

Biology and Philosophy. VIII. Heidegger's aletheia, scientific method and the advancement of the exact sciences. Followed by some thoughts on the minds living in darkness and the origin of the countless superstitions of *Homo sapiens* and ending with 'Do elephants see Einstein's moon?'

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Abstract—Here I present some reflections on three topics that deserve to be scrutinized. The first corresponds to the connections between the concept of 'aletheia' in Heidegger, the scientific method, and the generation of new knowledge by the exact sciences. I defend the idea that, in some precise cases in the history of science, the concept of 'unconcealment' is applicable. The second theme focuses on the activity known in the West as exorcism from the point of view of the Lasègue-Falret syndrome. The central idea is that this activity is not treated as a psychiatric problem simply because it has been normalized in the sense of presenting it as an activity with a lawful historical basis. The third topic contains some comments on the well-known and unfortunate phrase of Einstein with the question if 'the moon exists only when I look at it'.

Index Terms—Aletheia, Archimedes, Einstein, exorcism, folie à deux, Heidegger, human primate, Kekulé, Lasègue-Falret syndrome, Newton, Paleolithic, Planck, Plato's Cave, unconcealment.

I. HEIDEGGER'S ALETHEIA.

Had the Greeks known something of this Western future, a beginning of philosophy would never have come about. Rome, Judaism, and Christianity completely transformed and adulterated the inceptual - i.e., Greek philosophy. (Martin Heidegger).

I.1. Truth and aletheia in Heidegger.

Heidegger is the most important philosopher of the twentieth century and will remain so forever, just as Nietzsche was in the nineteenth century. When Mario Bunge mentions Heidegger, he does so using pamphleteering and caricature language since he does not want or wish to understand him (or perhaps he could never understand him since his philosophy is not reducible to set theory) [1]. For the record, I admire almost all of Bunge's work.

In Martin Heidegger's philosophy, the concept of truth occupies a central place in his quest to understand human being and existence. Heidegger addresses the theme of truth

in his major work *Being and Time* and in other later writings, exploring how truth relates to being and how it influences our understanding of the world. For Heidegger, truth is not simply a correspondence between a statement and objective facts but involves a more fundamental process of discovery and revelation. Instead of thinking of truth as a property of propositions or statements, Heidegger conceives it as a form of unveiling being, as a way in which being shows itself (this comes indirectly from Heraclitus, 'the obscure'). According to Heidegger, we live immersed in a world in which truth is already present in a pre-reflective way. This original truth, which he refers to as 'aletheia' (ἀλήθεια, a Greek term translated as 'unconcealment' or 'unveiling'), is the process through which the being becomes visible and reveals itself. It is an act of discovery by which things and beings become present and meaningful to us.

Heidegger also distinguishes between truth as unveiling and truth as correction. Truth as correctness refers to the adequacy of a statement or proposition to objective facts. However, Heidegger considers this notion of truth as correspondence to be secondary and derives from truth as unveiling. Truth as correction is only possible thanks to the previous opening that provides the unveiling of being. In his analysis of truth, Heidegger also stresses the importance of language. He considers that language is the main means through which the unveiling of being takes place. Language not only describes or represents the world, but, more fundamentally, opens the world and allows things to show themselves in their truth. Language is a vehicle that allows us to experience and understand being. Hence the dramatic case of human primates who have a very limited knowledge and use of their own language: their 'world' is extremely 'narrow' and poor and in it automatism, prejudices, clichés, and a very bad management of basic emotions predominate.

In addition, Heidegger posits that the understanding of truth is closely related to our existence and our being-in-the-world. Our understanding of truth is conditioned by our existential situation, our concerns, and our cultural and historical context. There is no universal or absolute truth, but multiple truths that arise from our relationship to being. In short, for Heidegger, truth is not reduced to a mere

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correspondence between words and deeds but implies an unveiling of being. Truth is a process by which the self is shown and revealed through language and our existence. Truth is intrinsically linked to our understanding of the world and our relationship to being.

Heidegger asks: For what is, for example, a table? Just that which constitutes it into what it is, which corresponds to everything that is a table. What they all have mutually in common, what is common to every real table and to all possible tables, is the universal, the 'essence': what something is 'in general'. Let us examine the 'tables' for a moment. I know what a table is because, during my learning of my natural language, someone pointed to one and said, 'this is a table' or 'this is called a table' (ostensive). No one showed me all the possible tables (with three legs, four legs, one leg, several legs, square, rectangular, oval, round surface, etc., etc.). And yet it is enough for me to look at an object to tell if it is a table or not. And, for example, if we are in a forest and we have decided to put some drinks and some food on a stool (understood as a three- or four-foot seat and without a backrest) to devour it, I can say that it is a stool and not a table. Then we can perfectly say that the essence of the table coincides with '*so that it is used habitually*', in this case to put on it the food and drinks to take advantage of them. That would allow me to discard the stools and other similar objects, even if some of them were habitually used to eat by someone with some defect. Here it seems that we are facing the case of a coincidence between essence and habitual function. Therefore, in the intension of the concept 'table' we should include something like '*it is usually used as a support for solid and liquid foods before being consumed*'.

That is summed up by Heidegger this way: *This: that in what he says, it coincides with the things and situations about which he says something. That is, to be true the statement means to coincide. What then is truth? Truth is coincidence. Such coincidence occurs because the statement is governed according to what it says. Truth is righteousness. In this way, truth is the coincidence, founded on righteousness, of the statement with the thing* [2].

In a writing on Biology and Philosophy I made some comments on Plato's cave in which I essentially argue that we are all inside it, some closer to the entrance than others and that the proximity to the entrance was expressed as '*a progressive expansion of the apprehension of reality*'. I mention in passing that the history of the human primate clearly shows that hardly anyone is interested in these topics. As for the rest, they are so immersed in their primate affairs that they are no more capable of arriving at the truth, than frogs can fly, as Monsieur de La Mettrie said. I mention that much later I learned about Heidegger's writing about the cave which I will comment on elsewhere [2-5].

The question I ask myself is this one.

When we understand 'truth' as implying a process of discovery and revelation (unconcealment), are there stages or processes in the creation of scientific knowledge that can be called unconcealment? (I mean only in the case of the exact sciences).

In other words, is Heidegger's concept of truth as an unveiling or unconcealment compatible with the way in which scientific research that creates new knowledge

develops?

I may not be the first to ask this question, nor am I the first to write the answer presented here. I did not search for references in this regard because I am looking for my own answers to my own questions about the essence of my scientific work and my thinking capacity. I have always been ironic when I mention how happy the pre-Socratics must have been because they did not have to quote almost anyone.

I.2. The scientific method. Essentials.

Scientific knowledge is essentially constituted by a very long list of propositions that are true and that belong to the class of scientific propositions. This is the primary material that serves as the basis for the generation of new knowledge through the formulation and testing of scientific hypotheses, the proposal of theories and the discovery of laws of nature. That is why it is so serious that criminals disguised as scientists insert various kinds of falsehoods into the body of scientific knowledge to satisfy their personal motivations. But scientific propositions are not considered proven, even though they have been verified many times. On the other hand, any of them can be refuted based on a single observation that contradicts it. That is why scientific propositions have the status of provisional truths: science does not seek absolute truths.

In the exact sciences, truth is based on logic and empirical evidence. Logical principles, such as non-contradiction and the law of the excluded third party, are fundamental to establishing true propositions. These principles state that a statement cannot be true and false at the same time, and that any statement must be true or false. In addition to logic, the exact sciences rely on empirical evidence to establish truth. This involves the collection of observable and measurable data through experiments, observations, or measurements. Empirical evidence provides the basis for the construction of scientific models and theories, which are subjected to rigorous testing and verification.

In the exact sciences, truth is established through the scientific method, which involves formulating hypotheses, collecting data, analyzing results, and verifying the initial hypothesis. Experiments and observations are designed in a precise and controlled manner to eliminate bias and obtain reliable results. If the data collected consistently supports a hypothesis, it is evidence of its truth.

It is important to emphasize again that, in the exact sciences, truth is provisional and subject to revision and updating in the light of new discoveries and scientific advances. Scientists are constantly refining and expanding existing knowledge through new discoveries and technological advances. Accepted scientific theories are those that have been rigorously evaluated and supported by ample evidence but are always open to challenge and modification if new information or evidence emerges that contradicts them. That is why scientific progress also implies the overcoming of obsolete theories and models as new evidence is obtained or more complete explanations are proposed.

It is evident that the 'truth' in the exact sciences corresponds to the coincidence of a statement with the thing or with the phenomenon. And it is also truth as 'correction' when a proposition is adapted to newly discovered objective

facts. But, as we shall see, 'correction' is not incompatible with 'unconcealment'.

I.3. Unconcealment in research in exact sciences.

To apply Heidegger's concept of unconcealment to the progress of science implies considering how scientific knowledge advances and develops by revealing hidden aspects of reality. Here there are some key points to understand this matter:

I.3.1. As science progresses, new laws and principles are discovered that govern the machinery of the universe. These discoveries reveal hidden aspects of reality that we previously did not know. For example, the laws of thermodynamics revealed the principles governing the flow of energy and the transformation of heat into work.

I.3.2. Science allows us to understand and make visible what was previously invisible or incomprehensible. For example, with the advancement of microscopy, we have been able to see and understand the world of cells and microorganisms, which was unknown to us in the past. This type of revelation reveals a hidden reality that could only be intuited or speculated beforehand.

I.3.3. Through science, the fundamental structures and relationships underlying nature are revealed. For example, Einstein's theory of relativity revealed the relationship between space, time, and gravity, and transformed our understanding of physical reality. These revelations unhide essential aspects of reality that were hidden from us.

I.3.4. Scientific progress involves challenging and overcoming established paradigms and preconceptions. As scientific knowledge develops, previous theories and assumptions are questioned and reevaluated, allowing for greater unconcealment of reality.

Heidegger's concept of unconcealment can be applied to the progress of science by considering how it reveals hidden aspects of reality through the discovery of laws and principles, the revelation of invisible phenomena, the unveiling of fundamental structures and the overcoming of established paradigms. Scientific progress allows us to transcend the 'forgetfulness of being' and gain a deeper and more authentic understanding of the world around us.

In the West, the history of unconcealment begins with the transition from myth to logos in ancient Greece, which was a gradual and complex process that took place over several centuries. The transition from myth to logos is related to the development of the scientific method. Greek philosophers introduced systematic thinking, empirical research, and the search for causal explanations. They established methods for collecting data, making observations, formulating hypotheses, and conducting controlled experiments. These approaches laid the foundation for the development of science as a discipline. This change occurred mainly during the period of Classical Greece, spanning roughly from the fifth century B.C.E. to the fourth century B.C.E. It was in this fifth century, with the advent of pre-Socratic philosophy, when the transition from myth to logos in ancient Greece became more evident. Thales, Anaximenes, Heraclitus, and Empedocles begin this process. Philosophers such as Parmenides and his disciple Zeno of Elea sought rational and logical explanations about the nature of being and reality, challenging mythological narratives.

Then, Pythagoras and his school proposed the idea that the universe was ordered and governed by mathematical laws, laying the foundation for a more structured and rational understanding of the cosmos. The most significant change in the transition from myth to logos in Greece occurred with the philosophers of the Athens school, such as Socrates, Plato, and Aristotle. They emphasized the importance of logical reasoning and empirical observation in understanding the world. While they still recognized the value of myths and stories as symbolic and poetic expressions, they sought more systematic and rational explanations of the cosmos. Importantly, myths and mythological narratives never completely disappeared. Although their interpretation and understanding changed, they continued to be an integral part of Greek culture and imagery, and remained a source of inspiration for later literature, art, and philosophical thought.

So, for these men there has been a progressive withdrawal from the chains that tied us to myth (transition from cosmogony to cosmology). And in each of them, to a greater or lesser degree, there has been a certain unconcealment of the cosmos, and a certain 'personal' unconcealment (by asking themselves about themselves). We must insist that the personal unconcealment is personal and non-transferable. Let us also mention that this way of expanding our knowledge of the physical world inherited from ancient Greece is not the only way of knowing that can lead to a 'personal' unconcealment.

I.4. Brief mention of the evolution/unconcealment of the concept of gravitation.

The concept of gravitation has undergone a significant historical evolution over the centuries. Before Galileo's work, the gravitational interaction between celestial bodies was a hidden and mysterious phenomenon. Astronomical observations revealed patterns in the movements of the planets, but the underlying cause of these movements was not understood.

The unconcealment of gravitation begins with Galileo's contributions in the seventeenth century. Using the telescope, Galileo made detailed observations of celestial bodies and studied the motions of planets. His observations of the phases of Venus and Jupiter's moons provided empirical evidence that Earth was not the center of the universe, thus challenging the prevailing geocentric view. In addition, Galileo conducted experiments with objects in free fall and showed that all bodies fall with the same acceleration, unless they are affected by air resistance. These experiments and observations led Galileo to develop the law of falling bodies, which laid the foundation for the understanding of gravity.

The unconcealment continued with the formulation of the law of universal gravitation by Isaac Newton, influenced by the works of Galileo. Newton postulated that the force of gravity was a fundamental force acting between all objects with mass in the universe. This law revealed the existence of an invisible force that attracts bodies to each other, explaining planetary motions and falls of objects on Earth.

The unconcealment culminated for the moment with the development of Albert Einstein's theory of relativity in the twentieth century. The theory of general relativity proposed a new understanding of gravitation, considering it as a manifestation of the curvature of space-time caused by the

presence of mass and energy. This theory revealed a profound relationship between gravity, the geometry of space-time and mass-energy, providing a more complete and accurate explanation of gravitation.

In recent decades, advances in cosmology and quantum physics have led to a greater understanding of gravity. For example, loop quantum gravity theory and string theory are two theoretical approaches that attempt to unify gravity with other fundamental forces within the framework of quantum physics. Summarizing, in this process of unconcealment, the concept of gravitation has gone from being a hidden and mysterious phenomenon to being a fundamental force and a manifestation of the very structure of space-time. Through unconcealment, we have gained a more authentic understanding of gravitational interaction and its influence on the universe.

I.5. The evolution/unconcealment of the concept of the structure of the atom.

In ancient Greece, atomists, such as Leucippus and Democritus, proposed the idea that matter was composed of indivisible particles called atoms. These philosophers held that atoms were eternal, immutable, and existed in empty space. This atomistic conception already raised the notion that matter was composed of fundamental and indivisible units. However, the idea of atoms in ancient Greece was not supported by empirical or experimental evidence.

The unconcealment of the concept of the structure of the atom began with subsequent scientific experiments and discoveries. In the nineteenth century, Joseph John Thomson discovered electrons, negatively charged subatomic particles, and proposed the 'raisin pudding' model. This model suggested that electrons were embedded in a larger positive mass, like raisins in a pudding. While this model did not fully reflect the true structure of the atom, it represented an important step toward its unconcealment.

Subsequently, Ernest Rutherford conducted the gold foil experiment in 1911, which revealed the existence of a dense, small nucleus at the center of the atom and the empty space around it. This discovery revealed the internal structure of the atom and provided a new understanding of the distribution of charge and mass in atoms.

In 1913, Niels Bohr proposed his atomic model based on Max Planck's quantum theory. According to this model, electrons are at discrete energy levels around the nucleus and can only move between them by emitting or absorbing specific amounts of energy in the form of photons. Bohr's model was a breakthrough in understanding the structure of the atom and explained the stability of atoms. In the 1930s, it was discovered that the atomic nucleus contained not only protons, but also neutral particles called neutrons. This led to a better understanding of the composition and structure of the atomic nucleus.

With the development of quantum mechanics in the twentieth century, a more complete model of the structure of the atom was formulated. This model, based on quantum principles, describes the probability of finding electrons in different regions around the nucleus in the form of quantized orbitals and energy levels. These advances in quantum theory provided a deeper understanding of the electronic structure of atoms and their behavior.

Today, scientists continue to investigate and refine our understanding of the structure of the atom. Quantum theory and experiments in particle accelerators have made it possible to discover additional subatomic particles, such as quarks and leptons, which make up protons, neutrons, and electrons.

We can see that in this process of unconcealment, the concept of the structure of the atom has gone from being a mere philosophical speculation in ancient Greece to being an entity composed of a nucleus with protons and neutrons, surrounded by electrons at quantized energy levels or in defined orbitals.

I.6. The evolution/unconcealment of the concept of human evolution.

For much of human history, explanations about our origins and diversity as a species were based on myths, legends, and religious explanations. These narratives provided symbolic and metaphorical answers, but they did not reveal the hidden truth of our evolutionary process.

Unconcealment began with the pioneering work of scientists such as Charles Darwin in the nineteenth century. Darwin proposed the theory of evolution through natural selection, arguing that species change over time because of competition for resources and adaptation to the environment. This revolutionary theory revealed a natural mechanism that explained the origin and diversity of species, including the evolution of humans. Empirical evidence gathered by paleontologists, anthropologists, and geneticists supported Darwin's theory and contributed to the uncovering of human evolution. The study of human fossils, such as the discoveries of early hominids in Africa, such as Lucy and the fossils of *Homo habilis*, *Homo erectus* and *Homo neanderthalensis*, revealed tangible evidence of the early stages of our evolution.

In addition, analysis of human DNA has provided deeper insight into our evolutionary history. The study of genetic markers has made it possible to trace the migration and mixing patterns of human populations over millennia, revealing our genetic diversity and the interconnectedness between different human groups. The unconcealment in the development of the concept of human evolution has led to the realization that we share a common ancestor with other primates and that we have experienced changes and adaptations over millions of years. This understanding has led us to reconsider our relationship with other living things.

I.7. The evolution/unconcealment of the concept of dark matter.

In the case of dark matter, we can identify several aspects related to the unconcealment of this concept.

I.7.1 The beginning coincides with some observations that were not possible to explain with current theories. For example, measurements of the rotation speed of spiral galaxies and the study of rotation curves have revealed that stars in the outer regions of galaxies move at higher speeds than expected according to Newtonian laws of gravity. This discrepancy indicates the presence of additional undetected mass, which is attributed to dark matter.

I.7.2. Also, the gravitational lensing effect, where light from distant objects is bent due to gravity of an intermediate mass, has provided indirect evidence for the presence of dark matter. Gravitational lensing measurements in galaxy clusters

and galaxy collisions suggest the existence of a significant amount of invisible mass.

I.7.3. On the other hand, studies of the distribution of galaxies on a large scale revealed a structure of filaments and voids in the universe. Models incorporating dark matter predict and match this structure, while models without dark matter fail to explain it satisfactorily. Computer cosmological simulations incorporating dark matter have been able to reproduce the formation of large-scale structures, such as galaxy clusters and superclusters, which are observed in the real universe. These simulations validate the presence and importance of dark matter in the evolution of the universe.

I.7.4. On the other hand, the study of anisotropies in the cosmic microwave background (CMB) has provided valuable information about the composition and evolution of the universe. The CMB measurements support the existence of dark matter due to its influence on the formation of large-scale structures in the early universe.

I.7.5. Measurements of the polarization of the CMB have also provided information about dark matter. Data collected by the Planck satellite and other observatories have made it possible to investigate the effects of dark matter on the polarization of the CMB, supporting its existence.

As evidence for the existence of dark matter has accumulated, scientists have worked on developing theories and models that can explain its properties and behavior. This involves using gravitation theory, particle physics and cosmology to understand how dark matter interacts with visible matter and how it influences the structure and evolution of the universe. The unconcealment of dark matter is a constantly evolving process. As new data is collected and new research is conducted, our understanding of dark matter continues to evolve. This involves a continuous review and updating of existing knowledge and theories as more information about the nature and properties of dark matter is unhidden. In this case the physical evidence is still lacking.

I.8. The evolution/unconcealment of the concept of dark energy.

In the case of dark energy, we can identify several aspects related to its eventual unconcealment:

I.8.1. The unmasking of dark energy began with the observation that the expansion of the universe is accelerating rather than slowing down due to gravity, as initially expected. This discovery was made possible through the study of Type Ia supernovae, which revealed that cosmic distances are increasing at an increasingly rapid rate. This phenomenon raised the question: what force or form of energy could be driving this cosmic acceleration?

I.8.2 The unconcealment of dark energy also involved questioning existing physical theories about gravity and matter in the universe. Previous theories, such as Einstein's theory of general relativity, could not explain the observed cosmic acceleration. This led scientists to consider the existence of an unknown form of energy that had a repulsive effect on the expansion of the universe.

I.8.3. Unconcealing dark energy has required rigorous scientific research and the collection of empirical evidence. Scientists have used a variety of methods, such as astronomical observations, measurements of the cosmic background radiation, and studies of the large-scale structure

of the universe, to collect data and analyze it for evidence of the existence of dark energy.

I.8.4 As evidence for the existence of dark energy has accumulated, scientists have worked on developing models and theories to explain its properties and behavior. This has involved modifying existing theories of gravity and cosmology, as well as proposing new theories incorporating dark energy as a form of repulsive energy that dominates cosmic expansion.

We can see that the unconcealment of dark energy is a constantly evolving process. As new data is collected and new research is conducted, our understanding of dark energy continues to evolve. This implies a continuous updating of existing knowledge and theories, as well as the emergence of new questions and challenges that stimulate scientific research in this field. In this case physical evidence is still lacking.

We can then conclude in general form that scientific progress can be understood as a continuous process of unconcealment involving the revelation (understood as the manifestation of a secret or hidden truth) of new knowledge and understanding of the natural world. Through research, experimentation and the accumulation of empirical evidence, progress is made in the understanding of the phenomena studied. This process is ongoing and subject to revisions and updates. But there is something extraordinarily important to mention for future discussions: only for those who discovered what was hidden, the process was one of personal unconcealment and correction. That moment of discovery must have been a 'revelation' and a sudden mental expansion. For the rest of us it was no more than a simple correction, offered to us in books we read while studying.

I will present the examples of Max Planck, Isaac Newton, Archimedes of Syracuse, and Friedrich August Kekulé for a better understanding of the difference between personal unconcealment and correction.

In the case of Isaac Newton, a biography written by William Stukeley, one of his contemporaries, relates the apple story as Newton himself told it to Stukeley. The history runs as follows [6, 7]: *'After dinner, the weather being warm, we went out into the garden and drank tea under the shade of some apple trees, only he and myself. Amidst other discourse, he told me he was just in the same situation as when formerly the notion of gravitation came into his mind. Why should that apple always descend perpendicularly to the ground, thought he to himself, occasioned by the fall of an apple, as he sat in a contemplative mood. Why should it not go sideways or upwards, but constantly to the earth's centre? Assuredly, the reason is that the earth draws it.'* This last sentence corresponds to the moment of personal unconcealment. Today, when we study classical mechanics, we only acquire the results of Newton's subsequent work.

In the case of Max Planck, his personal unconcealment arrived when 'after a few weeks of the most strenuous work of my life, the darkness lifted, and an unexpected vista began to appear' (cited by Ohanian in [8]). Let us mention that this 'unexpected vista' allowed him to calculate later the magnitude of the Boltzmann's constant, a new value for Avogadro's number and the value of the fundamental electric charge of electrons and ions⁸. We cannot even vaguely

imagine what sensation Planck felt when the unexpected sight began to appear'.

The fact that allowed Kekulé to propose the cyclic structure for benzene comes from a dream. It is known (at least it has happened to me twice) that, when a scientist is in the middle of an authentic creative process whose solution or solutions escape him, while he sleeps it seems that some brain areas are activated and work on the problem. Many readers will remember the times they have woken up with the solution to some problem (scientific or not) that the night before seemed to have no solution. And some will remember what they dreamed that night. Bentley's translation has been used here (I added some comas and made some slight modifications) [9].

'I was sitting writing at my textbook, but the work did not progress; my thoughts were elsewhere. I turned my chair to the fire and dozed off. Again, the atoms were gamboling before my eyes. This time the smaller groups kept modestly in the background. My mental eye, rendered more acute by repeated visions of the kind, could now distinguish larger structures of manifold conformation: long rows, sometimes more closely fitted together all twining and twisting in snake-like motion. But look! What was that? One of the snakes had seized hold of its own tail, and the form whirled mockingly before my eyes. As if by a flash of lightning I awoke; and this time also I spent the rest of the night working out the consequences of the hypothesis' [9]. Kekulé's internal experience is not available to us. Its results are inside an organic chemistry textbook where we are provided with information about the structure of benzene.

Regarding Archimedes, we will use the account of Vitruvius [10]. The history is as follows (several have suggested that this story would not be real but, given the little information available, this hypothesis is somewhat weak): *'Hiero, after gaining the royal power in Syracuse, resolved, as a consequence of his successful exploits, to place in a certain temple a golden crown which he had vowed to the immortal gods. He contracted for its making at a fixed price and weighed out a precise amount of gold to the contractor. At the appointed time the latter delivered to the king's satisfaction an exquisitely finished piece of handiwork, and it appeared that in weight the crown corresponded precisely to what the gold had weighed. But afterwards a charge was made that gold had been abstracted and an equivalent weight of silver had been added in the manufacture of the crown. Hiero, thinking it an outrage that he had been tricked, and yet not knowing how to detect the theft, requested Archimedes to consider the matter. The latter, while the case was still on his mind, happened to go to the bath, and on getting into a tub observed that the more his body sank into it the more water ran out over the tub. As this pointed out the way to explain the case in question, without a moment's delay, and transported with joy, he jumped out of the tub and rushed home naked, crying with a loud voice that he had found what he was seeking; for as he ran he shouted repeatedly in Greek, 'Ευρηκα, ευρηκα''.*

To me it seems natural that Archimedes ran naked shouting Eureka! since nudity was natural in those times and Eureka! was an interjection without offensive meaning. Many must have laughed. His rush was the result of his spontaneous

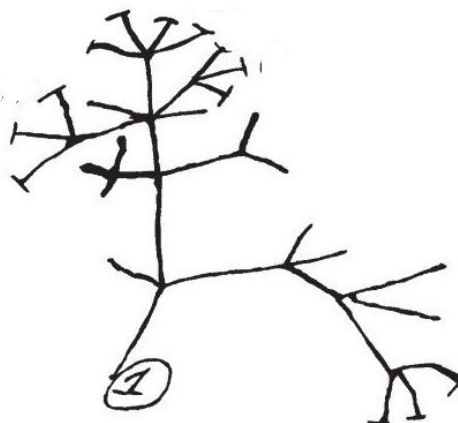
understanding (his personal unconcealment) of the problem.

I think that what has just been written is a good starting point.

II. EXORCISING THE EXORCIST: ABOUT A MIND PLUNGED INTO DARKNESS.

II.1. The complexity of the origins of belief formation.

Let us take advantage of this section to first present a picture that represents the extraordinary variety and number of current beliefs. We shall employ the *Homo erectus* geographical expansion as a basic example. They were the first human ancestors to spread throughout Eurasia, a little over two million years ago, with a continental range extending from the Iberian Peninsula to Java. Now, we will represent the wanderings of this species using Darwin's tree of life:



The number '1' will represent the first group of *Homo erectus* moving out of Africa. A kind of phylogenetic tree.

I assumed that it was at least one group because they survived until relatively recent times. The rest of the tree shows possible fates of their descendants: some evolved and transformed into Neanderthals, Denisovans, Men of Flores, etc. Others remained as such. And each time a group separated and followed another route, it had various experiences that were left in the collective: earthquakes, eruptions, floods, large local thaws, encounter(s) with large groups of predators [11], etc. By the way, some groups were geographically close which allowed them to interact. Now add other possible migrations of *Homo erectus* and the situation of each of those final ends of the tree becomes more complex. We can assume with some certainty that only about 50,000 years ago some specimens, mongrels according to my model, began to 'cross' into a new internal state. That 'crossing' defines the before/after line.

Let us add some about the before/after separation. On the 'before' side we have a species behaving only like other animals: being born, living, reproducing, and dying. There were no such things as beauty, functionality, unpredictable events, etc. The probable date of the before/after point in Eurasia should be placed around 40-50 kyr ago. It is after the 'after' when some human primates begin to ask themselves, in their own primitive way, *'why is the world [the world surrounding them] like this?'*

It should be mentioned that the mere existence of Neanderthal constructions inside the Bruniquel Cave,

approximately 176,000 years ago, strongly suggests the existence of 'before/after' transitions at dates much earlier than those proposed for *Homo sapiens* [12]. Mention should also be made of the recent analysis of some engravings made on one of the walls in La Roche-Cotard (central France), which are undoubted examples of Neanderthal abstract design. That's because they are dated more than 57,000 years and were made before the arrival of *Homo sapiens* [13]. Perhaps we shall discover in the future that Neanderthals had their own 'before/after' moment long before *Homo sapiens* arrived and copulated with them, and that it was finally those mongrels (we!) resulting from miscegenation with Neanderthals (and also with Denisovans in Asia) who learned to paint on the walls of European caves and on the island of Sulawesi.

In any case, whatever the moment of the 'before/after' transition, those who had it, who asked themselves the question mentioned above (they or their descendants who already lived in the 'after'), and who already had a 'mental' development to give themselves some answer, probably developed some basic conception of what much later they would call 'forces' or 'supernatural beings'. It is what Bruce Dickson called 'individualistic cult' [14]. Also, the existence of nonutilitarian objects (defined as objects that have no apparent functional link with any technical activity or food procurement), should be considered as evidence of symbolic behavior (the question is to prove beyond all doubt that a given object is really utilitarian) [15,16]. There may also have been nonutilitarian activities (recent examples are some cave paintings) but determining when the first of them developed seems difficult.

It seems clear then that trying to create the family tree of beliefs is an impossible task at the moment. For example, to suggest that all cults and rites involving trees have the same origin is bold. It is possible to hypothesize this for groups temporally and geographically very close, but it is a much more complex matter to do so when there is neither temporality nor geography nearby. Let us remember from biology that parallel evolution is the similar development of a trait in distinct species that are not closely related. Perhaps there are similar cases in the question discussed here.

I think that what has just been written is a good starting point.

II.2. Darkness.

The advances of the exact sciences and some non-exact sciences have helped, and I say this metaphorically, to build luminous beacons on islets that emerge in the blackness of the sea of ignorance. But as science advances according to its own method and speed, there are still lands plunged into the most complete darkness in which countless human primates live.

Now I am going to make some comments about a human primate who says he is an exorcist. I must say that for this task I have consulted several of his works [17-22]. What I write here may be very hard, but it is a product of the conviction I formed when reading. I am going to comment in brief on one of those texts [22]. The book oozes pride and vanity under a layer of apparent humility that is only hypocrisy or ignorance. For this reason, I will only dedicate the comments it deserves and nothing more. I invite the curious to read it carefully.

The first thing to say is that it is truly regrettable, given the age of technology available to almost everyone, that there is no video backup of some sessions (we are usually told that it is not allowed, that privacy cannot be violated, etc.). It is unfortunate because, if there had been that support, physicists would have already solved the problems of levitation, telepathy, telekinesis, etc. (yes! I am ironizing, but the texts claim that these 'events' existed).

And what do we have in terms of cases that ended up in the hands of this guy? We have a human primate that maintains several beliefs from culturally very primitive peoples. These 'beliefs' still obscure the minds of many human primates (I once said that these superstitious beliefs are sometimes evolutionary defenses since they have antipsychotic and tranquilizing properties). And who gets into their hands? Human primates who, by definition, believe the same things. Many of them are willing to accept 'whatever comes' since, according to the exorcist, they were previously treated by specialists who could not 'cure' the symptoms (if they existed).

And is there any explanation for this group phenomenon? It exists and is called Lasègue-Falret syndrome [23,24] (also shared psychosis or shared delusional disorder). Depending on the number of human primates involved and their family relationships, we may have cases of *folie à deux* ('two'), *folie à trois* ('three'), *folie à quatre* ('four'), *folie en famille* ('family madness') or *even folie à plusieurs* ('madness of several').

I invite the reader interested in mental disorders to read these texts from the point of view of the Lasègue-Falret syndrome. It is possible to draft a good article with that vision. I say that because there is, to my knowledge, no treatment of exorcist activities from that point of view. And why don't they exist? Simply because this type of activity is accepted by a significant crowd of human primates of certain latitudes and temporalities. Too bad that even people who were supposed to be cultured and intelligent do not understand it (Karol Józef Wojtyła for example).

I think that what has just been written is a good starting point.

III. DO ELEPHANTS SEE EINSTEIN'S MOON?

The wind off the Uji river adds to the luster of this moon that shines as it has always shone in this stream that flows as it has always flown.

(Gotoba's Moon in the water poem)

III.1. Introduction

Heidegger said that '*the supreme human action is thinking authentically, and authentic thinking consists in corresponding to a claim that being makes on us.*' The text that follows was written as an imperative need to do so. Since the days of Einstein's hagiography are finally over, the freedom to write the comments that follow is more protected from the action of the remaining inquisitors, worshipers, and licksters [25,26].

Here I will present some comments on the following expression by Albert Einstein: *Is the Moon there when nobody is looking?* Before that, I am going to present some comments that should be prior to the central theme and that

should serve as a framework.

III.2. About superstition.

On the website www.etymonline.com we may find the following two definitions:

Superstition (n.). early 13 c., "false religious belief; irrational faith in supernatural powers," from Latin *superstitio* (nominative *superstitio*) "prophecy, soothsaying; dread of the supernatural, excessive fear of the gods, religious belief based on fear or ignorance and considered incompatible with truth or reason," literally "a standing over," noun of action from past participle stem of *superstare* "stand on or over; survive," from *super* "above" (see *super-*) + *stare* "to stand," from PIE root **sta-* "to stand, make or be firm." There are many theories to explain the Latin sense development, but none has yet been accepted; de Vaan suggests the sense is "cause to remain in existence." Originally in English especially of religion, sense of "unreasonable notion" is from 1794 (from www.etymonline.com).

Superstitious (adj.). late 14c., "involving faith in supernatural powers or magic; characteristic of pagan religion or false religion," from Anglo-French *supersticius*, Old French *supersticios*, or directly from Latin *superstitiosus* "prophetic; full of dread of the supernatural," from *superstitio* "prophecy, soothsaying, excessive fear of the gods" (from www.etymonline.com).

To what is mentioned above about 'religion,' we must add that there are also superstitions of another sort, such as political, economic, and social. A very well-known example is this one: 'God does not play dice with the universe.' An additional example is 'the history of all hitherto existing human society is the history of class struggles' (Peter Sloterdijk said: 'Communism was also always an imperialism, a social imperialism. It was also understood in a missionary way, it was a symbolic imperialism. It was, if one will, a second Catholicism. Communism was Catholicism without God which then directed itself towards all', [27]). This political/religious superstition produced tens of millions of deaths and created the largest system of concentration camps and forced labor in human history. Let us add that there are also scientific superstitions, such as the association between the 'impact factor' and the quality of the research.

We must then agree that the people who cite the aforementioned pair of examples must be called superstitious. And, if you are a person doing authentic scientific research (the role of scientific research is to prove the truth or falseness of scientific hypotheses), you will agree with me that trying to take advantage of a fame as a scientist, deserved or not, to insert a superstitious comment within a scientific context, knowingly and subtly or due to lack of a clear understanding of the damage or confusion it can cause, is an unacceptable attitude. If some non-scientific phrase is slipped to one or more listeners by some famous scientist, there is always the possibility that his followers and/or worshipers will be willing to accept it as 'the word of the Lord' (*magister dixit*). But in this case, the obligation of this scientist is to stop these intellectual excesses and provide a clear answer to his own question or at least make it clear that it does not fall within the scientific scope.

Homo sapiens are not fallen angels but risen apes [28].

Some scientists, moved by vanity or some other reasons with a psychological/biological basis, begin to believe that they have grown wings and begin to 'preach' on subjects in which they have no authority. That is not the problem, but the enormous mass of listeners/readers who are not clear about what the Appeal to False Authority fallacy is. They constitute the multitude of worshipers of any given individual and are intellectually dangerous because of their intellectual blindness.

Personally, I find it deeply disturbing to see how incense is burned every day in front of phrases that seem to have great philosophical or scientific depth. Interestingly, and in the case of those scientists who pronounced some of them, they never bothered to answer them or make any profound comment about them. That is the case with, for example, of the infamous Schrödinger's cat (I am referring here to the cat as a physical object and not to the 'cat states' of quantum mechanics) [29].

III.3. The Moon(s).

It seems that this story is as follows. Abraham Pais recalled that 'during one walk Einstein suddenly stopped, turned to me and asked whether I really believed that the moon exists only when I look at it' [30].

Let us begin by agreeing that, from sunset to sunrise, a thing that appears to be an object that we have agreed to call 'the Moon' appears and crosses the sky. On January 4, 2023, Wikipedia describes the moon this way: 'It is the fifth largest satellite in the Solar System and the largest and most massive relative to its parent planet, with a diameter about one-quarter that of Earth... The Moon is a planetary-mass object with a differentiated rocky body, making it a satellite planet under the geophysical definitions of the term and larger than all known dwarf planets of the Solar System. It lacks any significant atmosphere, hydrosphere, or magnetic field. Its surface gravity is about one-sixth of Earth's at 0.1654 g.'

All that brainy description is probably true. The problem I am facing is this. The only thing I see when I look at the moon is that it is an object of a certain shape, with certain colors, which seems to shine, etc. Our Moon belongs to the class of Moons, containing all the astronomical bodies orbiting a planet, a dwarf planet (Pluto and Charon for example), a small solar system body (Dactyl for example) or even another moon (Tethys' two moons, Telesto and Calypso for example). It also includes all moonlets. But, regarding size, the lower and upper limits are vague. I mention this because if we are interested in building the intension of the concept 'moon' and include 'size,' we should expect intensional and extensional vagueness.

Let us start with one of the most obvious answers first. From it we will build our reasoning. Grodzicki made an interesting exposition about empirical and theoretical concept formation [31]. I cite: 'The empirical approach is object-oriented in that it starts from real objects and describes them as complete as possible by all properties observed under various conditions. Subsequently, among all of the possible properties assigned to the object itself, those that are considered to be essential are determined and selected. This selection of properties may be referred to as idealization: a real system is transformed, in thought, into an idealized object that exclusively possesses the selected

properties' [31]. This is nothing new. During 1662 Arnauld and Nicole stated that: 'In the universal ideas it is important to distinguish between the comprehension and the extension. We call comprehension the attributes that an idea includes and that cannot be removed without destroying it. We call extension the objects to which said idea can be applied: thus the idea of Moon applies to all different moons' (I replaced triangle by Moon) [32].

'A property of the first type is definitely the existence of macroscopic bodies: that a tree, a mountain, or the moon exists when nobody looks at it, is rarely put seriously in question. At least, I do not know any physicist who stays in front of his apparatus during a longer measurement because he is afraid it could vanish if he were not looking at it anymore. Existence can thus be taken as an attribute that is assigned to a body independently of perception and human consciousness, and may be called, in this respect, an objective property' (Ref. [32], p. 92). It seems clear to me that the property of 'existing' must be included in the intension of the concept of 'Moon' but, from a more general point of view, one can argue about the need to ask and analyze the idea that if the 'Moon' appears before us due only (or not?) to the 'partition' of the world that our sensory systems make, products of natural selection and survival of the fittest.

What you must do now is gather about 1,000 people in a large empty space, tell them to look at the moon for 10 minutes (approximately) and then write on a piece of paper the list of the minimum properties that make them say that they look at 'the' Moon. Theoretically, these lists make up what we could call the 'personal or individual intension' of the Moon. And certainly, those lists will not be identical. And yet, we all agree in a group when someone points to 'her' and says 'there is the Moon'.

In short, the question if 'the moon exists only when I look at it' is an extremely vague question: if for example Einstein read this text and because of it gave him a heart attack, what we can say definitively is that 'Einstein's Moon will never appear again'. And, when I die, 'my moon' will never be seen by anyone again.

The simplicity and crudeness of natural language conceals the fact that, when employing a concept of everyday use, the apparent coincidences that seem to exist in a group of human primates may not be such.

As to whether elephants see Einstein's moon, the answer is that they do not. About what they see when their visual system points to what we call 'Moon', we have no idea what they see and if they all see the same 'thing.' Maybe if we ever communicate with them, or with dolphins, or with orcas or with chimpanzees we can learn more.

I think that what has just been written is a good starting point.

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computers, from electric submarines to television, from infrared technology to intelligent missiles. Engineers and scientists in the hard sciences were the academic sectors that most supported Hitler's rise. In reality, the Third Reich was a model of the most radical and effective scientism."

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