

# Chapter 246

## Aristotle's cosmology and the modern turn with newton and descartes



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### ABSTRACT

This text aims to highlight the foundations of the construction of ancient cosmology and also the modern cosmological "turn" from the physics of Kepler. Galileo and Newton and the philosophy of Descartes. Firstly, » e tried to rescue moi» Aristotle's epistemological project. Which is a continuity and a break with Plato, formed the metaphysical basis for a later cosmology of the ancient Greek world. To

understand nature one must first understand the assumptions of the given definition. To understand, one must understand that change is the realization of what the object is subjected to, the realization of a possibility. Things that have the power to generate motion are natural and have substance. In addition to the Modern Age, Neionian physics and Cartesian philosophy provide the framework for a new cosmological conception coining from Aristotle. The Cosmology of Modernity.

**Keywords:** Cosmology, Antiquity, Modernity.

### 1 INTRODUCTION

This research aimed to investigate the construction of ancient cosmology and also the modern cosmological "turn" based on the physics of Kepler. Galileo and Newton and the philosophy of Descartes. Firstly, e tried to rescue Aristotle's epistemological project, which is a continuity and a break with Plato. Started the metaphysical basis for a later cosmology of the ancient Greek world. To this end, the investigation fell on the Categories and Book 1 of the S4etaplyysics. where the philosopher systematizes previous philosophies, which lie considers insufficient for an explanation of the nature of things and the cosmos. The investigation fell on Books 1 and 2 of Physics. where the foundations of Plus cosmology are found.

Later on, the investigation turned to Newtonian physics and Cartesian philosophy, which marks a new cosmology in modernity. For Aristotle, the whole is best perceived through the senses. It is through analysis that the particulars are obtained. Starting from the general and making the various definitions of the general is natural, psychological process. The general theory of categories must be used to understand the change in nature. Deductive ar benefit is embedded In a given discursive system since all kilo lledge presupposes something kilo n. To be recognized. To Aristotle (2015"), unlike Plato. A cognition discursive system must be assumed, here assumptions are taken as premises.

The general formula of change, for Aristotle, is "(x) qualified as 'not a' becomes qualified as 'a'." Every change insoles the terms (x), "not a" and "a". The three factors can be defined as "what underlies" (matter,

subject}, "deprivation" (lack). and "form" (acquisition of a characteristic). Aristotle criticizes the elite. because they denied the existence of "coining- to being. They maintained that being "is" or "is not". and that there could be no change from "is" or "is not". For Aristotle (Idemj. change occurs from "is" or the "concomitance of fiat is." He admits Pantienides' "fromnothing. nothing comes" principle, but holds that this is not qualified ("this" or "that"). it can come-to-be "this" or "that."

Matter "is" not simply by its attributes. but by its privation. For the Platonic, there was the "one." "the great" and "the small" (these last two as the only principle). saying that the "opposite" is the "divine concept" of form. For Aristotle. the Platonic did not take into account the subject of change, the substratum of matter. For Plato, our world of inconstancy. of the senses. is not the world of knowledge. Plato is transcendent. the Intelligibility of things is outside the world. Aristotle conceives that matter and only split in thought (as analysis), it is impossible to separate them. it is immanent.

To understand nature one must first understand the assumptions of the given definition. To understand motion. one must understand that change is the realization of what the object is subjected to. the realization of a possibility. Things that have the power to generate motion are natural and have substance. There are four species of itioveinent. change, depending on where the opponents are. The categories of motion are quantity (for example, the change of dimensions; addition, and decrease). quality (as per colors: from light to dark - change of property. alteration). place (spatial movements usually occur up or do ii: it is a translation) and substance, the roost controversial. In fact. substances have no opposites (antonyms). so it is inappropriate to say that something conveniently transforms from normal to man: generation and corruption do not change in the full sense.

For Aristotle (2015b). the object of philosophical inquiry cannot be any being. but being as general beings. that is. hat can be stated about anything that exists because of its existence and not because of the sortie attribute that this thing has. For the author. there are different kinds of causes, forms and matter. the existence of mathematical objects and God. Aristotle starts from the general to get to the particulars. The existence of what is in the sensible world is not entirely material. Metaphysics considers the hole below. general. rather than its past, with the nature of being. Thus. it is possible to define the four causes of things: the formal cause. which is the form or essence of the thing (an object is defined by its form as e dealt with earlier); the material cause. which is the matter of which a thing is made (the matter in which the object consists); the efficient cause. which is the origin of the thing. that winch inside the object possible, its first principle and. finally, the final cause. which is the reason for something to exist. the purpose of the object.

There is criticism of Aristotle for his conception of the hnality of things. But if one considers that his logical approach considers the la s and intelligibility of things by chance. by movement. and not by what things are made of. one realizes that the author is remotely faitlifiiil to his deductive itietliod. U'liat is consolidated by custom and also has its motivations and first principles. as well as its reason for the change. The argument retains the key to the search for truth. even if it can be developed In different ways. With a combination discursive system, it is possible to arrive at the evidence (tacitly accepted by the actors) that

leads to conclusions. It is necessary to know the method of arriving at the truth. as an elf as the title itself. are difficult to achieve. But it is the task of philosophy to do so.

Aristotle seeks an epistemological path to arrive at a project of knowledge that allows limits to deal with the multiplicity of things, beyond individual things. His project of the knowledge intends to know things in the treasure in which one reaches what is one, identical and universal in things. Aristotle strongly criticizes the Platonic tradition and the so-called "theory of forms". In the "Metaphysics", the author exposes philosophical theories that, in his view, were unable to explain the causes of the things of nature. For Aristotle, the previous philosophers had identified the "wrong place" that could be determinant in things. For him, there is no episteme without "definition" and without "universal".

The search for existence has been a theme of philosophical inquiry since Socrates, and Aristotle sticks to it, but harshly criticizing the solution found by Plato that there would be an "other reality", ideas or forms with an unchanging reality. Which would enjoy causality concerning the sensible world. For Aristotle, this connection is inconceivable and unacceptable. Heraclitus had already looked for the origin of things in the "polemos", in combat. There would be an "invisible harmony" that would be superior to the "visible harmony" of things. The presocratic philosopher sought "what things are" and, for Aristotle, it would be necessary to "listen to the logos". This search will also pride Aristotle, although in a very different way, because for his epistemological project, the Heraclitian conception would be a problem, because it would create a "philosophical relation". It would be impossible to find unity in contrariety for Aristotle. Just as it would be impossible to be and not be, which, for Heraclitus, is acceptable.

Aristotle is formed in the Platonic debate, inherits many ideas from Plato, but visualizes the limits of the Platonic answers and does not accept Plato's conclusions for various problems of knowledge. Since Parmenides, the "problem of being" has been present in the philosophical debate, which could need to exist, it could not be subject to change all the time. And Aristotle is the heir of this discussion. It is the nature of being that could lead to the truth about things.

Plato also recognizes that being would have to be naive and perishable, as well as one, all-encompassing, imperishable, and not divisible. It should be outside temporality, eternal, autogenerated. Plato seeks the "logos" of the sciences, the way they are. Plato seeks an intermediate solution to the "problem of being in motion". We accept that everything is in motion, a knowledge could be impossible. There must be fixity. And investment to know the possibility of predication. The immobility could not be that of Parmenides' perspective. There must be stability in fixity. Plato then coined the idea of "participation," which, for Aristotle, is inconceivable. The theory of forms is this attempt at an "intermediate position" between immobility and mobility, but for Aristotle, there is nothing to support the connection between a so-called "world of forms" and the world of things that we know.

Aristotle comes from the tradition of Socrates in claiming that in his work there is an "Epagoge", an induction, a "universal" that is the starting point for the "epistémé", for knowledge. And that is the point he wants to get at. There can be no knowledge if there is no induction from the universal. What could be in things

being "the same?" For Aristotle, it is the "particular universal." His concern is to find the ontological status of this "universal". It would be units that would form the basis of the Aristotelian epistemological project to arrive at the universal.

Plato develops the "theory of forms" by trying to establish an ontological relation between a specific form. for example "the beautiful". and what could not be "beautiful"? He deals with the idea of "participation" as causality. Aristotle says that nothing supports such an idea. Participation, for Plato. Would bring to distinct things together and establish a relationship of participation itself. Nothing would make a thing beautiful without the presence ("parousia"). The coincidence ("koinonia") of the beautiful. The beautiful itself would be the eternal form. which would serve any predication. and beautiful things would be precarious, and incomplete. Each thing comes-to-be when it participates in the essence, being of that which it participates in. There would be "ousia" for all things in the world. An 'ay of being "biologically superior" to all others. The fixity of the being of the thing would be an ontological status. Aristotle states what one must seek. is the "first itiode of being." For Plato it is the fullness. the "ousia".

Aristotle dialogues with the theory of forms. strongly criticizing it. For him. fiat exists are "universals, " which are present in multiplicity: the origin of the universal is in particular things. For Plato, differently. forms could not escape from multiplicities. To know the forms would be to be able. as a soul. to participate in a client. It would be a natural process of kilo ledge. implicitly present in the soul. and it would be up to the individual to purify himself. to enable the soul to go beyond bodily sensations. In evolution, the soul, as a unity, would reach the state of fixity, it would "touch". see the forms themselves. Kno ledge could only exist following this evolutionary path. There could be no knowledge of sensible things, only "doxa". opinion.

Aristotle says that it is impossible for "Evo worlds" to exist. with a superior and independent reality. with superior ontological value. The idea of an "intelligible place" is unacceptable. Aristotle even claims that Plato advocated an ontological reality of forms. Which would exist independently of being thought. Plato's methodology would bring more problems than solutions. The Platonic explanation would not be parsimonious enough. "increasing" the number of beings. Aristotle here makes an external criticism of the theory, no longer internal like that of the character "Parmenides." from Plato's book of the same naive itself.

Aristotle looks at the theory of forms as if it served only to explain sensible objects. For Plato. the claim is much greater. since the font would be full realities. There is a shift in perspective. Aristotle is interested in explaining the sensible world. If forms exist for sensible objects. it is better to explain them in their substances. He also uses the term "ousia" for sensible things, which. for Plato, could be impossible. He calls "ousia" the thing that participates In the form. that is. lie invents die perspective of the mode of being of reality, which is a rupture with the Platonic project.

If the font is sufficient to explain sensible things. they should be in sensible things themselves, and not outside them. The cause of the being of something has to be In it. not outside it. The idea of "ousia" existing outside of things seems aberrant to Aristotle. The central controversy between Plato and Aristotle is not "what is the object of knowledge." but here "ousia" is present. Most people. in everyday life, consider "reality"

to be the things that present themselves to us. it is what we "want". fiat e "care about". phenomena. nature. Aristotle ill has to reconcile the Inevitable exit of the kilo ledge with the lightable stability of objects. He says that the Platonic theory turns fiat inin-itself into relative, and what is relative into itself. What is In-itself will never be predicated on something. It shifts the In-itself that belonged to form into the thing. Every substance is a granulation subject. it is subject to the medication.

The pre-Socratics worked with constitutive elements of things, and, at the bottom. they were looking for the principles of things. They understood that. in seeking these principles. they were seeking the being of things, they just didn't understand that. many times. they ended up seeking "other principles". which were not the "arklié" of things. These authors had already investigated the process of generation and corruption, and. In seeking something that could be present all the time. they were seeking the "arklié" of things.

But the universality of the science of being as being relates to its object In this perspective. The "being" is every kind of being The object of the science of being as being is "that which is", mile being what is. It can concern eserylNng that is. so gains the status of universality. The question " What does it mean to be?" can be asked for auditing. To look at things with a philosophical bias is to approach the sanitized objects that a geometrician. for example. approaches. but not with the geometrical dliTlensioii. and out comes the "philosophical dimension". the "dimension of being". What does it mean to be for the one who is? This is the question that the science of being as being must ask. it needs to answer different "modes of being". Ontology is precisely the discourse on what the thing is.

Aristotle wants to make sure that this science is one. even though being is said In many ways. Even though being is said to be In many ways. it is a science that Investigates these many uays. Whenever being is said to be In many uays. but About one uay of saying being. with which all the others are said. the Investigation of necessary unity is guaranteed. There must be one meaning that enjoys "arclié". that guarantees that there is no dispersion in various sciences of the various meanings of being. This relation (multiple meanings of being) is not defined, beings refer to a specific way of being. it is unity in polysemy. It is the sense to which all others are directed. Aristotle gives the example that " fiat is salutary" is directed to the idea of salutary. Some things are said to be because they are substances(ousia). other things are said to be because they are pathways leading to substance. whether through generation. corruption. deprivation, etc. The archetypal (first) sense of being is associated with the substance.

The science of all things that are said to be. for example, is one. The science of being as being must also be one. Being a being must be the object of that science. There is something that is first In medicine. for example. which is to know what health is. The philosopher must kilo the causes and principles of substance. which the philosopher primarily investigates. All that is. is "one" (unity). The primary sense of unity is associated with Uh substance. There will be senses of unity that are associated with and arise from unity. Every science is a science of opposites for Aristotle (the physician knows 'ing 'what health knows 'fiat disease is).

Also concerning unity, multiplicity will have to be the object of the philosopher. This is true for everything that is a being. The science of being as being must study not only its essence, but its genera, species, and other factors that express the universality of its substance, and various senses of being. The philosopher can, for example, analyze the semantics of "being" with all of identifying the various modes of being. Without compromising being, that is, to show appearances, to do a "cleaning" in the use of language.

There is a total need for matter and a total need for form [something that determines and something that welcomes determination] and interdependence of both. I can form, in my logos, which is matter separated from the determinations brought about by form, but it has no real separate existence. The only thing with separate existence is THIS matter, determined. For Plato, real existence separate from form, not just as a thought, it is an autonomous existence. For Aristotle, form does not exist outside of matter. Substance, for Aristotle, is *in* itself. The form that is "in". And in what that found is matter. It is explained by the difference between a convexity and a concave (flattened) nose. In this case, the concavity is formed and the nose is matter. Individuality relates to universality: man and horses are considered in general [universality, and other predicate notions are not substances, but compounds of certain forms and certain matter are considered universally.

Near matter is the difference between the universal concept of matter to that which is considered particular. To define substance only as essence would be a problem. Essence defines what a being is. The substance is something that underlies its determinations. Aristotle succeeds by seeing that all substance is one. But we need a theory of substance that allows us to assert that substances can relate to each other without losing their essence. In Book 7 of *Metaphysics*, Aristotle indicates that "form" and "matter" are biologically inferior to "compound of matter and form." Substance can only be what it is because of founding (an idea kept from Plato), but Aristotle says that it is composition that matters. That is what defines substance.

In Book VIII of *Metaphysics*, the author says that sensible substances have a matter, but they are not matter. In one sense it is possible to say that substance is formed, in another that it is matter, and in a third that it is composed of matter and form. Matter is then related to "potency and form to act". The matter has the potency to be something determinate, but it is not so in the act. Matter in itself is indeterminate. Matter, thought of in itself, is possibility. It carries within itself the possibility of change. Matter is necessary because it receives the determinations, it is in potency. The becoming of something comes from matter. Without form, a substance would not be something determined: the only category in which there is separate existence is in substance, it does not need "to be of something". It is possible to think of the composite of matter and form by intellectually separating the two things, but it is not a real separation.

Matter, for Aristotle, does not exist independent of form. It is possible to think separately, but what exists is the compound. Every generated substance is only generated because of matter and for its composition. For matter and form never existed separately in the past (ideal temporality). A determined matter in an act has the action of the form. But which contains being, depends on the matter. There is an interdependence for the emergence of substance according to Aristotle. Forms do have some kind of eternity, but sensible things do

not. This perspective of 'initiation' solves the Platonic problem between unchanging knowledge and sensible things. The part of initiation in natural things is the means by which there can be some determination in the matter. It requires a principle, an external agent that moves a set of natural things. S4otioii appears In Metaphysics in a broad sense, a series of qualitative and quantitative changes.

There is a principle of motion in natural beings. At the same title, the first material principle of things, and another, of the substance of natural things (the form). Are these characteristics immanent or in the act? This is the question that arises. Without the notions of act and potency, it is not possible to understand. In natural objects, form and matter operate. That which possesses the potency to be that is not yet is matter. The fundamental determinations of a house, for example, were already in its bricks. The process of "kinesis" is an actualization of matter. Whether In natural objects (Internal) or in artificial objects (require external). These are two interacting elements, form and matter, which is a process of actualization of the form itself. Shatter is potentially form, the whole complex is actualized, and it is a unique procedure. every substance is a unique complex and that allow s s to be reached by knowledge for Aristotle.

At the advent of modernity, there is considered to be a "turn" in the conception of the positions, which is closely linked to the physics of Kepler (1992), Galileo (2011), and Newton (2017) and the philosophy of Descartes. For Descartes, common sense is the best-distributed thing in the world, so people can consider themselves all provided with it. Even people who are more demanding in other matters do not wish to have it any more than they have it. This is because common sense is naturally the same in all men. Descartes defines common sense as reason itself, that is, the power to judge rightly and to distinguish us from false. The philosopher states that the diversity of our opinions does not come from the fact that each one conducts his thoughts along different paths and does not consider the same things, but from the fact that each one conducts his thoughts along different paths and does not consider the same things, moreover, it is not enough to have a good spirit, the thing is to apply it all.

The epistemic incontinence that occurred in this period started from free thoughts, which detached themselves from scholasticism. For Kepler (1992), the codification of the world makes sense in the position in an a priori way, not with a causal link, as in the Neoplatonists. Keplerian science is sustained by a rigorous projection of thought onto observations; in their thought finds its necessary and indispensable verification. The objective is to find the true objective causes of the celestial movements. Thought must reproduce, uniquely and necessarily, the objective order of things, but not by authoritarian acceptance of the data. The independent activity of the spirit trust discovers the pure lineage of reality. It is from within man that the profound secrets of nature are revealed.

This primacy of the thought-subject results in the object world from a tension between the pure activity of thought and the geometrical and dynamic foundation of the cosmos. The knowledge of "force", for example, only becomes effective when it is expressed geographically. There is a resonance between man and the universe, there is a harmonic geometric-dynamic force between the elements that are in man and the universe. The cosmos carries three forms of intuition: participation, alignment, and reason-stimulating

contemplation. Harmony" is a fundamental philosophical concept of Kepler. The mystery would be a challenge to the discovery of the tone of vibration of the planet Kepler. The Copernican paradigm had presented, philosophically, a new form of uprooting from the sensible world. It is a new conception of appearance, which involves subjects.

For Kepler (1992), Galileo (2011) Newton (2014). The thesis of the planetary character of the Earth provided increased uncertainty in cosmology. It is not unknown whether the universe has a center, whether it has a shape, or how large it is, in short, whether it constitutes a system. This is a dramatic effect of the Copernican cosmology of Aristotelian cosmological principles. It is an invasion of the field of natural philosophy by Copernican astronomy. There is an emphasis on the new role of the subject in the context of the birth of modern science. He is responsible for realizing the intuition of nature in the form of a harmonic cosmos that is not immediately perceived by the senses. This intuition is only elaborated through rational and mathematical resources of knowledge. Empirical knowledge is not valued for the construction of universal knowledge, which in the function of the new astronomical observations, restitution of experience to its true epistemic function.

It was this scenario of modern science that fostered the elaboration of Descartes' philosophical ideas, fundamental to think of the modern cosmology as a whole. Doubt is, for the French philosopher, hyperbolic, because it covers a large field (and follows a straight line), methodological, because it is an application procedure, it is a "questionable question" (a strategy from doubt and even skepticism to reach certainty, clarity of knowledge, and the distinction of ideas and, finally, methodical because it follows the method to be applied. The criterion of truth starts from four precepts: doubt, because it starts from it and even fruit skepticism to reach certainty: analysis, which consists in breaking down and analyzing the facts (deconstruction); chaining, which consists of the order of the reason or sequence of the parts that make up the real (the procedure is slow and gradual, the next step is anchored in the previous one) and enumeration to confirm the process and see if nothing has been missed.

In parallel with Galileo (2011), who considered that Philosophy is written in the great "Book of the World," where one sees the truth, what is written? Descartes (2006) opens himself to understanding the universe, to understanding "its language" and the characters in which it is written. It is written in mathematical language, without those means it is impossible to understand the words and not get lost in an obscure labyrinth. Descartes thus seeks science in the "Book of the World" (the book in which the world is a kitten), through the senses, through observation experience, that is, through thought itself.

Descartes' (2006) mathematical development has no practical relationship: Analytic Geometry equates and solves problems. Optics is thus more important than mechanics for Descartes because the feeling of "being able to see" (by light) is constitutive of science. Objectivity is present, because in I have the object "in my mind" ("the eye of the spirit") it exists. Doubt does not cease to be the basis of Cartesian thought, but the fourth part of the Discourse of Method points out that there is a direct relationship between the thing that refers to truth and what refers to something of ours (a belief, for example). It is the passage "from



the world" to "the sell", from the absolute to the prosocial, from the definitive to the intermediate. The author does not want to arrive at a definitive idea. the final cause of things. lie wants to find an efficient cause. through the steps of the method. Questioning to discover the workings.

The goal of Cartesian doubt is to remove itself. Descartes is not a skeptic. he wants to highlight the relationship between the plane of truth and that of certainty, the causal relationship to arrive at the title. Knowledge is perfected by rejecting what is thought to retreat to thought. what has already been thought can be rejected. It is necessary to know to reject and begin to think properly. After applying doubt one arrives at the indubitable. since the thought comes from someone here to connect. it does not "fall from the sky". The important part of the world for the French philosopher is the knowledge (metaphysics is more important than physics). What Galileo does with the motion of bodies Descartes does thought. from a mechanistic explanation of the world.

Since doubt is the foundation of thought. one cannot doubt. which leads to three basic things at the end of the path of doubt: thought, extension, and God (the perfection, creator-creature relationship). One can point out that. for Descartes, the good state is that he is a kitten to writing (from constitution to logic). that his constitution is organized according to the law of reason. geometrically organized. It is an ideology that pervades the context of the "turn" of cosmology in Modernity. Aristotle's formulations (and his presence during the medieval period) are fundamental to the cosmology of the modern period. Therefore consider that there is neither a break in the cosmological interpretation in Modernity. nor a pure and simple rescue of Aristotelian cosmology. but a "turning point", based mainly on the physics of Kepler. Galileo and Newton and the philosophy of Descartes.

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