and convictions. Humanism is not a new dogma. For humanists there is no area of thought that is not to be explored, questioned, or doubted.**
- **Humanists don't believe the final absolute truth has been revealed to them. On the contrary, they believe that all beliefs are fallible and provisional, and that diversity and dialogue are essential to the process of learning and developing. Thus they value tolerance, pluralism, and open-mindedness as positive and beneficial qualities in society.**
- **Humanists recognize that intuitive feelings, speculation, flashes of inspiration, emotion, altered states of consciousness remain useful sources of ideas that can lead us to new ways of looking at the world.**

Humanistic Mathematics

Since Pythagoras up to the modern era, mathematics have been regarded as a single inseparable whole (the unity of mathematics), always the same (universality of mathematics), independent of context or epistemology (objectivity of mathematics), and is the paradigm of absolute, perfect, indubitable, and precise knowledge. For instance, for over 2000 years Euclid's Elements was taken as an absolute truth. Also traditional philosophies of mathematics, i.e. logicism (regarding mathematics as a branch of logic), formalism (viewing mathematics as a game without content) and intuitionism (considering mathematics as a mental activity based on our intuitions of natural numbers), have tried to establish the certainty of mathematical truth [MOS3]. However, Philip J. Davis, Reuben Hersh, Imre Lakatos, Philip Kitcher, Paul Ernest and Tom Tymoczko and some other philosophers challenged the paradigm of absolute truth.

Humanism as a school in philosophy of mathematics was introduced by Reuben Hersh in about 1979 [HER1]. According to Hersh, a world of ideas so-called social-cultural-historical exists which is created by human beings as part of their shared consciousness, and that mathematical reality is neither mental nor physical [HER2]. Once created, these objects have properties which are determined and we may however have difficulty in discovering their properties. The mathematical entities have no sense or existence beyond their cultural meanings. These objects are derived from the needs of science, experience, societal problems and especially technology, and in brief, everyday life. Mathematical theories are accepted for social reasons rather than because they are in any objective sense "true".

Mathematics is like law, like money, like religion and like all those other things which are very real, but only as part of collective human consciousness, so there's no mathematics without human beings [BRO].

Abstract ideas do not drop from Heaven, rather considered as a human endeavor. Mathematical knowledge cannot be given a final, fully rigorous form. In fact what separates formal from informal mathematics is only their degree of rigor and formality. Mathematics is infallibility, since mathematicians makes mistakes; is not unique, because there are different approaches to investigate the same thing; is not certain because of a lack of rigor practiced by many mathematicians. Mathematics constructed, not discovered; and is contextual not foundational. Humanist philosophy is educationally beneficial, since it is about and a part of our life; it is alive, growing and accessible; and everybody could learn and like it. ([D&H] , [D&C]). Moreover, applications of mathematical knowledge to empirical sciences can be fruitful in humanism. Also, as noted by Lakatos, mathematics is developed through the application of methodologies within rational research programs [LAK].

Humanistic mathematics attempts to explore the human side of mathematical thought and to guide students through mathematical ideas by the use of imagery, history, internet and computer tools to discover the beauty of mathematics [WHI].

This school is clearly consistent to general humanism described above. In my view, Hersh's views are compatible with postmodernism.

Postmodernism

Postmodernism is a recent movement and a reaction to modernism. Some of main components of modernism are rationalism (the belief in knowledge through reason), empiricism (the belief in knowledge through of the scientific method) and materialism (the belief in a purely physical universe).

Postmodernism has such features as the tolerance of ambiguity and disorder, stressing on skepticism and nihilism, the mixing of styles and manners, rejection of ultimate reality and absolute truth, lack of determinism and dogmatism. It emphasizes negative critical capacity and looks for such oppositions as good-bad, truth-fiction and science-myth. It is a refusal of any base for moral and of any already given meaning in the universe and a reaction against any naive confidence in progress.

Postmodernism resists the knowledge based on rationality, objectivity and the thought (based on what is true, good or beautiful). In postmodernism knowledge has an essentially pluralistic character in the sense that diversity, divergence, contradictory, and incommensurable interpretations contest each other without canceling each other out. In postmodernism, intellect, morality and reason are replaced by will, relativism and emotion respectively.

"The movement by which, not without effort and uncertainty, dreams and illusion, one detaches oneself from what is accepted as true and seeks other rules -- that is philosophy. The displacement and transformation of frameworks of thinking, the changing of received values and all the work that has been done to think otherwise, to do something else, to become other than what one is -- that too is philosophy.... It is understandable that some people should weep over the present void and hanker instead, in the world of ideas, after a little monarchy. But those who for once in their lives have found a new tone, a new way of looking, a new way of doing, those people, I believe, will never feel the need to lament that the world is error, that history is filled with people of no consequence, and that it is time for others to keep quiet so that at last the sound of their disapproval may be heard." **[FOU, P. 330]**

Postmodern Mathematics

Art, architecture, music, film, literature, sociology, communications, fashion, science, technology, philosophy, and also Mathematics are influenced by postmodernism in recent era.

In postmodernism, mathematics has turned from abstraction to representation and from control to indeterminacy. Also mathematics absolutism is being deconstructed and certainty becomes an unattainable idea. It emphasized upon experimental mathematics, nonlinear systems (which are governed by a set of

simple rules that, through feedback and related effects, give rise to complicated phenomena), Chaos theory (in which there are no natural or god-given centers, and describes unpredictable systems and irregular and highly complex structures in time and in space) and discontinuity.

The other important characteristics of the postmodern mathematics are the following:

- **Postmodern mathematics is free from any dependence on the concept of absolute truth and ultimate reality [MOS2]. We want to move beyond the "modernist" knowledge such as Newtonian and Cartesian sciences which seek to represent nature as a reflection in a "mirror". Postmodernism says that knowledge is neither eternal nor universal. It is a representation which is not truer than the other representations. The concepts, theories and methods through which we describe the world are socially constructed, and they are accepted for social reasons rather than because they are in any objective sense true.**

- **For postmodernists, as noted by Feyerabend [FEY], there is hardly any difference between science and magic. Postmodernism considers all types of knowledge with equal skepticism and believes that science is predicated on faith and may be regarded as a religion.**

- **Postmodern mathematics respects contradictions and paradoxes. It sees a mix of order and disorder, cause and effect, certainty and probability, control and creativity in every system. In particular order is no longer a base for knowledge and disorder is no longer an enemy to truth.[LYO]**

- **Computers are transforming the way mathematicians discover and prove ideas. Instigators have proposed a computational proof that offers only the probability, not the certainty, of truth. Computational experiments can yield more results than the old-fashioned conjecture-proof method.**

- **In modern science one must use the rules of logic put forth by Aristotle. He taught that a thing was either true or false, and not both. Postmodernism emphasizes fuzzy logic as an approach to decision based on "degrees of truth" rather than the usual "true-false". Fuzzy theory resembles human reasoning in its use of approximate information and partial truth. Hence it is ideal for controlling nonlinear systems and for modeling complex systems where ambiguity and uncertainty is common.**

In a postmodern society, knowledge is characterized by its utility and becomes functional i.e. you learn things, not to know them, but to use that knowledge. In a postmodern perspective, we say that chaos, graphics, intuitive explanations, metaphors, computer investigations, iterative and recursive procedures are all important and should be included in a postmodern reconceptualization of the mathematics curriculum. [MOS1]

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