

Relativistic Language and the Natural Philosophy Big-Bang

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Abstract

This article aims to show the emergence of Pre-Socratic Natural Philosophy using the cosmological Big-Bang analogy, where from a certain moment in time and space a universe appears, first in its "inflationary" moment and, soon, in constant expansion. In the case of natural philosophy, it arose with Thales at a certain moment in space and time. It also had its "inflationary" period marked by a large number of philosophers and a profound change in the understanding of nature. This period lasted for about 5 generations until philosophy entered its paradigmatic period with Plato and Aristotle. How was the Natural Philosophy Big Bang (NPBB) possible? What were the main factors that made this possible? The text discusses these aspects, and for the author, the main factor must be sought in the internal dynamics of Greek thought and not in external causes, such as the exchange with Babylonians and Egyptians or the economic dynamics.

To explain the NPBB, I use the hypothesis of linguistic relativism, meaning that "language shapes the mind", in the same line that Bruno Snell used in his 1956 book. That is, the development of the Greek language would be the preponderant factor to explain the dynamics that led to the NPBB. We believe that this hypothesis (currently criticized for being excessively deterministic) is justified when applied to the aforementioned situation and can be summarized as follows: "An extraordinary situation requires an equally extraordinary explanation". A set of historical occurrences justifies the application of the strong version of the concept of linguistic relativism, something that today would be difficult to occur.

The text synthesizes the main milestones of linguistic relativism, goes through the description of the turn of the oralist society to a society based on writing, which radically changes the way knowledge is stored, in addition to enabling its critical evaluation, one of the foundations of philosophy and science. Several authors who are already classics follow a similar line without, however, clearly adopting the author's position. These are the cases of Burnet, Havelock, and Ong. The text also shows some details of the linguistic evolution of Greek and its origins in the oralist mythical tradition.

The main conclusion is that linguistic relativism in its strong version is an adequate method to deal with NPBB situation.

Keywords

Natural Philosophy, Pre-Socratics, Greek Language,

1. Introduction

“An extraordinary situation requires an equally extraordinary explanation”.
(Heitor Matallo Junior)

This article aims to discuss a historical event of great relevance for Western thought in general and for science and philosophy in particular. I am referring to the advent of Natural Philosophy, a creation of pre-Socratic Greek philosophy in a process that lasted more than 200 years, until its consolidation in the paradigmatic works of Plato and Aristotle. From the 19th century and for more than 150 years, philologists and philosophers dedicated themselves to collecting, organizing and deciphering pre-Socratic thought. This was truly a spectacular achievement in restoring the original sources and seeking a more consistent and accurate reconstruction of Greek thought as a fundamental element of Western culture.

Hundreds of brilliant books were written, as well as theories developed in the search for explanations for what I consider an exceptional event, which was the emergence of natural philosophy that was left to us, albeit in fragments, by philosophers of the stature of Thales, Anaximander, Anaximenes, Heraclitus, Parmenides, and many others. They were brilliant minds with no prior theories from which to carry out the critical analysis needed to take the following steps in theoretical development. As Heidel mentioned, “In the beginning, however, there were neither established categories nor special methods and techniques; there was only the native intelligence schooled in practical affairs and directed to the various subjects which aroused the curiosity of the thinker. Men were surveying the scene, roughly sketching what they should like to achieve and forging the indispensable tools for its realization. Later generations have models ready to hand, on which they may improve according to their ability; the pioneer has at most the raw materials” (Heidel, 1933, v).

When I started to write this article, I thought that there wasn't much to do, except a historical summary of the development of philosophy, especially with regard to the pre-Socratic period. However, the historical importance of pre-Socratic thought goes far beyond any preconceived assumptions one may have. It is on the same level of importance as the discovery of fire for the history of humanity. It is like a generating principle of a new pattern in human thought, a way of thinking that brought us this great enterprise of the human mind that is scientific thinking. The realization that pre-Socratic natural philosophy is such an extraordinary event that it deserves an extraordinary explanation, which will not be achieved only by repeating arguments already known and which are certainly true, but we must use our imagination more actively, also as a new reading of the original and doxographic sources to try to illuminate this pre-Socratic universe with different colors.

The idea that the pre-Socratic event was something so extraordinary in the history of thought that it reminded me of modern cosmology, with the already popularized theory that the universe began with the Big Bang. The cosmological Big Bang (assuming it actually occurred) was the most important event in the universe, as it made possible the existence of everything we know, including life on Earth. The use of the cosmological analogy in the philosophical context only aims to show and emphasize the importance of Natural Philosophy as an original and exceptional creation in the history of human thought. It gave rise to scientific thought and all the successes (and also failures) that followed in the history of our species.

Greek thought generated a new path for the Western world: the discovery of the mind, as Bruno Snell (Snell, 1953) would say, a mind that was and still is capable of the most beautiful scientific and cultural achievements. A mind that diversifies into different cultures and in most of them has science as its most important representation of the world. This was the idea materialized by the Big Bang of natural philosophy. An extraordinary moment that manifested itself "from within" Greek oralist mythological culture, that is, overcoming oralism with the alphabet and written language, a language with the necessary flexibility to model a new type of thought and a new mental attitude.

I cannot say that there is a causal explanation for the emergence of Natural Philosophy, or rather, a single cause for this event. But certainly, linguistic relativity has a very important specific weight as an explanatory factor. The ex-post-facto narratives that have been and still are developed by scholars explain the past through the present. We practice what can be characterized as "reverse philosophy", making an analogy with modern engineering. In doing so, we can always find a new narrative that is consistent and can add some value to our knowledge. That's what we'll do in the next few pages. Search, in a general and schematic way, the explanatory endogenous factor for the emergence and subsequent development of pre-Socratic.

2. Shaping thought: relativistic language and the Mind

If plurality exists, things have to be as many as they are, neither more nor less. And if there are as many as there are, they must be limited. If plurality exists, the things that exist are infinite, since there will always be other things between the things that exist, and still other things between these things. And so, the things that exist are infinite". (Zeno's paradox by Simplicius)

Linguistic relativism is the term used to denote the notion that language influences the way we think. Throughout the history of linguistics, which emerged during the Enlightenment, some remarkable facts can be identified as if they were "micro-revolutions", so to speak, as a way of highlighting their importance within a broader process, that is, there would be historic landmarks that, seen together, acquire the historical grandeur that marks a revolution in thought and redirects the history of knowledge. The set of these milestones shaped research and knowledge, influencing the understanding of the relationship between language and thought, the cognitive sciences and even the concept of reality.

The first "micro revolution" occurred during the Enlightenment and was marked by the idea that thought and language are two distinct processes, with thought being the fundamental engine of ideas and language just the way to convey these ideas. Language, which was once considered a gift from God, is now considered a human creation but with no influence on thought. Language was therefore secondary to thought. As mentioned by Woulter Beek "First there was thought, and out of thought arose language" (Beek, 2005).

The second "micro revolution" had as protagonists two German thinkers, Johann Georg Hamann (1730 - 1788) and Johann Gottfried von Herder (1744 - 1803). They brought to the relationship between language and thought two new elements,

meaning *interconnection* and *precedence*. On *Interconnection* they realized that language and thought influence each other, but more than that, that language takes precedence over thought. In fact, language creates thought. Herder also developed the idea that language expresses itself through a particular culture, shaping the so-called *Weltanschauung* for those who speak it. This idea, as mentioned by Lorraine Code (Code, 1980) stresses that not only language shapes the culture but also the possibilities of human cognition as would be proposed by Emmanuel Kant (1724 – 1804) through the *a priori* concepts. “The language of a nation fixes its experience in a form which is transmitted to coming generations, thus molding their view of the world. The spirit of a nation is imprinted on language, and, reciprocally, bears the stamp of language.” says Code (Code, 1980, 247). I must say that the word *Weltanschauung* was coined by Kant in 1790 in his *Critique of Judgment* (Naugle, 2002) and probably was not used by Hamann or Herder. However, the idea was incubated there in their conceptions related to the idea of a “character of a nation”.

Johann Hamann was a contemporary of Kant, his friend and opponent. He contested Kant's *a priori* ideas about reason and, as a consequence, the precedence of Logos over language. As mentioned by several authors, Hamann's work, even though it is highly complex and erratic in terms of the topics addressed and of logical order, has several ingredients of linguistic relativism: “*He states that while some similarities among languages can be found, there are also differences. And those differences among languages parallel differences in thought. Language did not originate from thought, but its origin had been prior to thought, for thought presupposes a language in which it might manifest itself. Hamann may thus be seen as the first one to hold such relativistic views in a strongly articulated fashion*”, as mentioned by Beek (Beek, 2005, 7).

Johann von Herder was greatly influenced by Hamann and deepened his position on the relationship between language and thought. His radical view was that “thought itself is an internalized language”, making language and thought one and the same. Therefore, we cannot speak of “influence” or even “determination” as if there were two different things related to each other. For Herder there is no thought outside of language. Hamann and Herder questioned the Enlightenment assumption that reason, and reason alone, was the center of the human mind. Their concept of linguistic relativity “*fitted into a much broader anti-rational framework, calling into question the traditional conception of the universality of reason*” (Beek, 2005, 8). This was the kind of conclusion that, conceptually speaking, would destroy the idea of the *Logos* as a result of the functioning of the brain equipment that is innate to us and the same for all, a gift from nature to humans. This new development, even interesting and innovative, was put forward without empirical evidence. As Beek suggests, “*the views of Hamann were mere opinions based on intuition and not in the least backed by a sufficient study of language differences. The views of Herder were based on a shallow understanding of language diversity, many of his sources being unreliable, and his stance was more molded into his larger theory of spontaneity than it was fitting the facts scarce*” (Beek, 2005, 8).

The third “micro revolution” was given by the book published in 1836 by Wilhelm Christian von Humboldt entitled *On Language: The Diversity of Human Language-Structure and its influence on the Mental Development of Mankind* (Humboldt, 1988). The novelty of the book was the wide range of evidence brought by the author in support of the relativist principle. The simple fact that Humboldt collected and brought to light empirical evidence was an important change in the research process. Now the empirical facts would provide real support for what could previously be considered just speculation. In the book, Humboldt presents a lot of data about Malay, Burmese,

Chinese and Sanskrit languages, presenting refined analyzes of the structure of these languages. Just as an example, we quote a very illustrative passage from the book: *"Among all known languages the most violent contrast obtains between Chinese and Sanskrit, since the former consigns all grammatical form of the language to the work of the mind (underlined by the author), whereas the latter seeks to incorporate it, even the finest shadings in the sound (underlined by the author). (...) Chinese, on the contrary, has a high degree of excellence, and exerts a powerful albeit one-sided, influence on mental faculties. One might, indeed, seek the reason for this in its early scientific treatment (underlined by the author) and abundant literature (underlined by the author)"* (Humboldt, 1988, 229). As we can see, Humboldt promotes the idea that some languages are prone to developing mental abilities while others are not. The meaning of the phrase "language shapes thought" begins to take on full meaning with Humboldt.

Humboldt also reinforced the language cultural character. He used the Kantian word and concept of *weltanschauung* saying that *"the variety among languages is not that of sounds and signs, but a variety of **worldviews** themselves"* (Humboldt, 1988, 219). The language would therefore be a combination of the national character and the individuality of the language. More developed and more complete languages give rise to stronger national spirit. This can be verified by the existence of a universal grammar, characteristic of fully developed languages, in their most advanced stage. *"The pure conceptions of our universal grammar are always found only in languages that have been fully formed, and even then, only when viewed philosophically,"* says Humboldt (Humboldt, 1988, 229).

Humboldt gives language a protagonist role in real life, since it is directly responsible for knowledge. As mentioned by Code, *"language, for Humboldt, is the force which defines man's intellectual nature, and determines his relation to reality. The a priori which makes of cognition a subjective construction is the Weltanschauung inherent in language; the 'inner form' of language makes it possible to transform the world into a cognitive construction"* (Code, 1980) The epistemological consequence of what has been said is that there is a sequence of concepts being aligned to rationalize the understanding of the relationship between language, mind, and knowledge. The sequence is: language organize perception from sensorial experience (Code, 1980); this process puts cognition and the entire mind's machine to represent reality, the representation of reality becomes knowledge (it doesn't matter if the knowledge is a common-sense, philosophy, or science). What is important is that language shapes mind and it's knowledge production. This is what allowed the German philologist Bruno Snell (Snell, 1953) to say that the Greek language was directly responsible for the emergence of the natural philosophy in ancient Greece. Snell wrote an extraordinary book on the emergence of the Greek Mind as we will see later in this paper.

The third "micro revolution" closes a cycle. Humboldt made a genuine contribution to the development of linguistics by bringing evidence to demonstrate his position, as well as showing the path to the structural analysis of language, pointing out several features of extreme importance, as discussed by the author on the influences and determinations of the Chinese language for the development of mental abilities that can lead to scientific development. I would say that Humboldt opened up new possibilities for the consolidation of linguistic relativism as a discipline and the establishment of a research program aimed at empirical consolidation, where data mattered more than philosophical speculation. Humboldt represented the transition from a cycle of theoretical formulation to one of empirical research through a new generation of thinkers, led by the anthropologist Franz Boas (1858 – 1942), by the linguists Edward

Sapir (1884-1939) and Benjamin Lee Whorf (1897 -1941). This was actually the fourth "micro revolution".

Franz Boas was a German-American anthropologist and founder of cultural anthropology. His studies of the indigenous peoples of British Columbia of southern Canada were the basis for his conception that culture is not subject to the laws of biological evolution. The debate between Darwinian evolutionism and the human sciences, in particular anthropology, was quite intense in this period and Boas was a defender of the idea that each culture can only be measured by itself. It is likely that Boas has been exposed to the work of German linguistic relativists, at least Humboldt's ideas, since he grew up and was educated in Germany. Boas broadened the field of cultural anthropology to include the study of language and its relationship to culture, arguing, in the same vein as his linguistic relativism predecessors, that language is not just a mean of communication, but also a way of organizing and structure our thoughts and classify objects in nature. Therefore, different cultures use language in unique ways to express their different worldviews and experiences. He emphasized the importance of studying language in its cultural context and rejected ideas coming from Darwinian evolutionism, at least when applied to social and cultural issues. Boas used all the evidence he had to show that the concept of evolution cannot be applied to culture and that each culture is a "universe" in itself.

Although born and educated in Germany, Boas became America's leading anthropologist in the early 20th century and influenced many generations of researchers in different areas of knowledge. This meant that the relativist program, from its foundations with Hamann, Herder, and Humboldt, was now being consolidated as a solid epistemological alternative in the field of cognitive science, as well as becoming institutionalized, with Wilhelm Humboldt founding the University of Berlin and Boas carrying out his work at Columbia University. In particular, Boas had a great influence on two Americans who played an important role in introducing and consolidating linguistic relativism in America: Edward Sapir (1884-1939) and Benjamin Lee Whorf (1897-1941).

Edward Sapir performed as teacher of Whorf, even though they never published together. After Sapir passed away, another linguist attributed the ideas developed by both as one single combined Sapir-Whorf Hypothesis. The hypothesis consolidates the conceptions previously developed by those thinkers since Hamann, but with much more evidences based on studies of different languages and societies with the support of anthropologists and linguists. Three elements summarize Sapir-Whorf work:

- a. Languages show differences with respect to the meaning and syntax of words
- b. Semantics can affect the way speakers perceive and conceptualize the world
- c. Language affects thought; therefore, speakers of different languages think differently

This fact does not mean that the mind works differently among individuals from different cultures. It only means that different cultures produce different experiences in individuals" (Carroll, 1956). One of the important advancements in the direction of deepening even more the conception that different cultures think differently was the analysis made by Whorf about the Hopi conception of universe. In a paper published after his death and supposedly written in 1936 titled *An American Indian Model of the Universe* (Carroll, 1956), he advanced the methodology for researching the differences in "thinking about thought" through language. He went through the concept of time in Hopi culture and concluded that they simply don't have such concept as we

do. He stated in the following words his conclusion: “*After long and careful study and analysis, the Hopi language is seen to contain no words, grammatical forms, constructions or expressions that refer directly to what we call “time,” or to past, present, or future, or to enduring or lasting, or to motion as kinematic rather than dynamic (i.e. as a continuous translation in space and time rather than as an exhibition of dynamic effort in a certain process), or that even refer to space in such a way as to exclude that element of extension or existence that we call “time,” and so by implication leave a residue that could be referred to as “time.” Hence, the Hopi language contains no reference to “time,” either explicit or implicit*” (Carroll, 1956, 57). The conclusion was that even having no concept of time as we do, they built a conception of the universe as good as ours.

I now turn to Bruno Snell, who is at the center of the sixth “micro revolution” even though he is not the only one as we will see. As mentioned in the title of this article, Snell is an essential key to understand the emergence of natural philosophy among pre-Socratic philosophers. Snell was a German philologist who wrote an interesting book titled *The Discovery of Mind: The Greek Origins of European Thought* (Carroll, 1956). The central idea of the book is to show that philosophy and natural science were invented by the Greeks and this was not an accident but a result of the Greek language. Nowhere else could such knowledge arise other than Greece, he says. His main assumption is based on the strong interpretation of linguistic relativism, a deterministic view of language shaping the way we think.

Our objective is to explain the emergence of natural philosophy in the form in which it occurred using as an explanatory element the strong interpretation of linguistic relativism proposed by the author. We know that there is currently a scathing criticism of this thesis but, as we will see, the idea does not seem so exotic when different aspects of the question are analyzed and, mainly when we consider the fact that natural philosophy was not a common process of a paradigm shift, but it was the result of one of the most revolutionary social changes that humanity has experienced. It was the transformation from a culture based on orality to one based on writing.

3. The Amazing Pre-Socratic era or the Natural Philosophy Big-Bang

No man knows, or ever will know, the truth about the gods and about everything I speak of: for even if one chanced to say the complete truth, nevertheless one would not know it. (Xenophanes of Colophon)

In philosophy, the Greeks are the most enduring reference. In fact, philosophy was a Greek thing, a “Greek invention” in the words of Grant (Grant, 2007) and Kahn (Kahn, 1991). No other civilization in ancient times produced such a quality of metaphysics, philosophy, and even science as the Greeks (considering that the term “science” shall be relativized for the historical context). However, what is really impressive is the number of philosophers that emerged in the period between Thales of Miletus (625 – 546 BC) and Socrates (470 – 399 BC), philosophers who portrayed the universe in a certain way, the Greek way of thinking. The list below is just a sample of the best-known philosophers and whose references we find in later commentators, as their works have not survived the time. The list we are presenting represents a true

revolution in thought or, as Geoffrey Lloyd would say, a "Wisdom Revolution". Here is the list with some of those thinkers: Thales Of Miletus (625 – 546 BC); Anaximander Of Miletus (610 – 546 BC); Anaximenes Of Miletus (586 – 526 BC); Heraclitus Of Ephesus (535 - 475 BC); Xenophanes Of Colophon (570 - 478 BC); Pythagoras Of Samos (575 - 490 BC); Parmenides Of Elea (circa 530 BC); Zeno Of Elea (circa 495 – circa 430 BC); Empedocles Of Acragas (494 - 434 BC); Anaxagoras Of Clazomenae (500 - 428 BC); Melissus of Samos (5th BC), Hippocrates of Cos (460 – 375 BC), Leucippus Of Miletus (circa 430 BC); Democritus of Abdera (460 - 370 BC); Protagoras Of Abdera (490 - 420 BC), Gorgias (486 – 380 BC), Critias (460 – 403 BC), and Socrates (470 – 399 BC).

The number of thinkers listed above is really impressive. If we consider that this number of philosophers emerged in a few generations (about 5 generations) without having a theoretical basis on which to work, as mentioned in the introduction, the general opinion is confirmed that it was an extraordinary event, a true Big-Bang of Natural Philosophy as we call it in analogy with modern cosmological theory. Looking at these names, several issues relevant to our discussion immediately arise. How can we explain this number of thinkers emerging in the same place, Miletus, or around it in such a short period of time? About 200 years passed between Thales and Socrates, just five or six generations. How to explain that nowhere else has something like this happened? How to explain this incredible event? The number of active thinkers in a short period indicates how dynamic Greek thought would have been in the 6th and 5th centuries.

My impression is that such a number of philosophers cannot have arisen as a fortuitous result of chance. Something fundamental must have happened, a structural change that made possible the emergence of such a number of philosophers and a profusion of completely original ideas, unparalleled in history. For this exceptional event, there must be an exceptional explanation. This meant a fundamental change in the mental attitude with which the first natural philosophers interpreted nature. That's what this change is about. And when we assume that it is a mental change, we must look for the roots of this change in language, following our hypothesis of linguistic relativism.

The NPBB had its "*Inflationary Era*" through the huge number of philosophers dedicated primarily to cosmology and the amazing scientific development they fostered, starting with Thales and ending with Socrates who represents a reversal in the focus of Greek thought at the time, turning to moral philosophy and partially abandoning cosmology. Plato and Aristotle represent the culmination of the NPBB process and, at the same time, an inflexion to new emergent paradigms which evolved in two different directions: The Platonic philosophy and metaphysics and the Aristotelian science. The idea that the Big Bang of natural philosophy was an extraordinary event, driven by some factors endogenous to Greek thought, becomes even more evident when one observes that shortly after the death of Alexander the Great, Greek thought no longer produced anything extraordinary. As stressed by Albright, "*Soon after Alexander's conquest of Asia, the great period of philosophical innovation was over and after the second century BC there were only a few outstanding intellectual geniuses in Greek world, scarcely than two or three to a century*" (Albright, 1972).

Several interpretations of this event mention a "new way" of thinking invented by Greeks through the influence exerted by Babylonians, Egyptians, and Mesopotamians over Greeks. Geoffrey Lloyd questioned the nature of the revolution promoted by Greeks: "*Was there a revolution of wisdom with regard to the understanding of nature?*"

What kind of revolution was there?” (Lloyd, 1970, 3) The discussion is obviously relevant, since in no other civilization we find similar development. However, most arguments refer to the emergence of Greek philosophy of nature as a result of the inventiveness of the Greek mind or because of external influences coming from Egypt and Babylonia or because the “exciting cultural environment” of Miletus. However, it is not clear how these things would be acting for having the revolutionary movement of Pre-Socratic philosophy. Just to mention one of these opinions, David Lindberg expressed the exciting intellectual environment among Greeks at the beginning of 6th century in the following way: *“Early in the sixth century, Greek culture experienced a burst of a radically new kind of discourse—speculation unprecedented in its rationality (nous in Greek), its concern for evidence, and its acknowledgment that claims were open to dispute and needed to be defended. Speculations ranged over a broad subject matter, including the cosmos and its origins, the earth and its inhabitants, celestial bodies, striking phenomena such as earthquakes, thunder, and lightning, disease and death, and the nature of human knowledge”* (Lindberg, 2007). I would also mention Charles Kahn (Khan, 1991) who suggests that the contact between those cultures and the development of the natural philosophy in Greece was not only a process of appropriation of Egyptian and Mesopotamian knowledge but a new way of thinking, integrating previous foreign knowledge through proper analysis to produce a new knowledge system, comprising philosophy and science. The classical scholar and translator Francis Cornford (Cornford, 1957) expressed reservations about the way this thesis is frequently puts forward. He advocated that religious references were part of the foundations of the philosophical development in Greece, meaning that Greek philosophy is a continuum development from Greek religious and myth (Cornford, 1957). The famous philologist John Burnet (Burnet, 1920) supports the claim that Greek philosophy evolved independently of other cultures, but science had its origin through the knowledge developed outside Greece, mainly in Egypt. As he pointed out, *“the Greeks themselves believed their mathematical science to be of Egyptian origin, and they must have known something of Babylonian astronomy. It cannot be an accident that philosophy originated just at the time when communication with these two countries was easiest, and that the very man who was said to have introduced geometry from Egypt is also regarded as the first philosopher”* (Burnet, 1920). The idea of an existing continuity between religion/mythology and philosophy has been reaffirmed by Burnet and also by Philip Matyszak (Matyszak, 2018), who shows that Greek mythology or at least some of their Gods were not new but imported from other religions and cultures and adapted to the Greek style.

There is no doubt that the social and political environment of classical Greece had an important influence on the formation of Greek culture and also on the development of a new attitude of thought. After all, everything is linked to social and historical circumstances, and while we cannot deny this connection, we cannot show exactly how it occurs either. Cultural phenomena are too scattered to generate a more solid explanation, even more so in a situation that occurred more than 2,000 years ago.

Scholars and philosophers have been discussing pre-Socratic philosophy for over a century and there is no consensus until now. They entered into the discussion whether Greek thought and natural philosophy emerged due to influences and knowledge originating outside Greece or whether, on the other hand, there would be internal reasons related to Greek culture itself for this development. I would say that we are facing two types of arguments, that is, exogenous or endogenous causes as the origin of Greek natural philosophy. Perhaps a combination of both is more appropriate. Several important scholars worked and still work to find and/or organize the facts that are at the origin of the exogenous explanation of this revolution, that is,

looking for the Egyptian, Mesopotamian, or Babylonian influences that could give meaning to a revolution of the proportions created by the Greeks. I understand, however, that the process that led to the NPBB could be explained by more than one reason, but necessarily endogenous reasons must take precedence. It is necessary to demonstrate how the Greek mind came to be able to do what it did. Natural philosophy is a special representation of the cosmos and, as such, must be described in the appropriate language. Therefore, we must look for the reasons for this change first and foremost in the language, but also in additional cognitive factors that eventually came with the Greek language. A first and obvious finding is that the NPBB emerged from the transition from oralism to writing and that the Greek language, with all its characteristics, may have had a relevant role in this process.

Regardless of the reasons given by the aforementioned authors, the problem with the exogenous explanation is that we cannot estimate how profoundly or how influential these external factors really were, nor can we estimate whether these conditions were sufficient to promote such a shift in Greek mentality. The hypothesis that external factors were responsible for changes in the Greek mentality are as fortuitous as believing that the alignment of the stars was what allowed the Greeks to invent the science. If the exogenous argument serves to "explain" the situation in Greece, it must equally would serve to apply to other civilizations. That is, the argument must be bi-directional. The counterfactual argument must accept that existing knowledge and experience in the region, including Greek creativity and critical thinking, were available to existing civilizations in Babylonia, Mesopotamia, and Egypt. Lloyd discussed the issue of innovativeness and showed that *"Innovativeness is no prerogative of the ancient Greeks. Rather, it is manifested to a greater or lesser degree by every human society"* (Lloyd, 1970, 51). That is, the exogenous factors could also have acted as causal factors in Egypt or Babylonia. How would we explain that this did not happen? Appealing to a lack of "creativity", or "critical capacity" or low "social dynamics" of

In a personal exchange I had with Mr. Robert Jackson from USA, he made some interesting comments: "Why Greece rather than say Egypt, where the same general ideas of reality that Thales used to create his Paradigm existed long before the formation of the Greek City-states? I think that question is answered by the political structure of the Greek city versus the political structure of Egypt. In Egypt, there was a strong central government which had a very strong incentive to quash Philosophical Paradigms. The Pharaoh ruled by means of being divine - he was considered divine and all reality was organized around that principle (in early Egypt, for centuries, the Pharaohs married their sisters so as not to intermingle divine blood with common blood). Pharaoh and the ruling (and intellectual) elites of Egypt would simply not allow Philosophical Paradigms to exist". My answer to the comment is that even Mr. Johnson has a good point and the argument make sense and is certainly an important explicative element in the discussion, it is still an exogenous explanation.

Egypt and Babylonia? This does not make much sense. Egypt was a very solid society with strong institutions and a bunch of technical knowledge that are still not understandable for our modernity in many aspects. Some authors appeal for the differences in the political regime in Greece and Egypt to reinforce the idea that democracy and the decentralized city-states were the reason to justify the Greek development in philosophy and science. Egypt as being a centralized religious society did not allow the emergence of different

ways of thinking and remained a closed society until, at least the beginning of the Roman empire.

A comprehensive explanation about the reasons for the emergence of natural philosophy in Greece, and only in Greece is still a puzzle to be solved. However, we have (this is my opinion until now) a credible theory to explain it as we will see below.

Endogenous changes, on the other hand, and assuming that we can demonstrate them, could clarify the nature of the processes and ensure greater explanatory coherence. Thus, we must find the element that allows us to explain the structural reason for the change that made possible the rise of natural philosophy in Greece. This would be the internal force of change. As I mentioned earlier, natural philosophy in its various versions according to the Pre-Socratic philosopher considered is a description and explanation of the cosmos and therefore needs the appropriate language to create such representation. This is why our most important source to explain such thing is the language itself. Here is where linguistic relativism comes in again. It was mentioned previously the process of change through the evolution of the linguistic relativism, establishing some milestones which I called "micro revolution", since I believe that what has been done by those thinkers was no less than a revolution in the way of thinking Mind vis-à-vis language, which is of extremely relevance for the discussions related to modern cognitive sciences. Then, the milestones I briefly discussed can be summarized as follows:

1. The first "micro revolution" – during the enlightenment the conception that language was given by God to humans had been replaced by the conception that Men created language;
2. The second "micro revolution" - German thinkers Johann Georg Hamann (1730 - 1788), Johann Gottfried von Herder (1744-1803) put forward the conception that language shapes the thought,
3. The third "micro revolution" came as a consequence of the previous conception that language shapes thought. This concerns to the conclusion that different languages would result in different thoughts.
4. The fourth "micro revolution" was given by the book published in 1836 by Wilhelm Christian von Humboldt entitled *On Language: The Diversity of Human Language-Structure and its influence on the Mental Development of Mankind* (Humboldt, 1988). The novelty of the book was a wide range of evidence brought by the author in support of the assertion of the relativist principle. The simple fact that Humboldt collected and brought to light empirical evidence was an important step forward in the research process;
5. The fifth "micro revolution" brought by Humboldt opened the stage for the emergence of a new generation of thinkers, with the anthropologist Franz Boas (1858 - 1942) at the forefront, as well as Edward Sapir (1884-1939), Benjamin Lee Whorf (1897-1941). They brought new and sophisticated studies of languages from indigenous communities as the basis for comparisons.

To complete the whole process, meaning the revolution promoted by the linguistic relativism as summarized above, Snell also had taken the principle that "language shapes thought" in its strong version and applied it to a special situation. I mentioned earlier that "*for this exceptional event, there must be an exceptional explanation*". The NPBB was a very special event, since Pre-Socratics created many fundamental ideas for science out of nothing but mythology. This is why they are so important and this is why I borrowed the expression "Big-Bang" to conceptualize what Pre-Socratic did in philosophy and science.

As we said before, the deterministic version of the relativistic principle does not seem so exotic when we look at the linguistic evidence presented by Snell, Havelock and

others on the development of Greek natural philosophy. Their analysis of the Greek language allows us to accept the stronger version of the principle that language shapes thought, as it could explain the explosion of Greek philosophy in the pre-Socratic period, something that the other arguments do not seem convincing enough. As Snell pointed out, *“European science originates with the Greeks. Hence the Greek language is capable of showing what happens linguistically when people begin to speak “scientifically”. Only in ancient Greece is scientific discourse native and autochthonous: wherever it emerges later, it lives by virtue of taking over, translating and elaborating upon the original Greek”* (Snell, 1953, 50).

Obviously, Snell is not the only one to support the idea that the Greek language has something special which allowed the production of thoughts focused on philosophy and science. As we will see in the next sections, the development of the Greek language is a very special chapter in the history of Mind and an essential step in the Big Bang of Natural Philosophy.

4. When epic singers are silenced

Among poets of consequence in the history of European literature, no name is more familiar than Homer's. Millions who have never read a word of him know he existed. Two reasons have supported a unique status for him: he is massive and monumental, and also, inexplicably, he is there, present at the beginning, the first, the oldest, the archetype. (Eric Havelock)

The great classical art historian Rhys Carpenter conducted extensive and detailed epigraphic research into the origin of the Greek alphabet, showing its origins in the Phoenician alphabet. The Greeks adopted the Phoenician alphabet, which contained only consonants. They added vowels and ordered the way of writing that lasts until today. It is accepted that the Phoenicians developed their alphabet around 1000 BC and the Greeks developed it as a script around the 700's BC, meaning that Greeks had such an alphabet in place and some people with the proper ability to write, initiating a decisive step towards the development of philosophical and scientific thought that was consolidated at the end of the Pre-Socratic period in the fourth century BC.

According to Carpenter (Carpenter, 1933), the Greek alphabet was introduced in Rhodes, Crete, Samos and Miletus between 720 and 700 BC. In just forty years from 700 to 680 BC the Ionic variant reached Delos, Athens and Eretria. From 680 – 600 the alphabet had been consolidated and the writing was developed and diffused throughout Aegean and Greek Colonies. One hundred and twenty years for such a development that changed the entire world. It worth mentioning that the completion of the development of the Greek alphabet and its extensive use during the Hellenistic era was a process that took another 200 years, so that by the 4th century BC the development of the Greek language was complete, as well as the development of Natural Philosophy. There is some debate about the dates of such an alphabet's development. Some scholars have pushed it to the period between 900 and 800 BC, which has generated a very controversial discussion. This is because other topics related to the very development of the Phoenician language appears and cannot be resolved compared to Greek writing, according to what Willemijn Waal shows (Waal, 2018). So, what really matters for our discussion is that these processes, the consolidation of written language and the emergence of Natural Philosophy, occurred in parallel and this was not a coincidence. As several authors show, these processes feedback on each

other and, as we saw earlier, show that the development of language shaped a specific type of thinking. The alphabet has been considered revolutionary both as a writing system and as a tool for intellectual development, and the Big Bang of Natural Philosophy was a reflection of this process (Waal, 2018).

The invention of the alphabet is undoubtedly a new ingredient that we must take into account in the process we mentioned earlier, about which Bruno Snell is a reference. Snell put forward his thesis in the context of linguistic relativism, while this new element focuses on the passage from orality to a literate society. In these circumstances, orality requires a mental ability which is quite different from a situation where the alphabet and writing are available. Many authors have recorded this fact, including Walter Ong, Rosalind Thomas and Eric Havelock. Studies on orality ended up showing that a literate society needs a new mental attitude and that this new attitude, as well as the improvement of language, reinforce the idea that language was the crucial element to allow and promote the Natural Philosophy Big-Bang.

However, having the alphabet available was not enough to create a culture of writing. It was also necessary to bring about some crucial changes in the traditions concerning the transmission of ideas. Even during the 7th century BC, orality was the main tradition available for the transmission of stories, myth, and religion. The most important example refers to Homer and Hesiod, who transmitted their poems Iliad, Odyssey, and Theogony by word of mouth. *“Tragedy was watched in the theatre, and rhetoric or the art of speaking was a major part of Greek education. A civilized man in Greece (and indeed Rome) had to be able, above all, to speak well in public. Socrates pursued his philosophical enquiries in conversation and debate and wrote nothing down”* says Rosalind Thomas (Thomas, 1989, 3).

According to Ong (Ong, 2002), orality needs certain rules to be effective and keep culture and knowledge alive. This is guaranteed through a series of steps with the ultimate goal of maintaining and transmitting knowledge to other generations. The basic principle to follow is this: knowledge that is not repeated aloud soon disappears. In order for knowledge not to disappear, certain intermediary actions are necessary. Mental organization and classification of material, selection (aggregation) of what is most important from existing material, creation of mnemonic rules to help people memorize information, and ongoing dissemination of information. Here enter the "singers", those who will raise knowledge to its most important level of cultural value through verses. The interesting thing is that there is no clear idea of history, past or future. The singer sings the present, repeats the story as if it were always the first time, he was telling it. There is also no idea of abstraction. What is told is in the present and in the concreteness of a reality easily reached by the listeners. The verses obey mnemonic rules. As put forward by Ong, *“In a primary oral culture, to solve effectively the problem of retaining and retrieving carefully articulated thought, you have to do your thinking in mnemonic patterns, shaped for ready oral recurrence. Your thought must come into being in heavily rhythmic, balanced patterns, in repetitions or antitheses, in alliterations and assonances, in epithetic and other formulaic expressions, in standard thematic settings (the assembly, the meal, the duel, the hero’s ‘helper’, and so on), in proverbs which are constantly heard by everyone so that they come to mind readily and which themselves are patterned for retention and ready recall, or in other mnemonic form”* (Ong, 2002).

The consolidation of writing around 700 BC fostered the development of Greek society, strengthened democracy, the registration of documentation and contracts, new constitutions and written laws and other subjects of civil life. However, the acquisition of literacy for a more general public was slow, since it requires a new mental attitude. As Spengler noted in *The Decline of West* (Spengler, 1932, 8), *writing... implies a complete change in*

the relations of man's waking-consciousness, in that it liberates it from the tyranny of the present ... the activity of writing and reading is infinitely more abstract than that of speaking and hearing". In the period from 700 to 500 BC oral tradition coexisted with a new tradition that progressively began to spread in civil life, the writing. Writing was an asset that would lead Greek society to its maximum intellectual and economic development. However, the majority of the people would still live under the oral tradition. Religion and knowledge would still be passed down orally and epic poets would still be venerated.

Eric Havelock pointed out some questions related to the relationship between orality and literacy in Pre-Socratic thought (Havelock, 1966). The first thing to note is that writing was available to pre-Socratics, as in the times of Thales, Anaximander and Anaximenes. As we know, there is no survived works of the Pre-Socratic philosophers, however, it seems that those philosophers, as well as Xenophanes and Empedocles after them, used poetry as a default form of presentation of their thinking as showed by Catherine Osborne (Osborne, 1998; Hahn, 2001), which leads us to assume that the necessary skills for reading were not yet developed, that is, the majority of society, the audience, was not yet literate and the philosophers should "translate" their ideas for that audience in the "appropriate language" to ensure them to understand and to memorize the information. So, the first philosophers used verse for registering their discoveries and thoughts. As mentioned by Havelock, "*In their own inner thoughts, they (the philosophers) were trying to break with the oral tradition. But their public still had to memorize their statements and consequently these would reflect a transitional stage in the passage from pre-literacy to literacy. The philosophers would want to reach forward, but also be impelled to look behind, and their style of composition would be expected to reflect this ambivalence*" (Havelock, 1966, 51).

The transition period to which Havelock refers should end up in a situation different from the one in which it began, which means that orality progressively gave way to literacy and speech to writing. This effectively seems to have happened, since in Plato's time information was no longer transmitted through verses. Plato was a critic of epic poems and even said that there would be no room for them in his *Republic*. With Plato we can say that epic singers were silenced once and for all. Still following Havelock, "*the initial problems confronting the pre-Socratics would be syntactical, rather than philosophic in any larger systematic sense. They would be aware of the need of a new language and, it would follow, of a new mode of thinking, which could replace descriptions couched in terms of powerful and arbitrary agents and of acts performed by them, and could substitute a different mode of description, which, to judge by our own sophisticated speech, would be analytic and conceptual*" (Havelock, 1966, 50). A new type of representation replaced the epics and gave rise to natural philosophy. Thales is considered the first philosopher and his rhetoric was in verse, but his cosmic representation gave rise to a new type of thought, more abstract, distant from divine forces. It seems clear that there was a slow and continuous transition from orality to writing and, therefore, from myth to logos. Burnet defended the idea that philosophy came from the Myth/Religion (from inside) and that there was a progressive transition, without any rupture. At the end of the day, all the authors mentioned here believe in such assumption. The issue we are discussing is only what would have been the main elements leading to natural philosophy from a previous civilization (Buxton, 1999). This is, mutatis mutandis, the hypothesis of Havelock, Buxton, Snell, Ong and others.

5. Greek language propelling scientific thought

"They (the Greeks) trusted in names and their self-assurance was such that they could even afford to be

playful about them. And when they came to devising names for the strange new things that they themselves had wrought, they approached the task with both confidence and inventiveness" (F.E. Peters).

Throughout the article, I looked for internal elements in Greek intellectual development that could give rise to the NPBB, that unique movement in the history of science. I started discussing linguistic relativism as a basis to guide our search, accepting the assumption that language shapes thought. I mentioned several authors and milestones in the history of linguistic relativism, the milestones through which we can offer a unified narrative to explain the NPBB phenomenon. The discussion about the exogenous or endogenous causes that made the NPBB possible did not imply an intellectual dissociation of the temporal continuity between orality and writing. They just alert us to the fact that there is a significant shift when moving from one model of knowledge storage to another. In oral society, the epic song and myths are reaffirmed each time before the public and must always be in the present tense. They must also manifest an Agency that commands what happens, a source of action for the renewal of the movement and updating of the will of the Agents.

Our narrative started with language as a source and modeling element of thought and we saw the strong and weak interpretations of the concept of linguistic relativism. But now we must introduce an additional element to the language as a determining factor in the change wrought by the Greeks and which led to the NPBB. This new element is, however, totally linked to language as a propulsion factor in the modeling of thought and, therefore, of the Mind. Snell brought the idea that the Greeks discovered the Mind when they promoted a great change in the use of language, overcoming the mythological forces as an explanatory factor of nature, by a rational thought based on rationality and material causality. The new constitutive element of a scientific-oriented Mind is imagination, the engine responsible for the production of representations which we will discuss later. As mentioned by Eva T. H. Brann, "*these representations are image-like; therefore, they share a certain character with external images; in particular, like material images, they represent absent objects as present; they do so by means of resemblance*" (Brann, 2017, 3).

The editor of the *Greek Reporter* refers to the Greek language as following: "*The supreme quality of the Greek language is certified in various ways. First of all, the Greek language has absolute syntactic flexibility-elasticity, greater than any other language. It is not merely semiotic; it is conceptual. Greek, particularly, has a unique component, which lies in the approximation of the distance between the signifier (the phonemes of the word) and the signified (the meaning of the word), which is not observed in other languages. Greek also possesses the notorious "mathematical structure" in the way words are composed*" (Vasiloudis, 2022). Many philologists and scholars would probably agree with this quote. In the history of human thought, the Greek language was one of the most important achievements of mankind. In the previous section I mentioned that one of the milestones in the development of linguistic relativism refers to the contribution of Bruno Snell and his postulation that science could only have developed from the Greek language. No other language could have spawned philosophy and science like Greek language. I could add a complement about the Greek language, saying that Greek allows to trace precisely the transformation of the concepts as no other language, as said by Snell (Snell, 1953). This statement suggests that the Greek

language has within itself the mechanism, concepts and words to allow and stimulate the new narrative of science. Peter Wulfing (Wulfing, 1994) can help us with some features of the Greek Language, when compared with Latin: The definite article, absent from Latin; the ten participles of the Greek verb, showing various relationship of time, aspect and voice, Latin has three; the middle voice, which expresses so many shades of meaning; the optative mood in addition to the subjunctive; the capacity to modify any word by means of particles, liberating the word-order in the sentence. All these features allow great flexibility in the use of the language and, therefore in the operation of the above-mentioned representation production machine, the imagination.

In the pre-writing Greek era, when wisdom, traditions, and knowledge were stored and transmitted orally through the epics, the explanation of natural events was attributed to deified forces and not to other natural events. Let's give an example: Poseidon, the god of the sea, of storms, and the "earthquake", responsible for earthquakes, sent his revenge when ignored or contradicted. That was the explanation for the earthquakes or abnormal agitation of the sea. Thales was the first thinker who, taking a big step forward in the history of thought, attributed earthquakes to natural forces and not to Poseidon's revenge. His conception is based on the idea of a fundamental constituent elements of nature, water, and that its movement and transformation are explained by the fact that the Earth is at rest on it. Therefore, the Earth's eventual friction with water is the cause of earthquakes. The explanation now lay in a material relationship independent of supernatural agencies.

Thales posed a simple question before him to be answered. Even being a simple question, modern scientists, cosmologists, and philosophers are still looking for a response: What is the basic material of the universe? Thales' response to this question was that *matter* is the basis for everything, and such matter is *water*. The monistic assumption that everything is water transferred the cause of material existence of nature and men from Gods to the terrestrial world. This was a revolutionary change in the history of Greek thought, giving birth to Natural Philosophy and the unification of existing knowledge under the guidance of a new way of thinking. With the notion that the Cosmos is made of water/moist he started working with two universal ideas, "the cosmos" and "the matter" (water/moist) as universals. However, Thales kept one foot in myth and one foot outside of it, in the idea that objects in nature are, after all, matter and obey certain rules outside mythology but natural objects are still "full of Gods" (Aristotle, 2013). In the words of O'Grady, "*Thales declared water to be the substance (...) which is present in all things and to which they ultimately return in a recurring and continuous cycle of apparent change. Thales arrived at this decision empirically—through his repeated observations of events and objects occurring in the world around him—and he described a recurring cyclic theory through which water could be seen to change its state into the myriad of diverse things which make up the universe*" (O'Grady, 2005, 30). With this assumption, philosophy started its journey to become a discipline or more specifically, to become the "philosophy of all things", the "philosophy of nature".

Let's take another concrete example: In Homer's Iliad, Poseidon, the Earth God Shaker says that men are scattered over a "*boundless land*" and in the Odyssey Homer says that one advances on the "*boundless sea*". The Greek word for "*boundless*" is the famous "*apeiron*". The word also means infinite and was appropriated and used by Anaximander to give meaning to his cosmological theory. Just as for Thales the constituent matter of the cosmos was water, for Anaximenes, a contemporary of Thales, the air was the principle for everything. Anaximander adopted the *apeiron* (the

indefinite) as the ultimate element of the cosmos. "Indefinite" (as a pure concept) is actually the negative aspect of matter or anything else, and, it seems we cannot just say that the ultimate constituent of nature is "indefinite" or at least we cannot say that as an assertion to positively define a principle in the same sense as Thales and Anaximenes did (Dancy, 1989). It seems that Snell has a slightly different interpretation of the concept of "indefinite". Even though he agrees that "*one word, which asserts nothing positive, but only affirms that something is not there, namely an end or boundary, loses its harmless obvious meaning*" (Snell, 1960). And next he assumes that Anaximander "*openly and quite consciously cuts off the word from the sight and experience of men by transforming the adjective into a noun. Thus, he creates something that doesn't exist in the empirical world*" (Snell, 1960, 51).

In the table below I show some concepts that were of great importance for the development of the philosophy of nature. Most of them had an earlier origin and were used with different meanings by Homer. The table is illustrative only and the concepts mentioned come from the excellent work of F. E. Peters (Peters, 1967). The aforementioned author's book shows in detail the intricate philosophical relationships between the various concepts and how they were used by different philosophers, from the pre-Socratics to Plato and Aristotle.

Concepts	Use before Pre-Socratics - Homer and Hesiod	Use by Pre-Socratics
Aesth�sis (Sensation, Perception) aesth�sis koine (common sense)	Aesth�sis is used in relation to aesthetics.	As perception, <i>Aesth�sis</i> is involved in epistemological doubts by Heraclitus and Parmenides who think it is an obstacle to the truth. Perception is not the primary source of knowledge.
Aleth�ia (Truth)	Truth has to do with the reliability of what is said from one person to another.	One of the most important concepts in philosophy. The possibility of truth is related to the distinction between <i>doxa</i> and <i>episteme</i> and their proper objects. Protagoras propounded the theory of the relativity of truth. Aristotle's theory of truth rests on the assumption that truth is not in things, nor in our knowledge of simple substances, but in the judgment. For Epicurus all our sense perceptions are true and thus <i>aesthesis</i> (sensation), is the ultimate criterion of truth.
Apeiron (Undefined)		Unlimited, indefinite. Concept invented by Anaximander. What is involved in his idea of apeiron is to last in time, an infinite supply of basic substance. It is also possible that Anaximander visualized this huge mass of material that surrounds our kosmos as a sphere, and so without limit, i.e., beginning or end, in that sense as well.
Arch� (Principle)	Homer and Hesiod used Arch� as beginning, starting point.	The Pre-Socratic search for an <i>arche</i> in the sense of a material cause. Thales, Anaximander and Anaximenes used as first principle (water, Undefined, and air respectively)
Atomon: uncut, indivisible material, particle, atom		Leucippus and Democritus proposed that all matter was composed of small indivisible particles which they called "atoms". They float in a vacuum, which Democritus called the "void"

Eídos (Idea)	Its first meaning, and the usage is current in Homer, is "what one sees", appearance, shape. Image. Used by Homer regarding Helen of Troy.	Pre-Socratic philosophers continue using in the same sense (Empedocles and Democritus). By the time of Herodotus <i>eidos</i> , and its cognate <i>idea</i> that had come into use, had been broadened and abstracted into "characteristic property". Heraclitus influenced Plato to the effect that, given the changing, fluctuating nature of sensible phenomena, true knowledge (<i>episteme</i>) is impossible, unless there is a stable, eternal reality beyond the merely sensible. The <i>eidos</i> are that suprasensible reality and so the cause of <i>episteme</i> and the condition of all philosophical discourse.
Eidolon (Image)	In Homer, image, ghost, apparition - is an astral copy of a corpse.	In the Atomists' theory of visual perception (aesthesia - Sensation) Images of the same shape as the body are given off by the perceived object and enter the pores of the viewer. Plato uses "image" in the Sophist, and further divides it into "likeness" (eikon) and "semblance" (phantasma)
Epistemé (Knowledge)	Homer uses the word <i>Epistatai</i> with the meaning as know-how.	1] true and scientific knowledge, opposed to doxa 2] an organized body of knowledge, a science; 3] theoretical knowledge (opposed to <i>praktike</i> and <i>poietike</i>). <i>Eidos</i> and <i>episteme</i> are locked together from their first implicit appearance in Plato's dialogues Meno and Phaedo that strongly insists that true knowledge (<i>episteme</i>) of the Forms cannot come through the senses and so we must be born with it. The answer unfolds in the Sophist: the only true knowledge is a knowledge of the <i>eide</i> (idea) and its method is dialectic
Gnósis (knowledge, Gnosticism)		The general term for knowledge. Typical of this ordinary usage is Aristotle where gnosis and its equivalents embrace sense perception (aisthesis), memory, experience, and scientific knowledge (<i>episteme</i>).
Kinesis (Movement)		Anaximander, Anaximenes, Heraclitus posit an eternal motion. Xenophanes posits movement for all things except his God <i>kinesis</i> . For Parmenides, Melissus, Leucippus, and Zeno movement is an illusion.
Kosmos (Order)	In Homeric times, it meant adornment and also order and ornament of speech	Pythagoras was the first to use the term cosmos to refer to the order of the universe. Later the word became synonym of
Logos (Speech, account, reason, definition, rational faculty, proportion)		For Heraclitus <i>logos</i> is the underlying organizational principle of the universe. It is still material and can be identified with cosmic fire. Logos is also related to proportion. The <i>Logos</i> principle is perceptible only by the intelligence. Plato used the term logos in opposition to mythos, and identified it with true analytical account. Aristotelian use is logos as reason rationality, particularly in an ethical context,
Noein (To see, to think)	For Homer <i>noein</i> means 'to see'	For the Pre-Socratics <i>noein</i> becomes the verb that indicates 'to think' (<i>Noesis</i>), while <i>nous</i> designates

Noesis (Recognition)		the Mind. <u>Anaxagoras</u> was the first who is known to have explained the concept of a <i>nous</i> (mind). <i>Nous</i> is responsible to order things in the cosmos. Noesis: the operation of nous, thinking (as opposed to sensation), intuition (as opposed to discursive reasoning).
Nous (mind)	Nous is a kind of organ, which operates an activity. Homer also uses <i>nous</i> as mental activity	Reason, thought or consciousness
Physis (Nature)	The word physis was used by Homer in the sense of growing, becoming.	The <i>physis</i> of the earliest philosophers had movement and life. Parmenides removed movement from the realm <i>physis</i> through replacing it by two forces, <i>Love</i> and <i>Strife</i> . Plato finds faulty in contemporary views of <i>physis</i> is its materiality and the absence of design. It was to correct these two misconceptions that Plato chose <i>psyche</i> as a source of movement.
Psyche (Breath of life, ghost, vital principle, soul, anima)	Homer used the word as "breath of life" and associated with motion	The connection between psyche and breath is intermittent among the pre-Socratics. Anaximander said the soul was "airy", as did Anaxagoras. Heraclitus makes breathing part of the cognitive process, but only during sleep when the other senses are sealed off from the cosmic logos. Pythagoras considered psyche a property of numbers and different from matter.
Thumos, Thymo (Spirit)	In <u>Homer</u> <i>thumos</i> was used to denote emotions, desire.	

Sources: F. E. Peters, F.E. (1967) Greek Philosophical Terms: A Historical Lexicon, NY University Press; <https://www.ontology.co/aletheia-prephilosophical.htm>

Peters (Peters, 1967) provides a detailed analysis of the evolution and uses of key terms and concepts from Homer's time to the consolidation of philosophical language in Plato and Aristotle. The first philosophers, despite their revolutionary achievements, always owed a debt to the mythological worldview, but this debt did not prevent them from innovating thought, as is clear from looking at the table above.

It is worth elaborating a little more on a concept that is already included in the table above, and that had its origins in Homer, which is the concept of *epistatai*. This word is linked to the idea of know-how, meaning the practical knowledge to do things. However, *epistatai* is the root of *episteme*, later elevated to a higher level of abstraction by Plato. The concept of *epistemé* in Western culture has, in fact, reached the pinnacle of mental activity, creating the highest standards of thought in different scientific branches. It should be added that natural philosophers constitute a milestone in the activity of producing new representations of the cosmos that allowed the emergence of a new standard of explanation for the world, the emergence of the scientific narrative that, we know, was not homogeneous in its methods, but ended up consolidating itself in the western tradition. These new representations, as developed by the pre-Socratics, have a pattern, as we have already said. This pattern responds to the theme of the ultimate material constitution of the cosmos and the origin and status of motion and change, which have become of great importance, as these changes will no longer be in the hands of the Gods and Goddesses, but in the very nature of matter.

The intellectual material available to Greek thinkers was precisely the mythology of Homer and Hesiod, a world of supernatural gods commanding people's lives and the entire cosmos. It should also be said that in Homer, for example, there is a lot of information (let's say knowledge?) about astronomy (Genuth,1992), medicine and pharmacology (Vargoglis,2009), attesting the conceptual roots that made possible the later development of the scientific knowledge and philosophical language used by natural philosophers and beyond. As Snell indicated earlier, philosophical thought was stimulated by a changing language, which evolved from a sensitive consciousness to an abstract one. But this language is based on words as the main vehicle for concepts. Norman Austin (Austin,1973/1974) showed that the interpretation proposed by Snell should be deepened, since it is not just a matter of words, but a combination of words and sentences, as Wittgenstein (Wittgenstein,1948) also showed later.

We can say that abstract and universal thought was consolidating themselves, observation and analysis were being done, and more and more a new mental attitude was being adopted. This mental attitude, which needed an appropriate language to express itself, was what made the Big Bang of Natural Philosophy possible. Again, following Snell, *"the Greek language provided them, (the philosophers) through the definite article, with a convenient tool for constructing such abstractions: apeiron, "the endless"- in the same way that later philosophers continued to form such abstractions: to agathon, "the good," etc"* (Snell, 1953,51).

In addition to the evolution of language, the creation of new words and concepts, and new uses for existing ones, the general opinion is that the Greeks had a tendency to formalize their thoughts and linguistic products. Parallel to the philosophical development, a series of intellectual achievements were consolidated in written form and there are many indications that the pre-Socratics wrote important works in several areas of knowledge. Writing boosted the possibilities of storing knowledge, consolidating ideas, and enabling sharing and critical thinking. Nicholas Ostler in his book *Empires of Word* (Ostler, 2005) pointed out that in Greek culture there was a tendency to formalize its linguistic productions: *"Travelers' tales were organized and later presented as the first works of geography and history. Choral songs sung for inspiration at public gatherings such as athletics games have been preserved as lyric poetry. Religious liturgy, which was regularly held to expound and enact the myths of particular gods, was turned into drama; celebrants would now be seen as actors, their words not rituals but examinations of situations set out in ancient stories"* (Ostler,2005,277).

As we have seen, the Greek language evolved with the advent and consolidation of writing. The creation of universals, the flexibility of grammar and syntactic order, the use of prefixes and suffixes, as well as verb tenses were factors that, as Snell stated, propelled a new type of thinking that made the Big-Bang of natural philosophy possible. However, language as a modeler of thought requires an active mind prepared to receive modeling. The new mental attitude began with Thales, but it did not end with him. He was the first to propose a monistic and material explanation for the cosmos, but the process of perfecting and maturing the new style of representation lasted for over two centuries. Therefore, Thales represents the starting point of the Big Bang, the initial force that made subsequent movement possible. In the next section, we will see the advances of this propelling mechanism of the great revolution brought about by the pioneers. The activation of a mental activity that, as we have already mentioned, will be focused on the construction of new representations of the world, the scientific representations.

Finally, I would mention something that illustrates well the relativistic idea that language shapes thought. It is interesting to note that it took over 200 years after Aristotle's death for the Roman world to begin translating Greek philosophers into Latin. Perhaps the most interesting example to be mentioned is the one referred to the tribune Cicero (106 – 43 BC), who wanted to translate the philosophical concepts of Plato, Aristotle and others into Latin, since Roman domination already extended over a vast territory, even though the Roman Empire had not been created yet. The difficulties that arose were enormous, as the Latin language lacked the necessary vocabulary to translate Greek concepts. Cicero, then, begins to elaborate a philosophical vocabulary to fill this gap just to ensure “the right of Latin to become a philosophical language” as pointed out by Carlos Lévy. Many Enlightenment philosophers considered this initiative one of Cicero's greatest contributions to Latin culture. As also mentioned by Carlos Lévy, “many other philosophers throughout the history of philosophy have recognized Cicero's achievement, especially those philosophers who wrote in Latin. Seneca, Augustine, Thomas Aquinas, Descartes, Leibniz, among many others, testify that this Roman orator, so prudent in defining himself as a *philosophus*, made a valuable contribution to philosophy” (Lévy, 2021). Cicero's example shows that science needs a specific vocabulary, otherwise thoughts cannot be expressed. Greeks were the most important civilization when it comes to philosophy and science and even today many words of the scientific vocabulary come from Greek as well as many concepts science is using every day. Studies say that 30% of English words are Greek and the “vocabulary of the sciences and technology, the figure rises to over 90 percent” (<https://www.dictionary.com/e/word-origins/>). In summary, western thought is after all a by-product of Greek language).

6. A new Mind for a Literate Natural Philosopher

“Everything we hear is an opinion, not a fact. Everything we see is a perspective, not the true.” (Marcus Aurelius)

Using a contemporary analogy coming from the tech sector as mentioned in the Introduction, I can say that our analysis of the process led by the Pre-Socratics, as outlined in the previous sections, fits the pattern of *reverse philosophy* (this is an analogy with Reverse Engineering), that is, knowing a process through its product. In the present case we have the products or part of them and scholars have been trying to reconstruct the products and the processes of their production. It's not a simple task. However, the narratives about them and the one I make now should make sense in the general description of philosophical development. The products at our disposal are partial and difficult to rebuild. The “reverse philosophy” we are applying required the additional assumptions we have already mentioned throughout the text, namely:

- a) The Pre-Socratic Big-Bang was an extraordinary event; extraordinary events need extraordinary explanations;
- c) Internal cultural factors have greater weight than external factors
- d) The principle “language shapes the thought” in its strong version applies to the NPBB event
- e) Language/writing enabled the new Greek mental attitude towards natural philosophy connecting people's minds as never before.

In the previous section, it was mentioned the tendency to formalize language results by Greeks according to Nicholas Ostler studies. Writing is a practical result of using

language when there is an alphabet, vocabulary, and rules for constructing sentences (thoughts, ultimately). As Pinker said, "what is the trick behind our ability to fill someone else's head with so many different ideas?" (Pinker, 1999). The answer is: words and rules. Writing is, in itself, a revolutionary fact in human history, as it allows a type of mental association that is not available in an oralist culture. As mentioned, in oralism stories and myths are presented to audiences always in the present tense. There is no mechanism for comparison with the same story presented in the past and there is no way for the audience to make a critical assessment of what is being presented. In the case of writing, the process is different. The thought is recorded and allows it to be compared with other versions or other thoughts, to be critically analyzed and to be adapted, modified or even overcome. The incomparable advantage of writing is that it allows this mental connection between the writer, the sender of a message and the multiple readers, receivers of the message, preserving the nature of the message and preventing cognitive dissonance (Reece, 2009), so common in oral discourse. There is no corrosion of the message by forgetting, mishearing or a deliberate desire to change the interpretation. Writing preserves the sender's will as the nature of the message, even though possible differences in interpretations may eventually exist. The thesis that philosophy was born with literacy was contested by Leshner (Leshner, 1981), who says that the fact that both come at the same time is a coincidence and not a determinism. However, the theme of origin does not matter much here, but the fact that the existence of writing is undeniably a factor that makes philosophy viable.

We no longer need to stress the importance of this fact for nascent Pre-Socratic natural philosophy. What Thales and the first philosophers did was to create the scientific representation. These representations were subject to mutual criticism, but were able to evolve and have come down to us through commentators whose works have withstood the test of time. It is true that Thales, Anaximander and Anaximenes belonged to the same school and were able to exchange ideas and theories, enshrining divergences in texts, of which we only receive fragments, but which testify to our proposition about the connection of minds around scientific representations.

From the point of view of the abstract representation of the cosmos, the question first philosophers posed to themselves was: what is the basic matter of everything? What is the ultimate matter of the cosmos? This seems to be a simple question, but the answer is, without a doubt, very complex and has captured the attention of scientists until today. Thales' answer, as Aristotle shows us, was that water is the basis of everything. The assumption that everything is composed of water represented a revolutionary change in the history of thought, giving rise to Natural Philosophy and the unification of existing knowledge under the guidance of a new way of thinking. There is, however, a further development that we must mention. Thales' response inaugurates the monistic natural philosophy that is, the idea that the universe has an ultimate material constitution. Other philosophers followed him, in particular Anaximander and Anaximenes, who were his pupils.

The development of natural philosophy historically coincided with the consolidation of writing, in particular among the group of thinkers who pioneered the production of scientific and technical knowledge. It is attributed to almost all individual in the group of Pre-Socratics one technical or scientific work on particular issues. *On the Nature* is a title (even though a bit generic) that appears as the work of many of the authors as shown in the table below. The objective of the table is to show, in a summarized way, the main information available about the Pre-Socratics, in order to show that, in parallel with the cosmological representations, they also produced specific technical-scientific knowledge. This signals that the mental exercise that

produces the highest abstractions of natural philosophy could be being fed by this more immediate contact with the world of empirical perceptions. This is an important issue. What is the nature of a supposedly new Mind? In the context of the NPBB is the search for any evidence for a philosophical assumption. Natural philosophers were in such a way looking for empirical evidences for their philosophical assumptions, even though it was a non-linear process.

As can be seen from the second column, almost all of them sought to answer the question “what is the ultimate constitution of the cosmos?” and the answer obtained by each one of them leads, almost forcibly, to imagine that these philosophers had to think about the sequences of intentional mental states that can be evaluated regarding their adequacy and truth value, as it is conventionally called in the scope of the Representational Theory of Mind (RTM) (David, 2022). That is, somehow when Thales and the others offer a new vision of the world, they do so with the intentionality and expectation of truth value so that his peers could exercise the critical scrutiny. Thales said that the Earth was a disc floating on water and Anaximenes said that the Earth was a cylinder in the air. Later, Pythagoras admitted the Earth sphericity, another pictorial representation. It could be said that the mentioned philosophers faced the reason for building the “train of thoughts”, propositions leading to their cosmic representations. We might say that Snell’s phrase “*discovery of the mind*” in the title of his book makes more sense now. Even mixed in a mystic and religious society, natural philosophy was actually a conscious process, a way of establishing a sequence of explanatory arguments and the formation of new representations of the cosmos other than the one offered by Homer and Hesiod. From Thales on new generations of literate philosophes came up with new representations of the cosmos. Alphabet, writing, consciousness, imagination, and images are part of the cycle for the foundation of those scientific representations. Actually. It was the emergence of a new mind. Thales, Anaximander, Anaximenes, Heraclitus, Xenophanes, and others experienced the transition from mythological explanations of the world to a new conception that did not yet exist entirely, but was in formation, or rather, in transformation (Rorty, 1979).

Philosophers	Theory of matter	Other theoretical aspects	Works supposedly written
Thales of Miletus (625 – 546 BC)	Monist – Water is the ultimate source of matter. He was the first natural philosopher in history. Moist is the principle for generating things	The Earth floats in a great ocean and has a shaped-like a disc. Movement is generating by the Gods. “Things are full of Gods”. Beginning of pansychism.	Book: On the Solstice Book: On the Equinox There is some doubt that he actually wrote these books.
Anaximander of Miletus (610 – 546 BC);	Monist – Apeiron (the indefinite) is the source of everything. He was looking for a substance that could comprise the opposites in nature, such as wet/dry, hot/cold/large/narrow and so on. Water is always wet. Then it cannot be the principle. He succeeded Thales.	He envisioned the Earth at the center of infinite space, in which case it required no support as there was no "down" place to fall. The Earth has a cylindrical shape. Movement is eternal	The First World Map is attributed to him. Introduced the Gnomon in Greece
Anaximenes of Miletus (586 – 526)	Monist – Air is the original substance and the basic form of matter. It changes by	He believed the Earth was a disc. Air is always moving. Movement is eternal.	Letters to Pythagoras On the Nature

BC)	condensation and rarefaction. Since the air is uniform, it is not visible, but when set in motion, when turning hot or cold, when moistened, it gets perceivable shapes. He was pupil of Thales and also Anaximander.		
Heraclitus Of Ephesus (535 - 475 BC)	Monist - Fire is the ultimate source of everything. Logos (the intelligence that sustains human laws) Governs everything on every occasion.	Everything is in constant motion. Movement is eternal. "A person cannot step twice into the same river".	On the Nature
Xenophanes Of Colophon (570 - 478 BC)	Monist – the world is one and united. "One" is the source of everything, even though he did not define it.	He regarded the gods as coming out of human imagination	Discovered the fossils No book is known.
Pythagoras Of Samos (575 - 490 BC)	Monist – Numbers are the essence of everything. First to admit the Earth sphericity.	Change goes through the transmigration of soul.	On Education On Statesmanship On Nature
Parmenides Of Elea (circa 530 BC)	Monist – advocated the unicity of nature – The "One" is uncreated, indestructible, eternal and unchanging	Motion and change are illusions The appearance of plurality is illusion.	On the Nature
Zeno Of Elea (circa 495 – circa 430 BC)	Monist – He adopted and defended the Parmenides's doctrines of unicity of nature.	Motion and change are illusions The appearance of plurality is illusion.	Diogenes mentions 18 books. None survived. He is known by several paradoxes, now famous.
Empedocles Of Acragas (494 - 434 BC)	Pluralist – Four elements as sources of nature - earth, air (or <i>aether</i>), fire, and water.	Combination of elements plus the forces of Love and strife are responsible for all possible changes. All the objects are unstable compounds. Blending the elements brings about genesis and the creation of new things, and the dissolution of the mixture of elements brings about their decay.	On the Nature On Purifications
Anaxagoras Of Clazomenae (500 - 428 BC)	Pluralist - All the objects that can be seen are unstable compounds and made of a mix of elements and antagonistic properties (dry/ wet, hot/cold, heavy/light). He created the concept of <i>Nous (Mind)</i>	Mind is the moving principle. "All things were together; then came Mind and set them in order".	On the Nature
Melissus of Samos (5 th BC)	Monist – Same school of Parmenides and Zeno	Change and motion are illusions	On the Nature – The info came through Simplicius
Leucippus Of Miletus (circa 430 BC)	Atomist – Atoms are infinite in their form and their existence is within the void. Aristotle considers him as the inventor of the atomism	It has to be accepted that the atoms move within the void, otherwise there will be no movement. The movement of atoms is perpetual.	

Democritus of Abdera (460 - 370 BC)	Atomist who adopted the atomistic theory from Leucippus	The isolated atoms are not detected by the senses, but they can combine among them to form matter detectable by the senses.	Diogenes mentions 70 works on math, music, physics, and ethics. None survived
Protagoras Of Abdera (490 - 420 BC)	Man is the measure of all things; "of what is, that it is; of what is not, that it is not". He was convicted and all his books burnt.	He was the first philosopher who dealt with linguistics. He was concerned with the correct use of language to express his meaning. This led him to undertake the first historical analyzes of the language in the Greek world. He distinguished four different types of speech acts (petitions, commands, questions and answers) and three grammatical genders (masculine, feminine and neuter).	On the Gods

The fourth column mentions the works that each of the mentioned thinkers is supposed to have written (with the exception of Xenophon, Critias, and Gorgias). These works, as judged by specialists, sought to provide a characterization of certain events in nature in their scientific aspects. Two books on the solstices and the equinoxes are attributed to Thales; to Anaximander the sketch of the first map of the Earth. It is not really known the entire scope of those books. However, from what can be deduced, philosophers provided scientific explanations and through them they were able to make the leap to philosophical thinking. What is the relationship between these two things? How do these two types of representations connect to each other? On the one hand, there are evidences and facts collected directly through observation and, on the other hand, philosophical assumptions about the cosmic material constitution. What role did the early developments in geometry for instance play in formulating the representations of natural philosophy? These are questions that still have to be answered, which shall be done elsewhere.

7. Conclusion

Usually when we propose to carry out a non-empirical investigation, the conclusion, in a way, is already given from the beginning. I say this because empirical data can often contradict our working hypothesis, but philosophical investigation always starts from hypotheses that we already have framed under a theoretical structure and, therefore, we already expect a result. This was not the case for this paper.

The study of Greek philosophy is so vast and so surprising that we are never done making unusual discoveries. I believe that even for philosophers specialized in Greek philosophy (which is not my case), discovery is something constant. We studied different authors, read different papers and, suddenly, the idea comes to the mind. This happened when I started preparing a paper on mechanicism in philosophy. The idea was to show that a mechanistic interpretation of reality was not part of Greek philosophy. I started with the pre-Socratics and came across some questions for which I did not get a satisfactory answer. The most important of them were "how was the emergence of natural philosophy possible?", how to justify that suddenly, in just over 200 years, an amazing number of philosophers emerged in the same place? And talking

about the same things? From these questions came the analogy with the cosmological Big Bang. A starting point (Thales), an alphabet, writing, and the use of imagination. These were the main ingredients in the formation of the Greek Mind. A mind that started the greatest achievements of humanity, meaning philosophy and science as we know them today.

The paper analyzes the aspects of the development process of the history of Western thought. We begin with a brief history of linguistic relativism. We examine the trajectory of the hypothesis that language shapes the mind from the first German thinkers, through cultural anthropology, culminating with the Sapir-Whorf hypothesis. From there we move on to the more specific discussion developed by Bruno Snell, who is clearly positioned in the line that the development of Greek philosophical and scientific thought is a work resulting from the Greek language and, therefore, could not have developed anywhere else but in Greece.

We showed what the NPBB meant in terms of the philosophical movement and the conquests provided by the Greeks. We also showed the origin of this movement, the passage from the oralist society to the written society and its meaning for natural philosophy. We discussed the potential causes for the emergence of natural philosophy and divide the factors into endogenous and exogenous. This discussion resulted in the conclusion that exogenous factors always act bidirectionally, that is, saying that the Greeks were influenced by the Babylonians and Egyptians does not solve the theoretical problem, since the same question could be asked in relation to these other peoples. Why did natural philosophy not have its beginnings in these other regions under the influence of the Greeks?

We showed some concrete examples of how Greek stimulated philosophy through language, following the work carried out by Peters, a classic on this subject. Finally, we showed how from natural philosophy a series of other scientific developments took place. This theme was consolidated in a table summarizing the production of the pre-Socratics.

In methodological terms, my conclusion is that linguistic relativism can be instrumental to understand some specific situation and also the social behavior. It is a tool and its applications are not exhausted yet.

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