

Transition from Quality to Quantity in Descartes' Philosophy

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Abstract: According to Aristotelian (scholastic) philosophy, entities and objects are categorized under the ten predicaments (*categories*) and of these predicaments only *quantity* is measurable and has order; thus, qualitative approach has been governing entities and realities. Descartes rejected this theory and presented a quantitative approach instead. In order to prove his theory, he founded a universal science called *universal mathematics*. The present article aims to specify the aspects of this transition from quality to quantity in Descartes' philosophy.

Key words: Descartes, Universal Mathematics, Quantity, Quality.

INTRODUCTION

All possible entities, which are either substances or accidents, are categorized under ten predicaments. To discuss the nature of dividing the being into either substance or accident, we can say that possible entities are of two types; one type is present in another object and that is accident; the other part is not present in another object, which is substance. Thus, accident is in the subject, but substance is a being that is not in a subject. Dividing possible entities into substance or accident is based on exhaustive and exclusive division since it is a kind of dichotomous division.

According to Aristotelian philosophy, some entities and objects are categorized under the predicament of substance, some under the predicament of quantity, some under the predicament of quality and likewise all other entities and matters are classified under one of the ten predicaments or categories. Entities classified under the predicament of quantity are measurable and have order, while entities that are classified under other predicaments including quality are not measurable, nor do they have any order.

In Aristotelian scholastic philosophy, those entities that are categorized under the predicament of quantity are measurable and have order and the other nine predicaments lack the foresaid characteristics. Thus, in the view of the scholastic philosophy, qualitative approach dominates entities.

Descartes regarded the Aristotelian Scholastic qualitative approach to objects and entities as void and believed that order and quantity are the basis of entities and realities and that everything is measurable or possesses order and precedence. Therefore, the transition from Aristotelian qualitative approach to realities to a quantitative approach is one of Descartes' initiatives. Regarding the roots of quantitative and qualitative approach to realities:

"In modern philosophy, two schools of thought have Cartesian roots and are very important: first, quantitative models instead of qualitative ones; second, *infinite reflection* whose historical root goes back to Socrates".

Therefore, until the time of Descartes, Aristotelian theory dominated thoughts and it was originally Descartes who disproved of the qualitative theory and emphasized on the quantitative one; and it was this quantitative approach toward realities and mathematizing everything in its true Cartesian sense that led to advancement of science in all its fields. Therefore, for Descartes, "all qualitative differences of objects were regarded as quantitative and mathematics was the key to all the problems in the world".

The Impact of Quantitative Theory:

Descartes' quantitative approach toward realities, contrary to qualitative theory, had a profound and tremendous impact on science and philosophy afterwards; it led to such evolution and revolution in modern sciences that all fields, even criminology in law and legal science and human's psychological behavior in psychology was researched, surveyed, and studied using statistical methods and measurement techniques. Therefore, we can say that quantitative approach toward realities and turning away from qualitative approach, led to a tremendous revolution in Western culture and civilization and allowed for advancement of Western World in industry, technology and other fields.

Introducing Universal Mathematics and its Denomination:

At the time of Descartes, many scientists had become absolute philosophical skeptics and stated that we cannot be certain of anything. Descartes did not believe in this notion and wanted to include certainty in science and philosophy. Thus, he tried to integrate philosophy and all human knowledge using a special method and tried to establish it in a way to be completely exact like mathematics". Thus, after introducing the theory of existence of order and magnitude in all the realities and matters of the universe and by transforming the Aristotelian scholastic qualitative theory to quantitative theory, Descartes founded a new science called universal mathematics or general mathematics. Now the question is why Descartes has named this science general or universal mathematics.

The answer is that on one hand, Descartes regards natural sciences as a part of mathematics or mathematical sciences and on the other hand, he generalizes and extends analytic geometry to all the areas and aspects of human life and knowledge, and confesses that "a day will come when science will be a kind of universal and general mathematics, that is, all matters that are subject of other sciences will be transformed to quantity and like in mathematics, we will be able to solve all problems with the help of some certain principles and deduce one from the other". As in the roots of the tree of knowledge, that is metaphysics, he discovers the first certain principle of philosophy which is cogito (I think, therefore I am) using *methodic doubt*; then from that primary principle, step by step, other principles will be discovered with a special order and sequence.

The Mathematical Method:

From Descartes' perspective, all sciences and forms of knowledge have intrinsic and abstract relationship with one another and they are all as a tree whose components are united and related, or as members of a body that have exact and necessary relationship with one another. Thus, if a member becomes afflicted with a disease, other members will be affected or afflicted too; therefore, selective and individual acquisition of a specific science is not valid and they all must be learned together or along one another. The question is: what is the method through which we can study and investigate all sciences?

In Descartes opinion, the only authentic and permissible way of acquiring all sciences and studying all forms of knowledge is the mathematical method, since in all branches of science, even in humanities like law or psychology, there is order and magnitude and mathematics merely deals with order and magnitude. Therefore all sciences are subject of mathematics. "All sciences are as members of a body. They must be learned together though a method that is associable to all and nothing but the mathematical method can be the answer; for in all sciences, what is grasped are the order and magnitude of phenomena and it is mathematics that always deals with order and magnitude".

Thus, in universal mathematics that Descartes seeks to establish, everything, including humanities and natural sciences, is specified based on order and magnitude; for in human universe and in natural world, everything has the two properties of order and magnitude, but some realities have both these characteristics and some others only have order and lack quantity and magnitude. Material realities are of matters that have both order and magnitude, that is, they both have order or precedence as well as quantity, magnitude, or excess and want; while immaterial and abstract realities are of matters that only have order and lack magnitude and quantity.

Therefore, since all realities somehow possess the two properties of order and magnitude, there must be a universal knowledge and a general science to study, survey, and investigate all realities, objects, and matters and the only science that can investigate all sciences or encompass all of them is universal mathematics.

How Universal or General Mathematics Was Developed:

In Descartes' opinion, all sciences are interrelated; all have order and magnitude and the only way to study them is through mathematics. Thus, all sciences must be encompassed within universal mathematics. The question is how Descartes arrives at universal mathematics theory and discovers or develops it.

Initially, Descartes was preoccupied with investigation, study, and survey of minor sciences such as astronomy, medicine and such, as well as research and study of two branches of mathematics; that is, arithmetic which deals with numbers or discrete quantity and geometry which deals with shapes or continuous quantity. But during his investigation or afterwards, he posed the question why sciences like astronomy, music, optics, perspective, mechanics or other sciences that are related to mathematics are branches of mathematics and not physics. After his study and investigation of the subjects of all sciences and forms of knowledge, Descartes discovered that besides their special characteristics, there is also magnitude and order in all these sciences; that is, all knowledge are common in having order and magnitude.

Likewise, after study and investigation of other branches of the tree of knowledge and philosophy, he discovered that the subject of all minor sciences have both order and magnitude or merely one of these two properties and since magnitude and order are the subjects of mathematics, it is concluded that all sciences are subsections of mathematics; of course not the kind of mathematics that only deals with numbers and shapes, which are arithmetic and geometry, but universal mathematics whose subject is magnitude and order.

Therefore, in Descartes' view, all sciences and knowledge must be subjects of mathematics, for mathematics is the only science that plays a key role in everything, evening non-empirical sciences like humanities. According to Galileo, we can write the language of nature with mathematical alphabet; thus, in all the areas of natural sciences that investigate the natural world, as well as in humanities that deal with the human world, we can apply the mathematical method and acquire knowledge about nature and humanity.

Therefore in Descartes' opinion, the essence of science is reason, all sciences are interrelated, and there is only one way to acquire all of them; thus, they all have one research method and that is the mathematical method. "For Descartes, all sciences are interrelated and different sciences are in fact one science because human science and knowledge has no place but in human reason. There is only one way to acquire all of them and that is the mathematical method. He called this method "universal mathematics". Of course the denomination "universal mathematics" does not suggest that mathematics is the only science, rather it suggests that for solving the problems of different sciences we must use the mathematical method; for "he claimed that we can apply mathematical method in all sciences, such as biology, medicine, metaphysics, and ethics". Thus, "Descartes was a philosopher and a mathematician. He was vehemently mesmerized by mathematics and was amazed why mathematics is only serving mechanical sciences. Why should we not found a worthier structure upon it? We can say that Descartes aimed to mathematize philosophy".

Descartes' Intention Behind Introducing Quantitative Model and Mathematical Method:

Descartes is on one hand a rationalist philosopher, for he believes that the origin of science and knowledge is in human ration and reason whose first certain and unquestionable principle, that is *cogito*, is discovered through methodic doubt (or methodological doubt); on the other hand, he believes that mathematics is an exact science and the knowledge it yields is essential; thus, he came to the idea that in order to acquire sciences, not only should we apply the mathematical method, but the only way to acquire sciences is through the mathematical method. Therefore, "the objective of Descartes was to rationalize human knowledge and science and to acquire exact knowledge. Since Descartes had a firm belief in exactness of mathematics and regarded it as the pinnacle of human knowledge, he believed that knowledge obtained from it is essential and thought that in order to acquire new knowledge, we have to follow mathematicians. For Descartes, having correct procedures and rudiments will bring us certainty and absolute knowledge. Based on this, in Descartes' philosophy, we have to consider mathematics as a method in order to clarify the spirit of knowledge.

By presenting the quantitative model and establishing universal mathematics, Descartes' did not intend to transform all sciences into mathematic; rather contrarily he intended to say that all sciences and knowledge have either order and magnitude or only order and these two characteristics lead to unity, interrelation, and cohesion of different sciences and forms of knowledge; so each of the minor sciences and specific forms of knowledge constitute components of the tree of science and philosophy and all are acquired along or in line with one another in order to attain a common objective.

Therefore in the tree of knowledge, each of the minor sciences has two characteristics in common with other sciences which are order and magnitude; however, metaphysics does not have material or physical subject and thus lacks the characteristic of magnitude or quantity. Yet, natural sciences and its branches such as medicine, mechanics, and ethics possess both characteristics. Thus, we can say that "Descartes, using ingenuity of mathematics and its clarity and distinctness, made metaphysics subordinate of mathematical knowledge".

Therefore, Descartes intended to unify sciences and establish a universal science and found it only in universal mathematics. For him, universal mathematics is a science that can encompass all minor sciences and forms of knowledge. In order to specify universal mathematics, he resorts to the parable of tree of science and philosophy or the tree of knowledge.

The tree of knowledge, like a natural tree, is a connected, unified, and coherent unit whose components are related and unified with two common characteristics of order and magnitude; that is, all parts of the tree of knowledge can become related and unified through these two characteristics. But the root of this tree, due to its abstraction, can only become interrelated with the trunk which is natural sciences, and the branches, that are medicine, mechanics, and ethics through the characteristic of order.

Conclusion:

Descartes' quantitative approach to realities had a profound and tremendous effect on science and philosophy after him. At the time of Descartes, when many scientists had become absolute philosophical skeptics, he tried to incorporate certainty in science and philosophy; thus, he decided to found human knowledge and philosophy in a way to be exact as mathematics. In his opinion, all sciences and forms of knowledge are parts of mathematics, but not specific mathematics which merely deals with numbers and shapes; rather universal mathematics whose subject is order and magnitude. In Descartes' view, the origin of all sciences is reason; all sciences are interrelated and there is only one way to acquire all of them and that is through the mathematical method.

REFERENCES

- Burt, A.E., 1990. "The Metaphysical Foundations of Modern Physical Science"; Translated by Soroush AK, Scientific and Cultural Publications and Cultural Studies and Research Organization, 1st edition, Tehran.
- Book of the Month Monthly (Literature and Philosophy); Editor in Chief: Masjedjamei A; Concessionaire: Iran Book House (included in Namaye Software)
- Descartes, R. 1997. "Principles of Philosophy"; Translated by Sanei M, Al-Hoda International Publications, 1st edition, Tehran.
- Foroughi, M.A., 1982. "History of Western Philosophy", Safi-Alisha Publications, Tehran.
- Gilson, É., 1981. "The Unity of Philosophical Experience"; Translated by Ahmadi A, Hekmat Publications, 3rd edition, Tehran.
- Lavine, T.Z., 2005. "From Socrates to Sartre: The Philosophic Quest"; Translated by Babae P, Negah Publications, 2nd edition, Tehran.
- Noori, N, 1996. "Methodology of Sciences", 1st edition, Zohre Publications.
- Rahmani, Gh, 2002. "A Comparative Study of Aristotle's Ontology", 1st edition, Boostane Ketab, Qom.
- Saliba, J., 1987. "Philosophical Culture"; Translated by Sanei M, Hekmat Publications, 1st edition, Tehran (included in Islamic Philosophy Library Software).
- "The Philosophical Writings of Descartes", 1985. Cambridge University Press, first published in 1985
- www.forum.parsigold.com
- www.farsnews.com
- www.saayeh.mihanblog.com