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The Science of Physics and the Philosophy: Its Possible Reduction to the Philosophy of Aristotle and Thomas Aquinas

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Abstract: My thesis in this work is that unless Modern Physics (or, in general, Science), which is imbued with the Cartesian method, changes its scientific method so that it (theoretical and experimental), (or another Science that will "arise"), can explain the Essence of Man-Nature, according to the Philosophies of Aristotle and Thomas Aquinas.

Keywords: Relativistic biology; Experimental science; Essence; Scientific method, Unified field theory.

1. Introduction

According to Caruso & Oguri (2006, p 01), one of the greatest legacies of human history is the construction of what can be called a scientific cosmovision. The process of building this method corresponds to the origin and strengthening of philosophy and physics in ancient Greece. In this way, the scientific cosmovision can be understood as a new look at nature, that is, at the *physis* as understood by the Greeks.

It is important to understand that this historical moment marks the beginning of a drastic change in man's activity in relation to *physis* of great relevance to Western Thought, which would later be reflected in a striking way in modern physics. It is in this very rich period of almost two centuries, that the rupture with the mythopoetic conception of nature, until then predominant, begins and materializes, and some traits that will mark the cultural trajectory of the West are affirmed. On the one hand, the search for a vision of *physis* based on causal relationships established from reason, whose precursor was Aristotle, on the other hand, the idea of simplicity manifested since when one seeks to rationally understand nature from a single principle, from a primordial matter organized by the action of opposites and finally the guiding idea that there is a Cosmos. For the Greeks, Cosmos means an organized whole. We can say that the paradigm shift occurred in the passage from myth to logos.

This rich awakening of reason corresponds to the period between the seventh and fourth centuries BC and had its origins in the so-called Ionic School, whose first members originated from the city of Miletus, located on the coast of Asia Minor. Many scholars emphasize that this is the landmark of European philosophy. But it needs to be made clear that there is no clear demarcation line between pre-rational, mythical (or based on anthropomorphic conceptions) thinking and rational thinking, announcing a scientific view of the world. For a long time voices from the two streams of thought coexisted in an attempt to explain the cosmos.

The members of the Ionian School were mainly concerned with explaining the physical nature of the world. The fundamental question that Thales and so many others have posed can be formulated as: can all things be seen as a simple reality appearing in different forms? (Caruso & Oguri, 2006, p 02)

The striking feature of Thales' work lies in the search for the understanding of nature in a rational way, postulating that it is linked to a single principle. His ideas are justified not in terms of gods or supernatural forces, but in terms of logic. Thus, an important contribution of Thales concerns the development of the method of systematic proof. To this end he taught how to deduce propositions from axioms, or from simple principles, which seem indubitable, an essential ingredient for the rationalization of *physis*. In today's intellectual context, marked by pragmatism and immediacy, it is not too much to remember that Thales was moved mainly by intellectual curiosity and not by any kind of practical need, in the utilitarian sense currently employed (Caruso & Oguri, 2006, p 02-03).

It is worth noting that so far all attempts to formulate a rational explanation for the *physis* have encountered the “unity x variety” dichotomy. The enormous variety of things and events that make up the world is opposed to any attempt to understand nature on the basis of unity. Understanding nature rationally requires the establishment of logical criteria, which implies the search for an order in the world, which in turn corresponds to the recognition of what is equal, reinforcing the idea of a fundamental unity. And what would be the consequences of this stance?

On the one hand, it could lead at the limit to the conviction of the existence of a fundamental principle, but at the same time it would present great difficulty for the infinite variety of things to be derived from this single principle. This problem is still current and is most likely an epistemological barrier to unification theories in physics, such as that of Albert Einstein's unified field (1919 as cited in Caruso & Oguri, 2006, p 05).

With the beginning of the Italian Renaissance came a growing interest in nature. It was more precisely in the sixteenth and seventeenth centuries that natural science changed its method of Investigation. Through various discoveries, such as astronomical observations, which made it possible to describe the mountainous aspect of the lunar surface and the revelation of numerous stars hitherto unknown, it is that innovations in physics and astronomy began to occur. It is from there, in the seventeenth century, that Galileo Galilei (1632 as cited in Caruso & Oguri, 2006, p 25-26) begins to explain phenomena through natural causes. The interest in combining empirical knowledge with mathematics, as occurred with the work of Galileo, was the reason for the emergence of this new scientific method.

Then, mainly with the emergence of Galileo's works, there was a rapid and drastic change of the cosmovision of the world. *Physis* began to have an experimental vision, it became a problem of measurement.

The project of the Enlightenment is contemporary to the Renaissance. According to Grenz, 2008, pp. 14-15, the intellectual search of the human being had chosen as its objective to reveal the secrets of the universe to put Nature at the service of man, thus creating a better world. This search culminated in modernity, which commitment has been to infuse into life a rational management capable of perfecting human existence through technology.

The project of the Enlightenment brings in its foundation some epistemological assumptions. The modern mind specifically assumes that knowledge is accurate, objective, and good. Furthermore, moderns assume that, in principle, knowledge is accessible to the human mind.

The demand for a certain type of knowledge makes the modern researcher look for a method that demonstrates the fundamental correctness of philosophical, scientific, religious, moral and political doctrines. The Enlightenment method places many aspects of reality under the scrutiny of reason and evaluates that based on this criterion. This means that this method firmly believes in the rational capabilities of the human being. The Enlightenment perspective assumes that knowledge is not only accurate (and therefore rational) but also objective.

According to Grenz, 2008, pp. 121-122, after a solitary journey of ten years through the mountains, Zarathustra, at the age of forty, decided that it was time to return to the Society of men. He came to a town near the forest. As he entered the village, the hermit who was returning to the men's company noticed that the townspeople were crowded in the market. To this group of people Zarathustra preached the death of God and the coming of the superman.

The publication of *Thus Spoke Zarathustra* (1883), Friedrich Nietzsche's fanciful account of the teachings of this legendary character, marked the beginning of the end of modernity and the gestation of the postmodern period.

Postmodernism implies a radical rejection of the Enlightenment project, the modern technological ideal and the philosophical assumptions on which they are based. Adherents of the Enlightenment project seek to unveil the central unit that sustains the apparently disconnected flow of all experience. As for the source of this unity, modern thinkers turn to human culture, universal history, or nature - above all, however, they start with the human person, the self.

Postmodernism is marked by the rejection of this enterprise. Postmodernists have come to the conclusion that all attempts to describe an objective, unifying center - a single real world - behind the flow of experience are destined to fail; in the end, they produce only fiction, creations of the human mind. By separating human explanation from the notion of an underlying subjective world, the postmodern critique of modernism (Enlightenment) sets us apart from *things* and leaves us only with the *words*. It also separates us from the Enlightenment ideal of *I* human.

The physicists and their theories described here can be found in Alonso & Finn, 1992. According to Grenz, 2008, pp. 78-82, modernity was born out of the intellectual revolution. The spark of the specific scientific dimension of this revolution was launched by Galileo Galilei and reached its climax with Isaac Newton.

Galileo's innovation consisted in his attempt to interpret the world from a strictly quantitative point of view, as has already been seen. Experience that produces quantifiable results (i.e., numbers rather than non-numerical qualities) has become the main technique of the emerging scientific enterprise. The emphasis on numerical measurements gave scientists a feeling that they were working in a field of research that produced accurate and unambiguous knowledge. Organized into equations, such knowledge gives expression to laws or patterns within the framework of nature itself and can therefore be used to predict other natural occurrences.

The impetus given by Galileo and Newton led modern thinkers to reject the organic worldview that dominated the ancient understanding, replacing it with a mechanistic understanding.

In the midst of its greatest technological triumphs, however, certain fundamental aspects of the modern scientific cosmovision have been shaken from the inside out. The most devastating internal challenge came from physics, the discipline that had given him his strongest foundation. Discoveries in the early twentieth century

cast doubt on the modern assumption that the universe had a consistent internal order, easily comprehensible and imaginable by the human mind. The mechanistic model, which had previously seemed unquestionable, had come under increasing fire as evidence accumulated that there are many other things in the universe that are practically indescribable and even unimaginable.

At the beginning of the twentieth century, Max Planck declared that, at the atomic level, energy presents itself in distinct "packets" (quanta) and not in continuous flow. Albert Einstein, in turn, observed that light is not only a wave but also a torrent of distinct groups of energy (photons).

Parallel to the development of quantum theory, there was another series of discoveries, which I refer to generically as relativity theory, in which Einstein undermined the apparently rational notion that space and time are absolute. He refuted the old belief that length and time can be measured based on absolute standards, as will be seen in item 4.

Adherence to a set of procedures accepted by the scientific community can guarantee us a relative objectivity on the part of the observer, but no experimental report is capable of producing a purely objective and uninvolved observation.

Postmodernists insist that we are not spectators simply contemplating the world, but participants in what we seek to know.

2. Methodology

The methodology used is reflective thinking and bibliographical research. I have been researching and reflecting on this topic since I was studying physics at the University of São Paulo in the seventies.

In 2017 I finished my bachelor's degree in Philosophy at the Federal University of Paraná; which provided me with a greater philosophical vision about the context of this work. During this time, I realized that Physics, or in general Modern Science, with its experimental method, could not explain the Essence of Man-Nature.

From then on, I began to research and make notes from bibliographies, mainly of Aristotle and Thomas Aquinas, such as the five volumes of the *Summa Theologiae* (Aquinas, 1955), a *Summa contra Gentiles* (Aquinas, 1937), *The spirit of Medieval Philosophy* (Gilson, 1952), the seven volumes of *Physics* from Aristotle (1831), a *Metaphysics* (Aristotle, 2012) and the *Organon* (Aristotle, 1987). Such philosophies allowed me to base this article.

3. Some thoughts on experimental physics

The world is made up of facts, phenomena that impress us. These phenomena are not unrelated. For example: there are the phenomena of atomic physics, nuclear physics, particle physics, the physics of electromagnetism, etc. The way we interpret these physical phenomena makes the science of Physics possible.

The controversial positioning of how to do science is based mainly on empirical and rationalist conceptions. In both empiricism and rationalism there is the category of causality. It's important to emphasize causality, because it's also the difference between classical and modern physics. Relying entirely on one philosophical aspect, the idea of causality is inseparable from its effect: namely, the change of motion.

Causality in its most general meaning is the connection between two things, by virtue of which the second is predictable from the first. Historically this notion assumed two basic forms: i) the form of rational connection, by which the cause is the reason for its effect and this is deducible from it and ii) the form of empirical or temporal connection, by which the effect is not deducible from the cause, but is predictable on the basis of it, by the constancy and uniformity of the relationship of succession.

Pierre Duhem's article (1894) deals with classical experiments where determinism is present. Modern physics (quantum physics) contains the decisive concept that in nature we determine not the occurrence of an event, but the probability of an event happening. Thus, ends classical determinism. Quantum mechanics indicates at least two innovations in relation to the classical one: i) the fundamental roles acquired by indeterminism and ii) the special status assigned to the act of measurement. It can be said that not only in physics, but also in all modern science, the central problem is related to the problem of measurement. Thus, quantum physics, with another ontological status, represents a generalization of classical physics, along with Albert Einstein's General Theory of relativity (Alonso & Finn, 1992) which includes classical physics as a special case.

According to Duhem (1894, p 190), experimental physics makes measurements accompanied by its interpretations, leading to laws that form the body of theoretical physics, which can lead to New consequences. As an example of this, the English physicist Paul Dirac (Alonso & Finn, 1992) predicted the existence of anti-matter in 1928, when he had to interpret an apparently meaningless result while working in theoretical physics. Anti-matter was then observed experimentally.

What is an experiment in physics? An experiment in physics is not simply the observation through

laboratory instruments of a phenomenon. It is, moreover, the theoretical interpretation of this phenomenon (Duhem, 1894, p. 200).

In every experiment are chained: phenomena, language, hypothesis, induction, theory, law. An experiment in physics is the precise observation of a group of phenomena accompanied by the interpretation of these phenomena. This interpretation replaces the concrete data actually collected by observation by abstract and symbolic representations that correspond to them by virtue of the physical theories admitted by the observer.

According to Duhem (1894, p. 220), the researcher observes the facts and immediately reasons about the observed facts, where the mathematical instrument plays an essential role. It can be stated that theories replace the observed properties, which are physical phenomena. And the experimental laws governing these phenomena are exchanged for a symbolic representation. Physical theories are the vocabulary that correspond to each physical property a quantity and to each physical law an equation. Physical theory and experimental physics are inseparable: it would be like enunciating an idea without employing any spoken or written signal. An experiment in physics can never condemn an isolated hypothesis, but only a whole theoretical set. It implicitly recognizes the correctness of a whole theoretical set.

The work of Alonso & Finn (1992) presents a compendium of physical theories. The English physicist Isaac Newton defended the hypothesis of the corpuscular theory of light. On the other hand, the Dutch physicist Christiaan Huygens defended the wavy hypothesis of light. Both hypotheses encompassed a wide range of phenomena. Each of them explained such phenomena within its field of validity. However, the French physicist Louis de Broglie, with the emergence of quantum mechanics, merged the two hypotheses with the hypothesis that to each phenomenon of light was associated to a corpuscle a wave. And this hypothesis, which has become law, is more general because it encompasses all phenomena, all existing experiences.

According to Duhem (1894, p. 225), the experimental method cannot transform a physical hypothesis into an incontestable truth, because one is never sure of having exhausted all the imaginable hypotheses relating to a group of phenomena. The results of physics experiments are only approximate. The degree of approximation of an experience depends on two essential elements; which are the nature and perfection of the instruments employed and the theoretical interpretation of the experiences.

It is very important to analyze whether the inaccuracy in the measurements is due to the instruments or is an uncertainty that is characteristic of nature itself.

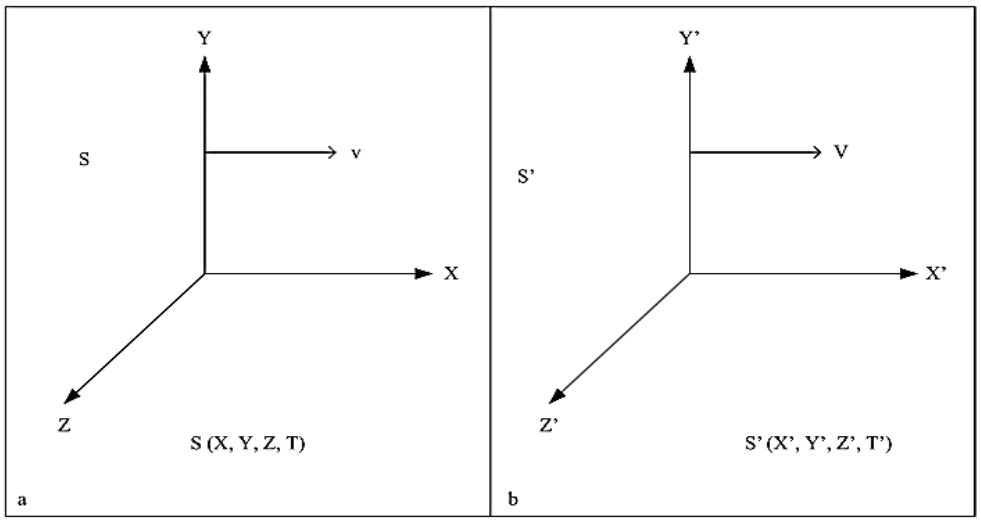
Duhem (1894) distinguishes in physical theory the definition and measurement of the quantities of physics, the choice of hypotheses, their mathematical development and their confrontation with experience. Every law of physics is neither true nor false, but approximate and provisional, just like Newton's law of universal gravitation of 1687. For its historical moment, such a law was true and indisputable, since it explained, solved, and also predicted all the physical phenomena of that time. However, with the progress of technique, new phenomena appeared that Newton's law could not explain or was not convincing. It became a special case of Albert Einstein's Theory of General Relativity, which went on to explain these phenomena (Alonso & Finn, 1992). However, it cannot be said that General Relativity is exact, since new phenomena may appear in the future that will lead general relativity to be a special case of another theory.

4. The philosophy and the twin paradox of special relativity

The German philosopher Immanuel Kant (1966) philosophically structured classical Newtonian physics. It is necessary to do the same with the modern physics of Albert Einstein, creator of the theory of Relativity, and that of Max Planck, creator of quantum physics (Alonso & Finn, 1992). Relativity corrected Newtonian physics for high speeds. Newtonian physics for low speeds compared to the speed of light in a vacuum, which is a constant and is the maximum speed of nature, is an approximation of the physics of Einstein's relativity.

The idea that the laws of physics must be the same for observers moving relative to each other in uniform translational motion was advocated by Galileo Galilei (1996). This idea can be presented as follows: if the laws of mechanics are valid in a given frame of reference, then they are equally valid in any other frame that moves in uniform translation with respect to the first, according to Galileo. These frames of reference are called inertials. Galileo's principle of relativity can be explained as presented by Figure 1.

Figure 1- Galileo coordinate transformations.



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S S’

Consider two references S and S’. At T=T ' = zero, the frames S and S’ coincide. Consider a particle moving with a constant velocity = v on the X-axis when the frames of reference coincide. Figure 1 shows Reference Frame S' moving with constant velocity V with respect to S. Coordinate transformations can be given according to (1), (2), and (3).

$X' = X - VT = vT - VT \rightarrow v' = v - V$ $Y=Y'$ (1)

$Z=Z'$ (2)

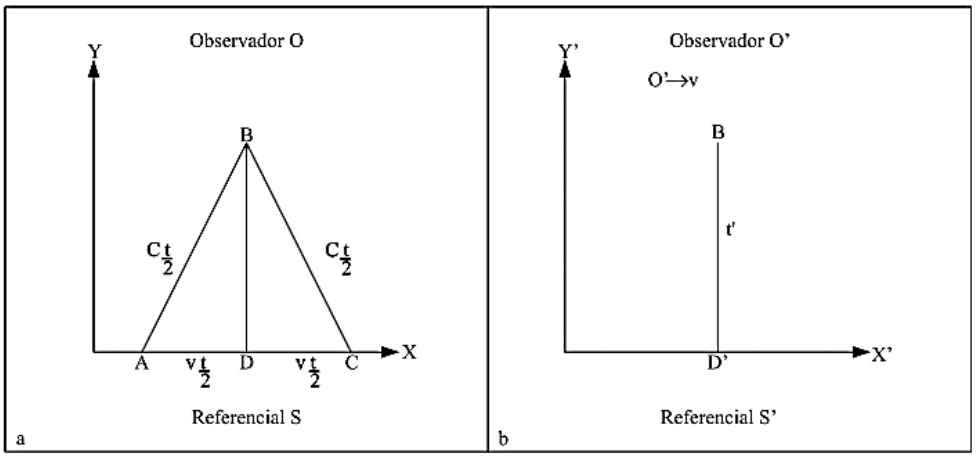
$T=T'$ (3)

Equations (1), (2), and (3) are called Galilean transformations. They imply that: i) time scales are invariant (T=T’) and ii) length measurements are also invariant. This implies that if L is the length of a bar in S and L’ the length of the same bar in S’, then L’ =L. For low velocities where V<<C (where C is the speed of light in a vacuum, is a constant of nature, and has the very approximate value of 300,000 Km/s), The Galilean transformations are coherent. However, for V≈C there will be inconsistencies.

In electromagnetism, Galileo transformations are not invariant; where the velocities involved are the speed of light (C) or very close to it. Since the principle of relativity is valid for the laws of physics, it is necessary to find other transformations that are invariant; namely, the Lorentz transformations (Alonso & Finn, 1992).

4.1 Lorentz transformations

Figure 2 - Lorentz coordinate transformations.



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Consider t=t'=0, where the frames S and S' coincide. Then the Reference Frame S' begins to move on the horizontal axis X' to the right with constant velocity V, as indicated in Figure 2. In the Reference Frame S' a ray of light is ejected vertically upwards, starting from D, is reflected in a mirror, positioned in B, and returns to D'. Assuming two observers, O and O', in the references S and S', respectively, we will have: I) the observer O' will see the light rise and fall after being reflected, that is, he will see a vertical line of length $2\overline{BD'}$ (Figure 2B) and ii) the observer will see the light describe a geometric figure of a right triangle with a right angle in B (Figure 2a). If t and t' are the time spent for observers O and O', respectively, then we have equations (4) to (8), below:

$$t' = \frac{2\overline{BD'}}{c} \quad \text{and} \quad t = \frac{\overline{AB} + \overline{BC}}{c} = \frac{2\overline{AB}}{c} \tag{4}$$

Where:

$$\overline{AB} = \overline{BC} = Ct/2 \quad \text{and} \quad \overline{AD} = \overline{CD} = \frac{vt}{2} \tag{5}$$

$$\overline{BD} = \overline{BD'} = \sqrt{(\overline{AB})^2 - (\overline{AD})^2} \tag{6}$$

$$\frac{t'}{t} = \frac{\overline{BD'}}{\overline{AB}} = \frac{\sqrt{(\overline{AB})^2 - (\overline{AD})^2}}{\overline{AB}} \rightarrow \frac{t'}{t} = \frac{\sqrt{\left(\frac{Ct}{2}\right)^2 - \left(\frac{vt}{2}\right)^2}}{\frac{ct}{2}} \rightarrow$$

$$\frac{t'}{t} = \sqrt{1 - \left(\frac{v}{c}\right)^2} \tag{7}$$

Of the equations (4), (5), (6), and (7), one has equation (8), which is the Lorentz transformation.

$$t' = t\sqrt{1 - \left(\frac{v}{c}\right)^2} \tag{8}$$

Where C is the speed of light in a vacuum and $\sqrt{1 - \left(\frac{v}{c}\right)^2}$ is called the Lorentz factor. For the Lorentz transformations to be valid the speed of light (C) has to be a constant in nature, that is, it is invariant in all frames of reference.

From equation (8) we can infer that there is a variation of time with the relative speed of the reference frames. For example, if in Figure 2 the reference frame S' is at a speed relative to S of $V = \frac{C}{2}$, we will have $t' = t\sqrt{1 - \left(\frac{\frac{C^2}{4}}{C^2}\right)}$ resulting in $t' = t\frac{\sqrt{3}}{2}$.

That is, if for the observer O 1 year goes by (t=1) in the reference frame S, for the observer O' will elapse $\frac{\sqrt{3}}{2}$ years or approximately 0.87 years.

4.2 Spatial variation

Figure 3 - Spatial variation

Source: Author

Let an observer B be stationary for the reference frame S and an observer A move to S horizontally to the left at a constant speed (v=const), as shown in Figure 3. The observer B concludes that the time A travels is t =

$\frac{L'}{V}$. Then:

$$\frac{t'}{\sqrt{1-\left(\frac{V}{C}\right)^2}} = \frac{L'}{V} \rightarrow \quad \frac{Vt'}{\sqrt{1-\left(\frac{V}{C}\right)^2}} = L' \rightarrow L' = \frac{L}{\sqrt{1-\left(\frac{V}{C}\right)^2}} \tag{9}$$

Thus:

$$L' = \left(\sqrt{1-\left(\frac{V}{C}\right)^2}\right)^{-1} L \tag{10}$$

Here L' is the space that the observer O' measures and L is the space that the observer measures. If in Figure 3 observer B measures L=1 meter and if the relative velocity of observer A is $V = \frac{C}{2}$, then observer A will measure L' = $\frac{2}{\sqrt{3}}$, or L' ≈ 1.15 meters.

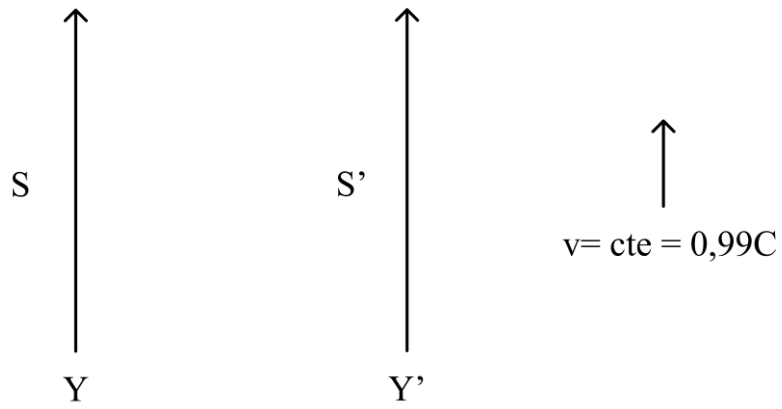
4.3 The twin paradox of special relativity

As a consequence of special relativity, where space and time vary for one inertial observer in relation to another when there is a uniform translational displacement and with constant velocity (v=const), one can elaborate a paradox that became known as the twin paradox. If we take equation (8) and elaborate an ideal experiment: let Lucas and Luciano be identical twins and healthy and they are both in an inertial reference Delta, both at the age of 20 years in relation to Delta. Now suppose Luciano stays for 50 years Delta moving at 99% of the speed of light (V=0.99 C), while Lucas stays stationary in Delta. The time for Luciano to reach the speed of V=0.99 C and the time for him to "come back" and meet Lucas again are neglected. When they meet again, Lucas will be 70 Delta years old and Luciano will be 27.1 Delta years old, as shown in equation (11).

$$T_L = \left(\sqrt{1-\left(\frac{0{,}99C}{C}\right)^2}\right) x\ 50 + 20 \rightarrow \quad T_L = 7{,}1 + 20 \approx 27{,}1\ anos \tag{11}$$

It can be concluded that while Lucas ages 50 Delta years, Luciano will age approximately 7.1 Delta years. Consider another ideal experiment, as shown in Figure 4.

Figure 4: Spatial variation



Source: Author

Let be the dimensions of Lucas and Luciano in Y and Y', respectively, of 2 meters. At t=t'=0 the inertial frames S and S' coincide. Assuming that Luciano, in S', is at a constant speed of 99% of the speed of light (v=const= 0.99 C) vertically and upwards, as illustrated in Figure 4, it can be concluded that the dimension of Luciano will be 14.2 meters, as demonstrated in equation (12).

$$D'_L = 1/\left(\sqrt{1-\left(\frac{0{,}99C}{C}\right)^2}\right) x\ 2\ metros \rightarrow D'_L \approx 14{,}2\ metros \quad (12)$$

Let us now imagine at the limit; that is, if Luciano could reach the speed of light (v=C). According to Lorentz transformations, we have:

$v \rightarrow C$, then $T'_L \rightarrow 0$ and $D'_L \rightarrow \infty \rightarrow$ conclusion 1 (13)

What does conclusion 1 mean? It means that if Luciano could travel at the speed of light (C), time would stop for him, that is, he would not age; and if he remained for an infinite time at speed C, he would become immortal. This also means that Luciano would have infinite dimension.

At this moment we touch on the nerve point of the text. It was mentioned that the experiments of Lucas-Luciano were ideal. But what is an ideal and real experiment? Before answering this question, one needs to question what is ideal and what is real. To the ideal, one cannot attribute objective reality (existence). The ideal is a perfection that has been achieved but not realized, which occurs every time the separation between ought to be and being is accentuated. The real, on the other hand, indicates the way of being of things existing outside the human mind or independently of it. There is a relation between real and ideal; since the opposite of real is ideal, it indicates the mode of being of that which is in the human mind and cannot be or has not yet been embodied or actualized in things.

It was mentioned that we now have two philosophical paradoxes, which are Luciano's non-aging and his infinite dimension when he is at the speed of light in relation to Lucas. These paradoxes are ideal because Luciano cannot move at the speed of light because there is a physical impediment. The physical impediment occurs because as its mass is finite, for it to reach the speed of light, it would require infinite energy. This conclusion can be seen in the relation between mass and energy of relativity physics, according to equation (14).

$$E = \frac{m_o C^2}{\sqrt{1-\frac{V^2}{C^2}}} \quad (14)$$

Where m_o is the mass of Luciano when he is at rest relative to Lucas in the inertial frame S. If $V_{Luciano}$ = C, then its energy becomes infinite, as shown by equation (15).

$$E = \frac{m_o C^2}{\sqrt{1-\frac{C^2}{C^2}}} \rightarrow E = \frac{m_o C^2}{\sqrt{1-1}} \rightarrow E = \frac{m_o C^2}{0} \rightarrow \infty \quad (15)$$

Or else:

$$m\ (v) = \frac{m_o}{\sqrt{1-\frac{C^2}{C^2}}} \quad (16)$$

If $V_{Luciano} = C \rightarrow m_{Luciano} \rightarrow \infty$.

It was mentioned that we designed the Luciano-Lucas experiment to be ideal. Why an ideal experiment? Because it is a perfection concretized, but not realized. There is a separation between the ought to be and being. The ought to be is the ideal represented by Luciano at the speed of light and the being is the non-possibility of him reaching this speed. Why reality? Because there is for Luciano the physical impossibility of him reaching speed C. But Luciano can reach the velocity of v=0.99 C in relation to the reference frame S. And for it to reach the speed of v=0.99 C there is a huge technical problem.

Just to get an idea of the energy needed to bring Luciano to v=0.99 C, let's take equation (14). Suppose Luciano has an inertial mass when S=S' of Mo = 20kg. It is concluded according to equation (14) that we would need an energy of 128 x 10Ex (17) joules, as shown in equation (17). This amount of energy is very large; that is, it is physically possible but unfeasible in practice. Therefore, it is an ideal experiment and not real.

$$E = \frac{20\ x\ (300.000)^2}{\sqrt{1-\frac{(0{,}99C)^2}{C^2}}} \approx 128\ X\ 10Ex17J \quad (17)$$

Now let's compare the value of approximately 10Ex (18) joules with the energy required to make an electron reach this same speed; pointing out that the mass of the electron at rest is estimated at 9.11 x 10Ex (--31) kilograms. Including this value in equation (14), the energy required will be 5.8 x 10ex (--13) joules to place the electron at this speed, as shown by equation (18).

$$E = \frac{9{,}11 \times 10^{-31} x\,(300.000)^2}{\sqrt{1-\frac{(0{,}99C)^2}{C^2}}} \approx 5{,}8\ X\ 10Ex - 13\ Joules. \qquad (18)$$

The order of magnitude between the energy for Luciano and for an electron to reach this speed is approximately 10Ex(31) times greater. It is therefore concluded that the Luciano-Lucas experience is ideal, and impractical.

4.4 Relativistic biology

On the other hand, how is it physically possible for Luciano to reach the velocity v=0.99 C and if one takes Luciano's experience at this velocity in relation to the inertial reference Delta where Lucas ages 50 years and Luciano approximately 7.1 years Delta (as demonstrated), one can question why biologically he stops aging. There must be a biological why for the age difference between them. The question that arises is: why physiologically, and biochemically does Luciano stop aging?

I therefore suggest the creation of a science that I call relativistic biology to explain why.

4.5 The twin paradox and Kant's philosophy

For Immanuel Kant, in his Critique of Pure Reason (1966), noumenon and phenomenon are philosophical concepts. The phenomenon is the thing as it appears to us. Scientific knowledge is universal and necessary, but it is phenomenal. The noumenon is the thing as it is in itself. Just as there is one for me, there must be one for the other. We must be content by necessity with the island we inhabit; and that there is no other solid land to build a house on.

This territory is precisely that of phenomenal knowledge which is the only sure knowledge. It can be affirmed that the intuition of man is phenomenotizing and that it admits a metaphenomenic substrate; that is, noumenal. The concept of Noumenon contains no contradictions; therefore, we may think of it but not know it effectively. Furthermore, Noumenon is a limiting concept that serves to circumscribe the pretensions of sensibility.

It is concluded, therefore, that Luciano at the speed of light is the noumenon. And it up to the limit, that is, very close to C, where its aging is delayed, is the phenomenon that can be thought about and known. It is the phenomenon that due to technical problems cannot be realized.

4.6 The study of nature and motion itself with application to the twin paradox

Taking as an example the movement of Luciano in nature in the paradox of the twins, we begin to study what is nature, having as a substrate the movement itself. According to Aristotle (2012), the four causes of nature (material, formal, efficient, and final) have motion as their principle. In the case of Luciano's trip, the material cause is Luciano himself, the formal cause is Luciano's "becoming" in the increase in his speed, the efficient cause is the external "engine" that increases Luciano's speed and the final cause is the possibility of Luciano reaching the speed close to the light. And if he happened to get to C, time would stop for him.

4.6.1 Nature and movement

The concept of form proceeds from the physics or philosophy of nature. The word physical comes from the term *physis* which means nature. According to the Greek philosophers, what defines nature is movement. In the "Second Book of Physics", Aristotle (1831, p. 1192b21) states that those things that "seem to possess an intrinsic principle of movement" belong to nature. The sense of movement is quite wide. It is not only about local movement but also, for example, changes in color, temperature, consistency, birth, growth, and death of living beings.

In saying that nature has an intrinsic principle of motion, this means that it is not the external agent that causes motion. To determine the intrinsic principles of motion, Aristotle proceeds as follows: anything that undergoes a mutation is becoming something from the negation of this thing. Thus, white becomes white from non-white. But the existence of only two opposites is not enough, but also a third principle which is the subject of these opposites.

According to Chatelet (1982, Vol. 2, pp. 200-220), Aristotle calls the term towards which the movement tends the form towards which the movement tends; or simply form – which inheres in a subject.

4.6.2 The substance

It should be considered the hypothesis that in some transformations of nature not only the passage from one form to the deprivation of this form or vice versa, preserving the subject, but also that the subject himself can become another subject.

Consider now this new fellow; whoever he may be, may or may not be capable of change. If it has any identifiable determination, it can necessarily undergo some kind of mutation, because if it, being determined, is this or that thing, it can become something other than this or that thing.

If it possesses any determination, it must be composed of subject and form. This other subject, too, if it has any determination, must also be composed of subject and form. And so on, until we come to an entirely indeterminate subject. That first entirely indeterminate subject that one must postulate in nature to be able to explain motion is what Aristotle calls Prime matter.

Prime matter as such cannot exist by itself. Whence it follows that Prime matter, due to its total indeterminacy, can exist only in potency and that it does not exist in act. In order to be something and exist, Prime matter must receive a minimum determination that will be given to it by a prime form. This prime form, which will make the first matter exist in act is called substantial form. The compound formed by the Prime matter and the substantial form is what in Aristotelian philosophy is called Substance or Being.

According to Aristotle, not only can Prime matter not be identified by human senses or laboratory instruments, but also by human intelligence. It can only be known indirectly; by analogies. Because if it were determined by human senses or by laboratory instruments it would no longer be Prime matter.

In Aristotle's physics, matter and form are intrinsic principles of motion. But only the two do not explain the movement.

The first extrinsic principle that must be admitted in order to explain motion is what is called efficient cause. The efficient cause is the external cause that effectively produces the movement. Movement as such implies a passage from being in potency to being in act. The same thing can't be simultaneously in act and potency according to the same aspect. Therefore, it is impossible that according to the same aspect and according to the same mode, something is moving and moved; that is, that it moves itself. Therefore, everything that is moved must be moved by another.

Every efficient cause to act as such has to be in act. This occurs because of a certain form which also confers a predetermination for the mode of action of this efficient cause.

It thus follows that all the movements of nature are necessarily ordered to some end. The easily observable fact that similar natural agents always act in a similar way is an indication that nature behaves in its movements with an order to some end. Therefore, nature is necessarily teleological in its movements, according to Chatelet (1982, Vol. 2, pp. 200-220).

4.6.3 Conclusion

In this way, it can be concluded in the study of "The study of nature and motion itself" that the Substance of Aristotle's metaphysics is "Luciano at the speed of light". The entire study of "The study of nature and movement itself" corroborates "Luciano's journey". According to St. Augustine:

> I did not know that God is spirit, not something whose limbs extend in height or breadth, nor something which has a mass, because a mass is less in part than in the whole, and if it is infinite, it is less in its part of determined extension than in Infinity, and is not entirely everywhere as Spirit, as God. And I was utterly ignorant of what is in us, according to what we are, and we are rightly defined in the Scriptures, the image of God. (Augustine, 2017, p. 85-86).

Now some questions are necessary; such as: What would Luciano's thoughts be like when he is traveling in relation to when he is stationary; that is, when S'=S? And when it is in S' at a relative speed of 0.99C, what would be the processes of events that would occur to it? When he returned to the Delta S frame of reference, could he report the events, the lived events?

In the metaphysics of René Descartes (2018), there is a separation between extensive thing and thinking things. Or, thought and matter. In our context, we have the "res cogitans" and the "res extensa" of Luciano and Lucas.

St. Augustine (1995) had already theorized the cogito. In polemic with skeptics, Augustine had observed that "if I doubt, I exist". Doubt is a form of thought and this in turn is not conceivable outside of being.

While Augustine's cogito (1995) reveals God, Descartes' cogito (2018) reveals man or rather the demands that should mark his thought. While in Augustine the cogito is constructed by referring to God, because it is founded on him, in Descartes, having acquired the truth of existence itself, it is necessary to set out to conquer the real other than our self. But what does Descartes mean by thought? According to him:

> By the term thought I mean all that is in us so factual that we are immediately conscious of it, as, for example, all the operations of the will, the intellect, the imagination, and the senses are thoughts. And I

> immediately added to exclude everything that derives from it: for example, a voluntary movement has as its initial point thought, but it itself is not thought (Descartes, 2018, P. 31).

No current metaphysics or logic can answer what Luciano's thinking will be like when he is traveling or when he is close to the speed of light, as for example, v= 0.99 C in S'. This is a philosophy that has to be elaborated for the future; in the same way that Kant built a philosophical system for Newtonian physics, as described at the beginning of this work.

5. 5 The scientific method

According to Keller:

> We are future-oriented beings, and so we need to understand ourselves as beings in a history that leads somewhere, to a purpose, to hope. Ancient people used to see time and history as cyclical. Christian theology conceives history as something linear, leading to 'judgment day', or progress with technological control over nature. (KELLER, 2018, p. 235).

The logical system that underlies the scientific process was presented – in its first version – by Francis Bacon in the seventeenth century (Rossetti, 2018). Acting on work done by other authors, such as Al-Hazen - 600 years earlier – Bacon's method requires scientists to make observations, form a theory to explain what was observed, and then test the validity of their answers from experiments. So, if true, the results could then be sent for review and verification by other scientists.

While Aristotle did not see the need for experimentation or put it on the back burner, Plato believed that truths would be achieved when a number of sufficiently intellectual men structured them after much discussion. Bacon criticized them because they did not make use of experiments, a process in which real-world evidence would lie. Bacon has several key works, two of them being the "Novum Organum" (1620) where he presents the pillars of the scientific method, and the "Nova Atlantica" (1623) which depicts a fictional island where there is research focused on inventions (Rossetti, 2018).

The "Novum Organum" is one of the six parts that constitutes Bacon's work called "Instauratio Magna", translated as the great restoration, where Bacon seeks to develop his philosophical-scientific thought. According to Rossetti (2018), William Hepworth Dioxon, one of Bacon's biographers, argues that the influence of this author in the modern world is so great that every man who rides a train, sends a telegram, sits in an armchair, crosses the Atlantic owes Bacon something.

Bacon learned to despise Aristotelianism and held that philosophy should be taught for its true purpose, and for this a new method of inquiry should be devised. With this conception, Bacon left the University and tried to describe a rational procedure for establishing causation between phenomena in induction. The induction for Bacon was, however, radically different from that employed by the Aristotelians (Rossetti, 2018).

Bacon suggested in the "Novum Organum" that another form of induction should be conceived besides that employed by Aristotle. It was to be used to prove and discover, not only the first principles but also the minor axioms and discover all that was possible. The Baconian method was based on reporting experiments to eliminate alternative theories, that by the use of instruments and the knowledge of nature, man could govern or direct nature to produce definitive results.

Thus, by seeking knowledge of nature, man attains power over it and reestablishes the "empire of man over creation", which had been lost by the "fall" along with Man's original purity. Bacon, considering the possibility of humanity abusing its power over nature acquired by science, expresses his opinion that there was no need to fear it, since once humanity restored the power attributed to it by God it would certainly be governed by "the right reason and true religion" (Rossetti, 2018).

It is known that several names in science, such as Robert Grosseteste, Galileo Galilei, Francis Bacon, René Descartes, Robert Boyle, Isaac Newton and others sought in science a way to understand nature. It should be noted that since the Middle Ages, nature was no longer seen as the Greeks did in antiquity (nature [*physis*] explains itself, presenting itself under the sign of constant change), but as divine creation and testimony to the existence of God. Many of these scientists drank not only from religion but also from esotericism (Netmundi, 2021).

Isaac Newton believed that through alchemy he could understand how God manages to hold all matter together and that gravity was an exclusively divine creation, as stated in "General Scholium" (Rossetti, 2018).

The current scientific method is not Baconian and owes much more to Descartes. However, important elements of the scientific method emerged with Francis Bacon and in authors before him, such as Galileo, who stressed the importance of experimentation; Grosseteste, who emphasized how important it is to take notes of the replication of experiments by third parties; Roger Bacon, who stated that argument alone is not enough, and experimentation is fundamental; Newton, who added the empirical-inductive method and the rationalist-

analytical-deductive method. (Rossetti, 2018)

In addition to the authors mentioned, there were others with outstanding importance in the history of Science and philosophy, going back to Aristotle.

In 1637, Descartes (Netmundi, 2021) published the text that can be considered the birth certificate of modern philosophy; that is, the "Discourse on the Method of Right Reason and the Search for Truth in Science". The Cartesian project is from the beginning guided by this search for a way to repair the secure knowledge of the uncertain or a way to make solid new beliefs so that one can aspire to the status of knowledge. Another important indication is the criticism of cultural tradition, unable to satisfy that intention.

Of all the disciplines considered as science, only mathematics shows promise “due to the certainty and evidence of its reasons” (Netmundi, 2021). Finally, this author affirms faith in his method that according to Descartes “acting in this way, there will be no truths so distant that they cannot be reached, nor so hidden that they are not discovered” (Netmundi, 2021). Descartes describes the scientific method as "never accepting as true anything that is not so clear to my mind that there is no doubt of its truth; dividing every difficulty into as many parts as possible and necessary to solve them; organizing my thoughts, beginning with the easiest and simplest subjects and gradually progressing to the most complex; making, for each case, enumerations and revisions until I am certain that I have omitted nothing." (Netmundi, 2021)

Our current way of thinking is still Cartesian; that is, everything must go through a method, be explained and evaluated rationally to, only then, be part of the set of our beliefs. This way of thinking merged Bacon's inductive-empirical method with Descartes' deductive-rational method (Netmundi, 2021; Rossetti, 2018).

6. The possible reduction of Modern Physics to Philosophy in the visions of Aristotle and Thomas Aquinas

Based on all the considerations presented in this work, it is believed that there is a basis to question whether physics, as it is structured today, can one day reach the knowledge of Greater Intelligence. Unfortunately not, since it has in itself a description of its own limitations. It is in this context that one tries to show philosophically that total knowledge through science is not possible. Let us begin by asking a question to an illustrious Christian disciple of the Greek philosophers, St. Augustine, so that we may philosophically question what is the meaning of Physics today: what about us, about Augustine, shall we stand here waiting for the day when Physics understands and explains the “essence of Man-Nature” and surpasses it?

This question is pertinent, since the scientific method used by science today, which is the Cartesian, is structured in such a way that it allows the question. It will be able to be answered, that is, science will be able to understand and explain the “essence of Man-Nature” if there is a change of scientific method.

6.1 Purpose of human life

To understand what the “purpose of human life” is, one has to question and answer the questions: “what am I?”, “where did I come from?”, “where am I going?”, “what do I do in the world?”.

I will try to answer the initial question, namely, what is the purpose of our life in the world with a metaphor. Let's imagine that an adult when leaving his house suffers an accident on the street and, as a result, loses all his knowledge. When he comes to his senses, what question will he ask? What will be his immediate concern? It will certainly not be about the nature or usefulness of the objects he sees around him.

His question will be a total interrogation: "what happened?", "where am I?", "why am I here?", "what am I?", "what is nature like?". Well, the situation of man in this world is somewhat similar, for we have come into the world without these questions being explained to us beforehand. However, since we are not born in the adult state, our intelligence is formed little by little and, at the same time, we get used to things until we see them as something natural.

However, if we were born in the adult state, our perplexity would be similar to that of the man who lost all his knowledge when he suffered the accident and woke up in an unknown place. Thus, our intelligence, when we reach the adult state, will formulate questions that in each case are necessary.

We then build, over time, the Science that seeks the Truth, because we have intelligence. In a first survey this is the purpose of human life: to seek and contemplate the truth!

6.1.1 What is philosophy

Among the Greeks, philosophy was called the study of the essence of each reality, the ordering of all these realities among themselves in an organized whole through a network of causalities and the dependence of these networks of causalities on a first cause to which all other causes are subordinated.

My text will mainly deal with the philosophies of Aristotle and Thomas Aquinas, and these philosophers fall into what is called Perennial Philosophy. It is important to mention that this philosophy has as its best-known representatives: Plato, Aristotle, St. Augustine, and St. Thomas Aquinas. That is, most of the Greek,

patristic and medieval philosophers. In addition to these, plus a multitude of other later and even contemporary thinkers. In Perennial Philosophy, contemplation plays a central place in the search for truth.

6.1.2 What is life

In the writings of the Perennial Philosophy, living beings are presented as those beings who are by their very nature capable of producing immanent movements. Immanent movements are understood as those that, by contrast, are not transient. A transient movement is one that passes from one entity to another; that is, one by which an entity moves to another entity. An immanent movement is one that remains in the entity itself; or one by which an entity is able to move itself.

Living beings are those who are by their very nature capable of moving themselves. Inanimate beings are those who are able to move others and are unable to move themselves. In this sense, life is the ability to move itself or the ability to produce an immanent movement.

There is a metaphysical principle according to which nothing can move itself and everything that is moved must be moved by another. The movement of every living thing has an external cause. The fact that the living being moves itself does not mean that something external does not cause the internal movement of the living being. The living being does not move himself in the sense that he is the ultimate cause of his movement and that this movement has no external origin.

If everything that moves must be moved by another, for a living being to move itself, an external cause must trigger the movement of the living being in such a way that the living being itself causes an internal movement within itself. If it were not a living being, the external cause would cause the being moved to produce a transient movement, and not immanent.

Every living being despite its unity which derives from its single substantial form must be composed of inhomogeneous parts. When we say that a living being moves itself, we mean that the living being is composed of heterogeneous parts and that one part of the living being moves the other part. Therefore, in every living being there is a part that moves and a distinct part that is moved. If a living being were constituted by a single indistinct part there would be a contradiction with the principle according to which everything that is moved is moved by another; for in this case, the same single part that moves should also be moved. The parts that constitute a living being, moreover, cannot be homogeneous because the motor part must be in act for movement and the moved part must be in potency for movement, and therefore must necessarily be distinct and inhomogeneous parts. A living being, therefore, if it is to be something capable of moving itself, must necessarily consist of heterogeneous parts. For example, a drop of water or even a large amount of water could never be alive.

6.1.2.1 The soul as a substantial form of the body

Put it this way, for something to be alive it must by its very nature be able to move itself. This implies in the first place that both the moving part and the moved part of the living being must share the same nature, for if it were not so, the movement would not be immanent but transient. That is, if the moving part and the moved part had different natures, both would constitute two diverse entities and the movement would be passing from one entity to another, instead of remaining in the same entity.

The unity of nature between the parts of the living being implies a unity in a substantial way. Hence it follows that there can be no immanent motion if there is no unity of substantial form between the moving and the moved parts. But this also implies that the immanent movement by which life is defined must come from the very substantial form that gives unity to the living being. Otherwise, it would not be by its very nature that it would be able to move itself.

It is important to point out that I assumed that each thing has a specific nature because of its substantial form and this ability to move itself comes from this substantial form, as from its formal cause.

In this way, we get to the substantial form of living beings, their vital principle, their animating principle, or simply their soul, which is what animates living beings. It is for this reason that in the writings of Aristotle and St. Thomas Aquinas, the soul is defined as “the substantial form of the physical body that has the power to life” (Rosa, 2001, p. 4).

6.1.2.2 Contextualization of philosophy

The being, the movement, and the truth are the three principles that philosophy uses to construct a synthesis of the Universe. The first of these principles consists in the affirmation that the first reality of things is their existence or their being. In other words, the first principle of philosophy holds that something exists and that the existence or being of this something is, as such, its first reality, on which all other realities depend. It is first because it is the ultimate presupposition of any knowledge, not demonstrable from any other more elementary principles.

The second principle of philosophy is the reality of movement, defined as such from the concept of being. The second principle states that this entity which we assume to exist can move. And moving to this principle means more than changing places. We assume that something moves when that which is, can also be another. And this possibility of becoming a reality is when the movement takes place.

To assume motion implies to assume that not only being is a basic structure of the universe, but also power to be. The possibility of constructing a synthesis of the structure of the Cosmos in philosophy presupposes the existence of three fundamental realities: the being, the power to be, and the intelligence that grasps the being and the power to be. In apprehending the being, the intelligence grasps what is called the third principle, namely, truth.

The postulation of truth as the basic structure of the universe is necessary, under penalty of returning to the experimental sciences, where consciousness is impossible, or under penalty of returning to modern philosophy, in which consciousness is postulated, but the outside world cannot be reached.

This third principle simply maintains that when intelligence apprehends what being is, the content of this apprehension really corresponds to what being confers on the entities that exist. Denying this principle would be tantamount to claiming that although we have stated as a principle that something exists, it could happen that in fact, nothing exists.

6.1.3 Ultimate reality

The idea that there is a reality beyond the material world on which its movement and therefore its structure depend can be difficult to accept for those who have been educated, whether they are scientists or not, by modern educational establishments, which are impregnated with the idea that experimental science is the exact and ultimate description of the Cosmic structure. But it is very simple to grasp the opposite.

It is immensely easy to realize that there is something beyond the universe as it is described to us by physics. Human consciousness is the first example of this something. To say that human consciousness is something that exists and that it lies beyond the universe described by physics is the same as saying that it will never be possible to develop a computer program that is capable of perceiving its existence. In other words, that it is aware of itself.

Anyone with even the slightest programming experience can see how obvious this statement is. For the same reasons it is not possible to build a robot, no matter how complex it may be, that would be able to grasp its own existence as such. If it were, then in a short time it would also seize its rights and demand not to be turned off.

Such things, however, are nothing more than science fiction. Any programmer or engineer knows that there is no possible way to write a program or build a machine that is aware of its existence. The previous impossibility shows that there is something at work in the extensive universe beyond the principles proposed by the experimental sciences and that, therefore, one cannot invoke an a priori impossibility that the extensive universe cannot suffer the action of causes that lie beyond its nature.

6.1.4 Basic elements of the philosophy of nature

According to Greek philosophers, nature is an intrinsic principle of motion. It should be noted that this statement not only says that nature is a principle of motion, but also that it is an intrinsic principle of motion. This is to say that the principle of motion of which nature is claimed to be is not the external agent which causes the motion.

As we shall hereafter see, the external agent or principle not only exists but must also exist. Those who have been accustomed to thinking about the structure of nature on the basis of experimental sciences alone will certainly have difficulty understanding how entities that can never be seen or detected by any laboratory experiment can not only be real but also be the very foundation of all nature.

For those who cultivate the experimental sciences, it is an outrage to claim that the basic structure that gives reality to entities are purely intelligible entities and that, for this very reason, they can never fall under the domain of these sciences. These people tend to deny or at least not to recognize the reality of what cannot be identified by the experimental method. However, according to the Perennial Philosophy, not only do entities of this kind exist, but they are also the most fundamental entities of nature and reality. Nothing else could exist if they didn't exist.

6.1.5 Realities that transcend the experimental method

Examining the functioning of sight, it will be easy to see that it does not apprehend the existence of beings, but only accidents, such as their colors and shapes. The sense of sight does not guarantee that the person we are seeing is an effectively existing being. It could be a dream, a hologram, or a hallucination. What the eyes see is only the color and shape of that person; not his/her existence. The same can be said about the hearing. By

this sense one can hear the sound that something produces; but not the existence of this something.

However, it is known that the beings that surround us exist and that this existence is a reality. We do not know it because of the senses or laboratory instruments, which do not go beyond the limits of the senses. The consciousness of the real is a long work of abstraction of intelligence. We are aware that things exist because at some point in our development sensory experience has become sufficiently rich and intelligence has become sufficiently mature that such abstraction has made it capable of grasping what it is to be real and not real.

From the moment in which the intelligence becomes capable of apprehending abstractly what it is to be in Act, it also becomes possible that in man the consciousness arises that something individually considered is real. This awareness occurs when the information that reaches man through the senses is confronted with previous information, and the rich coherence of this data forces intelligence to explain it by attributing to the things seen and heard the reality of being in act that it had already become capable of apprehending.

For this reason, the experience of consciousness of reality is not a sensory experience, but an essentially intellectual experience, abstracted and superimposed on sense data. Only a being endowed with intelligence can possess it. A machine will never possess it, nor a laboratory instrument, nor a computer.

However elaborate they may be, the degree of awareness of the reality of these instruments is and always will be null. The senses and laboratory instruments are never mere accidental forms. This reasoning shows that there is something, as is the case with the existence of the beings that surround us, whose reality is so obvious, and which, notwithstanding this, cannot and will never be apprehended either by the senses or by instruments. It is a reality that is beyond the possibilities of the experimental sciences, beyond the senses and instruments and has a purely intelligible nature.

6.1.6 Extrinsic principles of motion

In Aristotle's physics, matter and form are the intrinsic principles needed to explain motion. However, they do not fully explain how the movement is possible. To this, other extrinsic principles must also be added.

The first extrinsic principle that must be admitted in order to explain motion is what is called efficient cause. The efficient cause is the external cause that effectively produces the movement. When a person pushes a table, the person is the efficient cause of the movement of the table. When the water in a pot boils, fire is the efficient cause of this heating.

According to Aristotle's physics, everything that moves must necessarily be moved by an external efficient cause. This statement can be demonstrated as follows: movement, as such, implies a passage from being in potency to being in act. Before the movement begins, the moving entity is, with respect to the form towards which the movement tends, only in power.

The movable being, insofar as it is in potency, has a relation of possibility to the act that will be determined for it by the form, but it does not yet have any determination in act that will be conferred on it by the form. The triggering of the movement, however, is already the beginning of this determination and therefore presupposes that the process of this determination has already begun. It cannot, however, have been initiated by potency alone, because that would mean that what was called potency already possessed some determination and that, therefore, it would not be power alone.

The movement, therefore, would have already begun, contrary to what had been supposed. The beginning of the movement, therefore, already supposes a first determination of the power that cannot come from itself. This first determination, having characteristics of act, and not of power, cannot come from the mobile itself. It must come from an external mover who must possess the necessary determination to initiate the movement. That is, it must come from an external mover who, unlike the Mobile, is in act. Therefore, nothing can move itself, but only by an external agent in action which is called an efficient cause. If efficient causality did not exist, only by matter and by the form as intrinsic principles of the being moved, the movement would not be possible.

6.1.7 The final causality

In the case of St. Thomas Aquinas, the problem of ends is ontological. This is because the world in which man is inserted has an intrinsic ordering independent of man's subjectivity, and the ordering is linked to an end, according to Thomas. The order that Thomas describes as existing in the universe necessarily implies the existence of God, who is in turn the ultimate cause of this order.

In this way, the problem of order and order is no longer cosmological, but metaphysical. Thus, it must now be added that only material and formal causality, as intrinsic principles, and efficient causality, as extrinsic principle, are not sufficient to fully explain motion. To this must be added, as previously stated, the final causality.

Every efficient cause to act as such has to be in act. This occurs because of a certain form which also confers a predetermination for the mode of action of this efficient cause. It follows from this that all the

movements of nature are necessarily ordered to some end. The easily observable fact that similar natural agents always act in a similar way is an indication that nature behaves in its movements with an order to some end.

The word that in Greek means end or purpose is *teles*. It is therefore said that nature is necessarily teleological in its movements. Thus understood, final causality is the cause that moves the efficient cause, which, in turn, moves the compound whose intrinsic principles are material and formal causality.

It is pointed out that the final cause is the cause of all other causes, or simply the cause of causes, and is in this sense also the true ultimate explanation of motion. According to this ultimate conception of nature, essentially teleological, it can only be said that movement is truly known when it is possible to explain it through the final cause, and not when only the efficient cause is identified (Rosa, 2001).

6.1.8 Substance

Everything that moves is made up, as its first real principles, of raw material and substantial form. The compounds of raw material and substantial form, together with their first accidents, the latter necessary for the compound entities to be able to interact with the world around them, are called substances.

According To Aristotle,

> The truest and strictest primary sense of the term substance is to say that it is that which is never predicated on anything else, nor can be found in a subject. As an example of substance, we can put a concrete man or a concrete horse. (Rosa, 2001, p. 59)

6.1.9 Essence

According to what St. Thomas Aquinas says in his work *De Ente et Essentia*, is called Essence something common to diverse natures by which beings are classified into their various species. The Essence can be understood in two different ways. In one sense it is the principle of knowledge and in another sense, it is that by which entities possess being. In this way, the substantial form uniting with matter produces the essence, which is the being in potency (Rosa, 2001, pp. 71-73).

6.1.10 Proof of the existence of God through the first way of St. Thomas

St. Thomas affirms and demonstrates that there are five ways to prove the existence of God. The first way we are going to show you is the most manifest. It is the one that proceeds from the analysis of the existence of the movement of all things. In this proof Thomas comes to the conclusion that there must be a first cause of the motion of all things, which we call God.

According to St. Thomas in his work "Order of Concepts":

> In fact, only what is in potency is moved towards what it is moved towards; and only what is in act is moved. In fact, to move is to make something pass from potency to act; and nothing can make something pass from potency to act except that which is in act; thus the hot in act, fire, makes wood, which is hot in potency, pass into hot in act - and in this way moves and alters it. However, it is not possible for the same thing to be both in act and in potency under the same aspect, but only in different aspects: what is hot in act cannot at the same time be hot in potency - it can, nevertheless, be simultaneously cold in potency. It is thus impossible for a being to be, at the same time and in the same way, moving and moved - or for a being to move itself. Therefore, everything that is moved is necessarily moved by another. If, then, what moves a being is also moved, it must also be moved by another - and this one by another: here, however, we cannot proceed to infinity; for in that case there would be no first mover and, consequently, no other mover either: because second movers only move if they too are moved by the first mover - just as the staff only moves because it too is moved by the hand. We are therefore forced to come to a first mover that is not moved by any other. This is what they understand to be God. (Rosa, 2001, p. 60).

6.1.11 Determinism, contingency, chance

There is in the science of physics a concept called entropy, which measures the degree of disorder of a system. The principle of increasing entropy shows an increase in disorder in the universe. One can use this result to define an “arrow of time”: the future is the direction in which entropy tends to increase; that is, the degree of disorder (chance) tends to increase in the universe, evolving spontaneously without “extreme intervention”. That is, order tends to disorder. (Nussenzveig, 2002, p. 232)

A living being (as studied in item 6.1) is a highly improbable system according to biology, and its existence seems at first glance to violate the principle of increasing entropy. This is what happens to the living being: it survives thanks to the production of organic molecules with a high degree of order by the process of photosynthesis, which is fed by the Sun. In entropy is implied the movement that we are studying so far.

How to reconcile determinism with chance, with contingency according to the philosophy of Aristotle and St. Thomas?

As we have seen, there are four causes. However, it is still necessary to add something very important: in Aristotle's philosophy is it possible for an agent to cause by accident a transformation to which he was not moved by final causality?

When this occurs, it is said that the effect occurred by chance (this is what was analyzed above); or, when the agent was an intelligent cause, chance is also called luck. These circumstances when they occur are considered causes by accident. The effects will have an efficient cause, but that will not cause these effects per se, but by accident.

The effect per se of a natural cause is that which follows it according to the exigencies of its form. The effect per se of an intelligent cause is that which occurs in view of the intention of the agent. Both types of causes can cause an effect by accident when they are effects that are accidentally joined to the effect caused per se by the agent.

In causality, however, it often happens that things that occur by luck or chance, that is, beyond the scope of the final cause in a given line of causality, can be reduced to some higher cause that orders the lower causes that seemed to operate by chance. When this happens from the point of view of the higher cause, the apparent causality of the effect of the lower causes can no longer be seen as true chance.

This is due not to the existence of causes per se that operated on a parallel line of causality, but to the very line of causality that seemed to operate by chance only because the analysis was limited to the action of the lower causes (Rosa, 2000, pp. 94-95).

6.1.12 Physics and higher intelligence and other intelligences

If Physics assumes that there is a greater intelligence and that nature does not resemble a great machine, it is saying that it does not appear as an occasional intruder into the realm of nature. On the contrary, physics must begin to suspect that this higher intelligence is the creator and Governor of nature – not undoubtedly human intelligence, but that which exists in nature from which our intelligence sprang. When it is said, repeating Parmenides, that being and thinking are one and the same thing, it is concluded that this is the condition *sine qua non* for intelligence. Ultimately, it is thanks to this ability of an intelligence to identify itself that makes it intelligent.

It is important to point out when an intelligence acquires reflection. Exemplifying with Man, the reflection occurred because for him every successive stage always contains and transcends a previous stage. But this transcendence is all special: not only does man transcend the preceding stage, but also all the intelligence that produced it.

For this reason, man can put himself on the outside of these steps. There is a way of evolving that seems to be directed according to a program with the tendency to a connection with the greater intelligence.

If one day man through physics manages to reach the total knowledge of nature it would be possible to explain it totally. In this way, we ask: Would Man identify himself completely with this greater intelligence? I try to show, from the beginning of this paper, that in the domains of current science, this identification is not possible. That is, total knowledge is not possible unless current science changes its method of investigation.

Let an analogy be drawn between Albert Einstein's physical theory of relativity and the above statement that we cannot come to the knowledge of the Greater Intelligence – the “outside” and the “inside” – the objective and the subjective. According to The Theory of Relativity no material being that has mass can reach the speed of light in a vacuum. This has already been discussed in item 4. This means that there is a limit to the subjective (or the "inside") becoming the objective (or the "outside").

If the human being reached the speed of light, the subjective (which is the human being) would become the objective (which is nature). However, according to Relativity, such a fact is not possible.

I have already stated that my thesis is that unless present-day science changes its method of investigation, it cannot have the full knowledge of nature; that is, identify itself with the Greater Intelligence explaining the “Essence of Man-Nature”.

The scientific method currently used is the Cartesian, as demonstrated in Item 5.

According to St. Augustine:

> What do I love, then, when I love my God? Who is the one above the head of my soul? I will go up to him by my own soul. I will surpass my faculty by which I join the body and fill its organism with life. It is not in this faculty that I find my God: in fact, it is found even in the horse and donkey, which they do not understand, and it is the same faculty by which their bodies also live. (Augustine, 2017, p. 262)

According to Philippe:

> Thanks to the virtue of wisdom, human intelligence acquires a certain connaturality with the end of its contemplation: the prime substance. This virtue of wisdom, the supreme virtue, establishes a certain similarity between God and us, between divine intelligence and ours, which allows us to lead the same life as God and to lead it as a life that is connatural to us and not alien or painful. Thanks to the connaturality that wisdom establishes between the first intelligence and our intelligence, this act of contemplation can expand in joy. He is utterly delightful. (Philippe, 1949, pp. 538-539)

6.1.13 Nature and intelligence

First of all, a comment should be made between the meanings of Nature and intelligence. Nature is the object of all intelligence because it is intelligible. In a more specific sense, it is said as intelligible the being that can be understood or comprehended. In its proper and specific meaning, the term nature indicates the being of things as long as it exists outside the human mind or independently of it. The Greater Intelligence expansion, on the other hand, means the being of which nothing greater can be thought.

6.1.14 Aristotelian analysis of cause

The Aristotelian concept of cause has already been studied throughout this text. Cause, in the most general sense, is everything that intervenes positively in the Constitution of an existing thing. Therefore, the cause influences the existing thing itself, putting into it something that from there can be found in it. In nature there is not an assemblage of entities; but an ordering of entities that are linked by causal links.

In the most general sense, causality is the law that allows the connection between two things, by virtue of which the second is univocally predictable from the first. Aristotle states that the relation between knowledge and science consists in taking into account the causes; there being nothing outside of this.

Asking the cause of something is the same as asking the why of that thing. The cause is why something exists. For example, bronze is the cause of the statue. On the other hand, the cause may also be the necessary Essence or Substance of a thing. For example, it is the cause of Man's intellectual or rational nature that defines him.

Aristotle's doctrine demonstrates the close connection between the notion of cause and that of Being. The cause is the principle of intelligibility. Because understanding the cause means understanding the inner articulation of a being. That is, the reason why a being, such as Man, God or a stone, are what they are and cannot be or act differently.

6.1.15 Science and truth

I have already stated in item 6.1 of this text that science seeks truth. However, what is the truth? St. Thomas Aquinas defines truth as an adequacy of the intelligence and the being that it apprehends. That is, truth occurs when there is an identification between the content of an intelligence that apprehends a being and the being itself. It should not be forgotten, however, that the Aristotelian theorem holds that things and not the Greater Intelligence are the measure of truth. That is, the Greater Intelligence is able to measure; but it is not measured.

Things (or other beings) are able to measure and be measured. There is also a Truth in things: that by which things resemble their Principle; which is the Greater Intelligence or God. The cause of truth in the lower intelligences is in the object. However, in the Greater Intelligence, the cause of truth is in itself. That is, It is the Truth.

6.1.16 Scientific laws and Greater Intelligence

Once these considerations are made, we ask: Can there be scientific laws from which Physics, as it is currently structured, can explain the Greater Intelligence? For such laws to exist, it is necessary to prove that the Greater Intelligence is intelligible to physics as it is formulated today. Otherwise, Physics needs to find another scientific method so that it can explain the First Cause or Greater intelligence.

You have to find an immaterial being. First, Aristotle notes that observable living beings in nature can be classified according to a hierarchy of ways of life. In plants, there is only the way of life corresponding to the vegetative principle, which is responsible for food and growth. In "imperfect animals", in addition to the vegetative principle, there is also sense; but not movement from one place to another. This is the case with oysters, for example. In the "perfect animals", in addition to the vegetative and sense principles, there is also movement.

Finally, in Man, in addition to the above three attributes, there is also the intellect. Living beings of a higher hierarchy include all the attributes found in those of a lower hierarchy, but not vice versa.

As already seen throughout the text, Aristotle points out that what is common to every sense (according

to him, there are five senses to this day considered: sight, hearing, taste, touch, and smell) is the fact that they receive form without matter. For example, wax receives the signal of a ring without considering whether it is gold or aluminum. These five senses converge into a common one. In this way, they are unified into a single piece of information. The prolongation in time of information obtained by the senses without using them, according to Aristotle, is imagination.

6.1.17 Imagination and intellect

Above the imagination is the intellect. The intellect is the faculty by which man apprehends the essence of things or beings. That which each being is in its species, abstracted from individual conditions. As stated above, the operation of the senses receives form without matter. That is, this operation results in an abstraction over the sensible. The operation of the intellect, having for its object this product of the operation of the senses, results in an even greater abstraction.

In the interpretation of Thomas Aquinas, Aristotle when saying that when the operation of the sense receives the form that exists in the sensible, but without matter, is stating that through the information contained in the nerve impulses that come out of the optic nerve or else the report of an observer about the colors he is seeing, the colored object can be reconstituted. It is for this reason that through science we have managed to reach the Moon, invent the mobile phone, and so on; that is, we have built technologies.

Now an important point is reached: when one analyzes the form abstracted by the intelligence of the Sensible Object presented to him by the imagination, the information contained therein is not the form of a material object. As an example, if one considers that the apprehended essence of man is a rational being, what can one reconstitute? If we were to reconstitute the being apprehended by the abstraction of the intelligence of "Man", we would have to reconstitute an Immaterial Being; in other words, an Immaterial Man.

Intelligence is able to see the immaterial. And what he sees is not in nature, but in himself, because this Being exists and he himself is immaterial. When asserting this fact, one must rely on Parmenides (Chatelet, 1982, vol. 1), who states that being and thinking are one and the same thing.

We can conclude then that this immaterial being is the First Being, the First Cause, the Greater Intelligence or God. As far as one can infer, or conclude, up to the present stage of Physics today one cannot reconstitute this Greater Intelligence.

Today's physics has taken the final cause of Nature out of its domain.

7. Unified Field Theory

In current physics, there is a concept called Unified Field Theory.

In physics, a field is a physical quantity that has an associated value at every point in space. For example, one can speak of a gravitational field that assigns a “gravitational potential” to each point in space. The isotherms shown daily in weather reports are an image of a "temperature field" on the Earth's surface.

Fields can be structured quantities, that is, formed by several components. Thus, for example, the gravitational field is a vector field, like the electric and magnetic fields, quantities that associate three values to each point in space at each instant of time – namely, its components in a given coordinate system (SEARA, 2021; UNESP, 2021).

It is not my aim to write a treatise on the field. Moreover, what has been written is enough to be aware of the same when we talk about Unified Field Theory. An important bibliography on field theory is that of Landau & Lifshitz (1973).

After formulating the Theory of General Relativity in 1915, in which he showed the relationship between geometry and gravitation, Einstein began to think about the possibility of there also being a relationship between geometry and electromagnetism and thus geometrizing physics; in other words, unifying physics.

It is necessary to state that at that time only two forces were known in nature: Newtonian Gravitational Force and Maxwellian Electromagnetic Force. With the discovery of two more forces in Nature, such as the weak nuclear force by Italian-American physicist Enrico Fermi in 1934 and the strong nuclear force by Japanese physicist Hideki Yukawa in 1935, the idea of unifying all four forces of nature: gravitational; electromagnetic; strong nuclear and weak nuclear, became more complicated. Although the electromagnetic and weak forces (electroweak force) are unified, today's problem is to unify the electroweak and strong quantum forces with the gravitational force (Infopedia, 2021).

In short: what physicists today seek is to unify these four forces in what is called Unified Field Theory; which would have a single "Logical Structure", a single law. With this single "Logical Structure", all physical phenomena would be explained. I ask: only physicists?

What I want to do is an analogy between unified field theory – with its single logical structure – with the Greater Intelligence brought up in this text. Perhaps this unification is still possible in the future. However, such a unification would not say what the "Essence of Man-Nature" is, as expressed throughout the text.

It is thus also implied, after all that has been dealt with in this work, whether the laws which represent and explain the phenomena of nature really and fully express these phenomena.

8. Final Considerations

The men of Science who have the most affinity for these dispositions capable of leading man to wisdom are probably theoretical physicists, such as those engaged in the study of relativity and the pursuit of unified field theory. However, despite the way these questions are posed among theoretical physicists, much is reminiscent of the initial dispositions of the wise man.

The way physicists and other scientists have posed these questions is such that they restrict the possibilities of answers from the outset, and this is for two reasons. The first reason is that, directly or indirectly, physicists are not willing to accept anything but what can be verified by the experimental method. Now this means denying the intelligible character of the Cosmos, for the laboratory instruments responsible for experimentation are but an extension of man's sensory life.

A similar attitude to this is to discard all knowledge that cannot be expressed in numbers, or at least force all knowledge to be expressed mathematically. Now numbers do not exceed in things the level of quantity, which is a material characteristic; a knowledge of purely intelligible objects, therefore, cannot be framed either in the category of experimentation or in the category of mathematical expression for the sake of intrinsic exigency.

When men of science intend, from what is presented, that the answers to their questions fit the criterion of verification by a laboratory experiment or the criterion of mathematical quantization, they are automatically preventing their questions from leading them to that knowledge that philosophy calls wisdom, which transcends entirely the sensory level and numerical quantification.

Lauand (1987) puts it very well:

> It is important to highlight the difference between science and scientism: scientism is a philosophical, and not a scientific, position that considers only scientific knowledge valid. Science and technology today dazzle so much that one hardly questions a mentality such as that represented by a position like this. Applying Lord Kelvin's sentence that "all knowledge that cannot be expressed in numbers is of poor and unsatisfactory quality" and his own evaluation criteria to scientism in general, it turns out that it, and scientism in general, is also of poor and unsatisfactory quality, because this sentence cannot be expressed in numbers. Pieper invests against philosophies that claim that the only knowledge with meaning and content is what can be expressed in protocol statements. He claims that we can only express numerically realities of lesser importance. (Lauand, 1987, pp. 113-116)

But there is still another reason why the questions raised by physicists, despite their similarity to the questions asked by the wise, cannot lead them to wisdom. It is that physicists previously delimit the field in which they are willing to seek their answers to the very area of Physics. At first glance it may seem natural that it should be so; within the methodology of each particular science, this attitude may even be justifiable. But the fact is that, justifiable or not, it ceases to be true that, at the same time, such an attitude cannot lead to wisdom, nor to contemplation.

The wise man places no limits on his search; on the contrary, he has to be open to the totality of knowledge whatever the field of origin of the question that has been his starting point. Still according to Lauand (1987):

> For one who inquiries into the total connections, into the ultimate meaning of the world and of existence, to be critical is something fundamentally different, namely, it means with the utmost vigilance to see to it that nothing escapes him from the real and the true whole. (Lauand, 1987, pp. 95-96)

Now, a person animated with dispositions such as those here described, who, without prejudice, opens himself to wholeness, is one who in his pursuit is being moved by the truth itself, not by pleasure. Such a person will not be satisfied with any truth. It has learned in advance the nature of a truth that is capable of justifying all other truths; a truth that cannot be the object of experimental method, but only of Contemplation of the Intellect.

As in this work, I suggest that more philosophical research be carried out in conjunction with the Exact Sciences, in order to transcend the limits of the experimental method.

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