



The construction of the scientific method and the influence of philosophy

 [10.56238/homeinternationalanais-019](https://doi.org/10.56238/homeinternationalanais-019)

Alexander Diniz Breder

Military Fire Department of the State of Rio de Janeiro (CBMERJ)

Ariel Alegre Cruz Ludiosar

Military Fire Department of the State of Rio de Janeiro (CBMERJ)

Valério Vieira Chaves

Military Fire Department of the State of Rio de Janeiro (CBMERJ)

Bismarck de Luna Cavalcanti

Military Fire Department of the State of Rio de Janeiro (CBMERJ)

Alexsander Pereira Silva

Military Fire Department of the State of Rio de Janeiro (CBMERJ)

Keywords: Scientific Method, Philosophy, Thinkers.

1 INTRODUCTION

Scientific knowledge is the basis for any experiment and which must be based on a methodological process, which uses scientific materials and methods to determine the cause and effect of a given object of investigation, this method must meet some requirements among them the possibility of replication of the method and the possibility of being testable, rebuttable and fallible. These concepts have deepened over time and one of their foundations is in philosophy, which is extremely complex and comprehensive.

The term philosophy was coined by the Greeks, however when trying to explain we must be careful to understand that its definition has different meanings and is dependent on time and place, some philosophers understand philosophy as the foundation of the particular sciences, while others expand this concept and also define it as the science of spirits (human science) or science of inner experience, also understood as the science of valid universal values. (DILTHEY APUD CASANOVA, 2014).

Because of the breadth, it is impossible to explain philosophy concerning the construction of scientific knowledge in this work. This expanded abstract aims to mention the role of the following philosophers in the construction of scientific knowledge as we now understand it: Aristotle; Galileo Di Vincenzo Bonaulti of Galilei; Francis Bacon; René Descartes; Karl Raimund Popper; Gaston Bachelard.

2 METHODOLOGY

The method used in the construction of this study was qualitative research. "Qualitative methods are those in which the interpretation by the researcher with his/her opinions on the phenomenon under study is important (PEREIRA et al, 2018). "



We used the Narrative Review of literature, which is a broad production on a given subject that uses the theoretical or conceptual point of view of the author (Rother, 2007). These texts constitute the analysis of scientific literature in the interpretation and critical analysis of the author (COSTA et al, 2015).

Of an explanatory nature, which aims to identify determining factors or contributors for events to occur, deepening, in reality, to explain why things or reason (KAUARK, 2010).

3 DISCUSSION

The thinkers began to deviate from the thoughts derived from common sense and vulgar knowledge, seeking the protection of logic and subject aiming at improvement, emerging philosophy. (SILVA, 2006).

Also according to SILVA, 2006 p.3

Philosophy in the historical sense arises first than science but never ceased to be knowledge. Philosophy is the alpha and omega of science. That is, all science began in philosophy, and all the science that craves perfection ends in it. Science needs philosophy and philosophy will never cease to be a science because it never ceases to be knowledge. (SILVA, 2006, p. 3).

Aristotle was the creator of the scientific method, developing proposals on how to investigate the nature and reality of things, with numerous contributions to science and aspects valid today, however, limited by the lack of technological development of his time, he developed the exercise of empiricism by the inductive method, demonstrating general truths as particular phenomena. With the deductive method, he proposed the reverse, going from particular to general phenomena, passing through so-called syllogisms, thus combining two premises leading to a conclusion. His main contribution to the scientific method was observed in the studies of any science, opposing speculation and subjectivity, using reasoning to formulate premises, and referring to scientific research as a method of science or experimental scientific method, thus establishing a relationship between philosophy and science, connected to the search for truth and fruit of logic applied to science (FRÍAS, 2020).

For SILVA, 2006 there is a difference between philosophy and science, being specific science and multidisciplinary philosophy, so philosophy uses all methods and studies all objects, however, science has a specific method, with the creation of the method that there was the separation of philosophy and science, the other being from the method galileo Galilei (1564-1642), using it in research to prove his ideas (SILVA, 2006).

Galileo Galilei was cited as the "father" of modern science. His contributions range from the creation of the scientific method to the development of instrumentation, through fantastic discoveries and the popularization of knowledge. He also used a working methodology, which involved systematic experimentation, because he established the need to test his hypotheses and confirm them with knowledge, changed the way knowledge is produced, and allowed scientists to evolve to be the powerful force it is today (SUPER ABRIL; 2019).



Karl Popper, who is recognized for his theory of conjecture and refutations, sustaining himself in absolute reality, states that scientific status is determined by his ability to be refuted by empiricism, with direct contact with the real world, so science only progresses when these tests are reproduced, that is, direct contact with reality. Popper is based on Aristotelian logic, assuming that reality based on science is static, stating that "what is real is always real and only real." What is not real, has never been and will never be real" (ARCANJO, 2017).

Bachelard states that scientific knowledge is the reformed illusion, and this is the first contact with the world, sensitive contact, and it is necessary to move away from common sense to build scientific knowledge. It is a theory not based on Aristotelian logic, assuming then that science is dynamic and stating that what is proposed as truth, can at some point be refuted, "so what it is, it is not always", being the world formed by lenses, and the lens of the scientist is based on a rational theory (ARCANJO, 2017); also according to Bachelard is not contemplating, but building, creating, producing, rectifying, that the spirit comes to the truth. It is by continuous rectifications, criticism, by polemics, that Reason discovers and makes the truth (PORTELA FILHO, R.N.A., 2010).

Francis Bacon held public office, yet never left intellectual life, he believed that a revolution was needed in scientific methods of research, the thought of his time, in the system of science and logic (GALVÃO, 2007).

Bacon has an inductive approach, which begins with observable situations and then leads to reasoning with affirmations and laws, requiring verification of specific situations before a trial. (OZMON; CRAVER, 2004, p. 67 apud GALVÃO, 2007), "The induction process aims, above all, to establish the cause of natural phenomena, emphasizing the need for theories to be verified through their results." (GALVÃO, 2007).

For Francis Bacon (Positivist) it is not applicable in all areas of knowledge, it uses empirical methods and logical methods, and the most important is that it is constantly evolving and not being universally accepted.

René Descartes, on the other hand, had no interest in social and political changes, being different from Francis Bacon also at this point. There is a big difference between Francis Bacon who uses the empirical method and René Descartes who used the rationalist method. (GALVÃO, 2007). For Descartes, "Knowledge must be an instrument to dominate nature and put it at the service of humanity (TONET, 2013)", thus breaking with the philosophical and theological movement of scholastics, founding the very system of thought, based on the subject and not on the outside world, cartesian philosophy defended the thesis of innate ideas (Silva, 2018).

According to SILVA, 2018 apud RUSSELL, 2004, p. 319

"[...] the general concepts, as extension and movement, meaning independent of the senses, represent for Descartes innate ideas, genuine knowledge is composed of these primary qualities" (SILVA, 2018 apud RUSSELL, 2004, p. 319).



Renê Descartes founded modern rationalism, basing his philosophy on a mechanistic and materialistic interpretation of the universe, based on human thought and reason, making theological conceptions obsolete, thus reflecting on modern science, scientific discoveries, and political and economic transformations of society (Silva, 2018). Renê Descartes used science and mathematics to explain the events of the world, and from there he elaborates theses that contributed to the formation of modern science; he also tries to demystify reason and reflect on it, making clear the full reach of all men of this who use scientific methods.

4 FINAL CONSIDERATIONS

It is considered that the objective of the work was achieved, because the researched literature brought information about the role of philosophers, Aristotle; Galileo Di Vincenzo Bonauti of Galilei; Francis Bacon; René Descartes; Karl Raimund Popper, and Gaston Bachelard for the construction of scientific knowledge. The scientific method has undergone several changes and visions of various philosophers, not only those who have been mentioned here, however, what can be observed is that science remains in a kinetic state.

It can be observed that there are controversies about the emergence of the scientific method and who created it, however, since the focus of this work is not to discuss this subject in depth, we advise that this nuance be further discussed in future works.



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