The Pythagorean Contribution to Contemporary Thought

Richard Bloodworth

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Georgia State University

Dr. Almeder

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Science began with Pythagoreanism. The secretive sect "worshiped" the concept of numbers and believed that the universe is ultimately describable in mathematical terms. Pythagoras, a Greek philosopher (569-668 B.C.) and father of the exact sciences and founder of the group, combined mysticism and mathematics in the formulation of his philosophical system which stressed the study of the unchangeable elements in nature and society.

The basic tenets of Pythagoreanism included the following beliefs: 1) reality is mathematically describable, 2) the practice of philosophy can cleanse the soul, 3) the soul has potential to transcend the earthly plane and unite with the ideal, 4) the use of symbols and the concept of the harmony of the spheres, or the cosmos, 5) the Pythagorean theorem 6) the observance of secrecy concerning proceedings and loyalty to the sect. This paper will concentrate on the mathematical aspect of Pythagoreanism.

Pythagoreanism preceded most of the major philosophical movements and its influence is evident in their doctrines. The Platonic contemplation of the forms is borrowed from the Pythagorean idea of transcendence through mathematical or philosophical thought or speculation. The mystic, irrational, or artistic side of Pythagoreanism complements the factual, rational, or scientific side, combining and uniting the opposites. Intuition and observation, the beginning of the scientific method of hypothesis, experimentation, and observation of results, can be traced in origin to Pythagoreanism. Copernicus acknowledged his debt to Pythagoreanism in his development of the heliocentric model of the solar system which had its origin in Pythagorean thought and Galileo was considered was considered a Pythagorean. The interrelationship of subjectivity and objectivity used in determining the basic cosmic substance(s) and their doctrine of opposites helped form their and our view of the world. They were also among the first thinkers to think of the Earth as spherical.

Religious or unscientific concepts such as the transmigration of the soul figured in their belief system at he mystic end of their spectrum of beliefs balancing against the arithmetic calculation at the other end of the spectrum. Rationalism and irrationalism, the scientific and the mystical, and the

humanist subjective side combined with the analytic objective side of the yin and yang life of reality all combine to form the components of Pythagoreanism.

Since we live in a regulated, ordered, numbered world we owe much of our intellectual and cultural heritage to the beliefs of the Pythagoreans and their view of a mathematically describable universe suggesting the idea of an ordered cosmos. "In any particular theory there is only as much real science as there is mathematics" (Morris Kline quoting Immanuel Kant *Mathematics: the Loss of Certainty*; New York; Oxford University Press, 1980, p.50). That the universe and its contents is measurable is the basis of the exact sciences and the parent or them all is mathematics, the Platonic and Euclidean contemplation of pure forms. The Ionian doctrine of the opposites encompasses the entirety of life and arithmetically includes the concept of positive and negative numbers. The Pythagorean idea of the limited and the unlimited is a precursor to Isaac Newton's calculus and is represented by odd and even numbers respectively. Arithmetic, geometry, music theory, physics, and astronomy all grew from the seeds planted by the Pythagoreans. Architects, Leon Battista Alberti specifically, expressed their debt to and gratitude of the geometric concepts of the Pythagoreans. Our dependence on computers, accounting procedures, and economic theory from capitalism to Marxism all rely on our knowledge of mathematical systems, mathematics being the most fundamental branch of human knowledge.

Pythagoreanism, although it is based on abstract numerical and spiritual concepts, began as a fraternal order, a secret sect of strictly observed organizational rules similar to a monastery. Like the doctrines of Socrates, Pythagoras' information was transmitted orally and one source said he forbade his followers from writing thoughts (calling to mind Great Britain's unwritten constitution). Pythagoras, who was born in Samos in 569 B.C., studied cosmography, physics, mathematics, and philosophy from Anaximander and Thales (who was 90 years at the time) and refined and modified their concepts and also lived in Egypt for 21 years. He excelled in philosophy, mysticism, geometry, musical composition, and astronomy and was considered by many to be the Newton and Galileo of his era. One of his students who was expelled from his academy for being unworthy later gained control of the democratic party in Kroton where the school was located and

through political maneuvering caused the dissolution of Pythagoras' organization. Pythagoras was exiled to Tarentum where he lived for another sixteen years. He was again exiled at 95 years of age.

After the death of the mystic, scientist, and aristocratic statesman (Pythagoras), Archytas of Tarentum, who lived around 400 B.C., took over the helm of the Pythagorean school. He was a contemporary of Plato and is credited with dividing numbers into odd, even, even times odd, odd times odd, prime and composite, perfect, friendly, linear, triangular, etc. A point was "unity in position" which brings to mind the concept of singularity of astronomy's Big Bang theory of cosmological beginnings. Like the Platonists, of whom they were contemporaries, they separated the world of ideas from the world of material objects.

The mystic side of Pythagoreanism arose from the fact that the "school" began as a religious brotherhood. Like the Orphic counterpart that attempts to purify the soul of the believer in order for him to escape the "wheel of birth" and the cycle of the transmigration of the soul. Pythagoras predated the Socratic tradition that existing objects were form and not matter. Pythagoreanism believed contemplation of the sublime could lift the soul above the mundane. The religious concepts were eventually dominated by mathematical principles which is a trend that is occurring even today since science is, in effect, becoming the new religion. Even though nature has many "magical" or, to us, mystical processes that science cannot yet explain, the belief of the believers in the immutability of science is that all processes are eventually and ultimately knowable and measurable.

Even though we are currently questioning the axiomatic-deductive method of proving mathematical theorems primarily because the premise is fabricated or created, without the language of mathematics our perception of the world would be total chaos.

In today's world of computers, accounting, population censuses, numbering of citizens and products, charting, mapping, cataloging, filing, calculation, economics, account numbers, codes, telephone numbers, and numerical systems, it is absolutely essential to have mathematical systems to describe them. Economics is simply a method of imposing some order on the seemingly random transactions that occur during the trading of goods and services. All philosophies from those initiated by Socrates, Plato, and Aristotle as well as religious movements including Christianity to

Existentialism are in some way derived from Pythagorean origins. The thinkers/philosophers/mathematicians Euclid (300 B.C.), Archimedes, Ptolemy, Copernicus, Kepler, Galileo, Leonardo, Descartes, Huygens, Pascal, Newton (1642-1727), Leibniz, Kant, Euler, LaGrange, Gauss, Poincare, and Einstein, among others all were directly or indirectly influenced by the teachings of Pythagoras, who, it should be mentioned, got some of his mathematical thought from Egyptian and Oriental sources. On the mystical side of Pythagoreanism, the transmigration of souls could be interpreted as the transmission of knowledge through culture or the written word. The idea of the "kinship of all beings" could take the form of the idea of the evolution of the species. The transmigration of souls could also refer to genetically transferred information.

Since everything is number and therefore is in some way measurable, mathematics must be the purest (the closest to the Platonic forms) and therefore the most prevailing science of all the sciences. Anytime we are creating something new we are touching the mystic side of Pythagoreanism; anytime we are placing order and form on our existence and our interpretation of life processes we are expressing our debt to the contribution of the mathematical thought of Pythagoras.

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