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The limits of knowledge

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Abstract

The definition of knowledge encompasses various meanings, from the process by which we have the perception of the outside world, through the stimuli that we receive from this, when that perception becomes part of our system of awareness and experience.

When awareness of ourselves and the outside world is acquired and recorded, we can define it as learning.

In the broader, philosophical sense, knowledge consists in learning and retaining in the mind a notion, an information. In use, however, it has a more concrete semantic value, and can indicate the various degrees of knowledge, from the initial perception of the existence of a thing to the full cognition of its being, its modes and qualities.

Whatever the subject, cell, organism, neuronal network, and so on, the process always takes place by the use of specific receptor systems, adapted to the reception of different stimuli from the environment. Because they are calibrated only on the stimuli they receive, the receptor systems have limited sensitivity.

This limitation is extended to all living beings, who therefore have partial and incomplete knowledge of the world.

In this work we are going to examine these limitations and invite scholars to become aware of them.

Keywords: Receptors; Environmental Stimuli; Wave Motion; Knowledge.

1. Introduction

The material universe as we perceive it consists of physically substantial particles that affect the body composition of other analogues, and leave a mutually detectable trace. [1]

The sensory stimuli that we feel from the outside world, through our receptors we can detect them in the form and consistency of the different states of aggregation, solid, liquid, gaseous, and in the sensations we feel such as light, heat, sound, and so on.

Stimuli in any case, leave perceptible traces through which we have knowledge of their properties.

But the cognitive capacity has several limits, one is inherent in the neurosensory apparatus of all species, which is able to receive only a limited number of stimuli and a limited range of values (visible spectrum, audible spectrum) the other

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is conditioned by the communicative property within the same species, so that the knowledge can be shared only in intraspecific mode [2-3].

In other words, all our knowledge we can transmit and share only with our fellow men and therefore has the double limit of being structurally limited and of being intraspecific, that is, not universal [4].

This limit is universal, and every living species is equipped with its own cognitive and communicative system, a jellyfish can not communicate with a shark or a snake can not communicate with a crocodile although they can recognize each other and be prey and predators.

The awareness of these limits in knowledge and science that ensues, should inspire us a more realistic modesty in the affirmation of our supposed omnipotence and omniscience that seems to denote the attitude of many scientists lovers of the exact sciences

We also receive stimuli that we perceive but that do not present any of the consistencies that we have indicated above, seem immaterial.

Yet we are aware of it, so light, heat, sound, gravity, are some of these sensorially perceptible but materially elusive phenomena.

Over the centuries, scientists and philosophers have tried to describe them, translating them with the help of technology, from immaterial essences, into materially perceptible and measurable quantities [5-6].

These are the quantities that, thanks to the mediation of the technological tools once collected and recorded, are represented in a conventional shared language, and with the use of graphic signs, formulas and diagrams represent us the immaterial universe in a form that we can modify at our will and adapt it to our needs.

During this process of reification of immaterial substances, we have transformed the intangible properties of matter, into editable quantities, taking them as tools with which we can understand the real world.

With this conviction, the theorists of quantum physics claim that they can govern the entire sensitive universe with their formulas.

Back to our representation of the world, the knowledge for how we encoded it consists of two levels:

The first is formed by our physical structure and material organization, by the cognitive capacity that we experience through the neurosensory system that we are equipped with.

Willy-nilly, our ability to know things depends on the limited sensory-cognitive systems we have and interact with the universe.

These instruments allow interaction with a limited range of physical events, and with other stresses that come from the environment, such as temperatures, cosmic rays, sounds, etc. provided that their intensity and quality do not exceed a certain threshold, beyond which our material organisation is not liable or is exposed to the risk of irreparable damage Fig. 1.

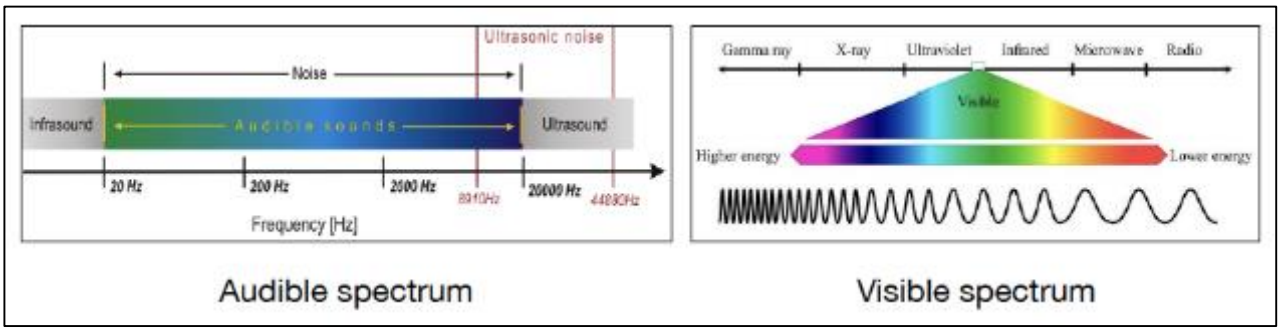

Figure 1 Audible and visible frequency spectrum

This is what we can do, and it is bound to our essence.

Then there is the outside world, the universal matter that we want to know.

Even universal matter has the properties that we have attributed to it, for what we said earlier, and that we can summarize with:

A material composition able to organize itself in unlimited shapes and dimensions, to have unlimited energy content, and a capacity for movement in the space-time available.

Real matter can manifest the intrinsic properties that we have attributed to it, that is how it can express the unique properties it possesses and of which we can only detect those permitted by our limited cognitive systems.

So what is real and exists, regardless of our ability to recognize it, is the material universe, and to know it we have built a complex set of rules and mechanisms of interpretation by adapting them to our cognitive tools.

It is evident then that our ability to know is limited and subjective.

Yet our intellect has made us believe that the outside world, the real world, is what our projection of it represents to us.

And we claim to be able to control it and dominate it with the rules we have set ourselves.

Nothing could be more absurd and impossible.

Yet along the path of knowledge we have passed through historical eras, which have proposed many different theories and laws that claimed to dominate the world.

The conviction of the omnipotence of science has reached its maximum expression with quantum mechanics.

At the basis of all phenomena and events that happen in nature there is matter, without matter there is nothing.

Quantum mechanics has hypothesized that matter is formed by a set of different elementary entities, called atoms, and that each of these atoms has its own form and energy [7-8].

This science, which is the most advanced frontier of all sciences, uses the observed properties of matter to describe them in mathematical language that subtracts it from the need to give an explanation in an understandable language.

And in the realization of the sophisticated technologies it claims as his own creations, it does nothing but use the properties of matter, most of the time without knowing the intimate mechanism.

In reality, what quantum physicists can do is building apparatuses and instruments according to their own ingenuity and of which they know everything, and they know how they work Fig.2.

Figure 2 Instruments built with quantum physics

And least of all are they able to predict, prevent and control catastrophic geomorphological events, such as earthquakes, volcanic eruptions, meteorite impacts, and so on, and if they can predict them, such as extreme weather events, are unable to contain their destructive power. If anything, they are capable of producing equally destructive and catastrophic events, such as wars and pollution of the ecosystem.

They often fail to control and predict even the accidents of the complex and expensive equipment built by themselves.

Because the unexpected is around the corner.

So the presumption of these scientists that they can dominate the world is equal to their ignorance, they have to get over it.

This should advise them to scale back their claims to omnipotence

According to physics, everything originated from atoms, planets, solar systems, galaxies, and so on.

In our planet these atoms have produced everything that exists, molecules, inanimate and animated matter, antimatter, including man, who thanks to these molecules, can think, imagine and hypothesize how the remaining matter is formed and how it works Fig.3.

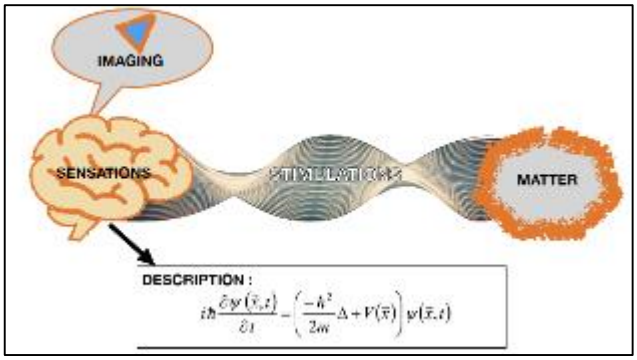

Figure 3 Scheme of Interaction between matter, sensory stimuli and their representation

So if man thinks and can formulate theories it is thanks to the matter from which he himself was generated and therefore, if he believes that matter obeys his theories he distorts the reality of things.

Because one thing are the theories produced by man on the functioning of matter, another is the real matter that follows its own rules and evolves in a continuous and random, while the path of scientific research follows a different way and evolution than the real world. They are two processes that run on parallel and separate dimensions, which like geometric lines, will never meet.

Our knowledge is the projection of sensations received from outside and processed by our neuronal circuits.

Therefore mathematics, physics and the exact sciences in translating natural phenomena and the results of experimental observations into theories, must follow a different and transient path than the real world, and be willing to modify laws and theories formulated, to adapt them to the results of new experiments.

There is nothing so transitory and changeable as the laws of nature, and it is the unexpected events and discoveries that force us to review and correct the theories accepted up to that moment, and that is what happened with the last revolution in quantum mechanics.

It's amazing that scientists don't have the awareness of the huge, and never-surpassed, gap between scientific theory and the reality of the ever-changing physical world.

The reality of the material world precedes and surpasses fantasy and theory.

2. Sensory systems and knowledge

2.1. Evolution of the sensorial systems

The study of zoology has shown us the different ways in which each living species knows its own environment and is able to distinguish useful aspects from dangers, fundamental for its survival.

The neurosensory apparatuses have developed in the course of evolution to make the living species able to recognize their environment, their similars and the preys and predators, and to ensure their survival and the transmission of the species.

Thus, for example, a coelenterate has a sensory and reproductive nutrient system based on a limited number of cells differentiated for individual functions.

But nothing more, and since it lives in the marine environment it cannot walk on the earth, even if it is not a sessile species, in order to walk on the dry land it must first acquire the suitable structures in order to adapt and survive in the new environment.

The evolution of living species has made it possible to reach increasingly complex organic systems capable of carrying out increasingly complex and specialized activities, but without failing to comply with the very strict constraint that binds them to their environment.

Thus the environment is the factor that indissolubly conditions the adaptation and survival of the living that coexist in it.

The material bodies and phenomena that we observe in nature are manifestations of the different properties that they can assume and transmit.

The range of dimensions and the properties they can assume can be superimposed on the range with which they occur and manifest themselves in the form of matter.

Our contact and knowledge of nature is mediated by our senses which are the means by which we enter into relationship with the outside world.

And it is a universal phenomenon that occurs in all living beings from bacteria to man.

But how did the senses form?

They have evolved to collect and recognize the different types of stimuli from the environment, Fig.4, are so effective that they seem shaped to adapt perfectly to the stimuli they receive. Without our senses, we cannot know the world.

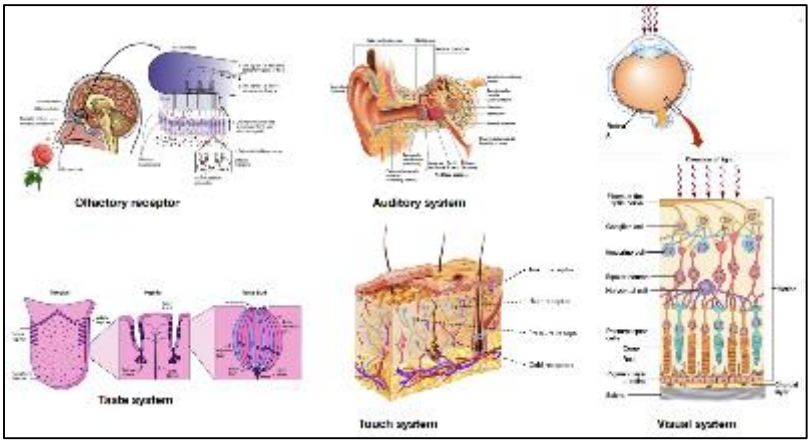

Figure 4 The receptors of the five senses

The evolution of the organs of sense has produced many scaffolds of protein macromolecules that must have the property of assuming an infinite number of forms, simply by modifying a small part of their components, amino acids, and to modify their conformation in response to the stresses they received from outside.

The stimulus can take any form, physical, chemical, sound, electrical, mechanical, heat, light, and so on, but their essence is always wave-like.

And it is for this reason that the senses have specialized to receive different forms of waves.

Is it because matter in its essence is made up of particles with wave motion?

If this is the case, why has the matter been organized in wave form?

Let's try to answer this series of questions starting from the description of the various types of waves.

3. General description of the waves

The fundamental transmission system adopted for universal information is wave-like, as quantum mechanics argues [9].

Waves have the property of transmitting the maximum amount of information contained within a single vector physical size.

The information contents of the waves are: amplitude, length, frequency, energy, direction (they have an origin and follow directions in all dimensions of spacetime).

So that according to their characteristics can be deduced the properties of the bodies that issued them.

The types of waves in the universe are represented by electromagnetic waves, sound waves, and gravitational waves. Each of which is able to transmit specific information based on the properties of the material that produces it Fig. 5.

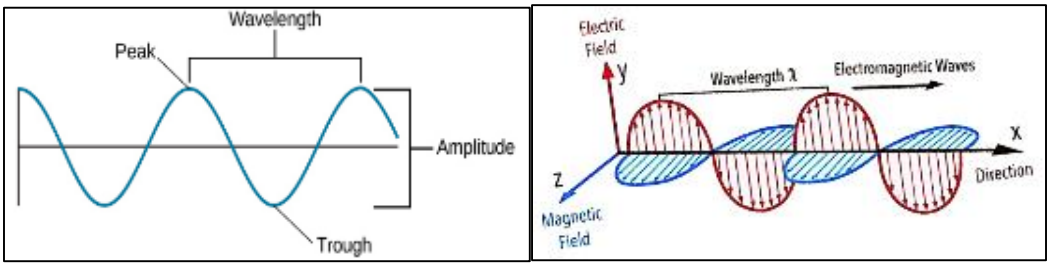

Figure 5 Different types of, Mechanical (left) and electromagnetic (right) Waves

In their essence they are vibrations that originate from molecular aggregates and are transmitted according to the quality and intensity of their energy-wave content in all spatial-temporal directions.

3.1. Mechanical waves, the sound

Sound is transmitted only in a physical medium, it is not transmitted in a vacuum.

It is generated by a source capable of modifying the physical medium in which it propagates, air, water, solid bodies, producing an oscillation within it.

The range of oscillations it can produce is very wide, from microwaves to very wide waves, changing frequency and amplitude of the oscillations Fig.1.

The effects they can produce are also very wide, from the sounds of musical instruments to the sea waves, depending on the source and the means of propagation.

Mechanical waves therefore do not transport material substances, but modify the matter through which they propagate.

3.2. The electromagnetic waves

They transmit the information already described (length, amplitude, frequency, direction) plus the energy associated with the particles they carry (electrons, neutrons, photons, gravitons), finally

3.3. The gravitational waves

have an energy content dependent on the total mass from which they originate (stars, planets, planetary systems, etc.).

Among the large celestial bodies present in the cosmos, stars emit electromagnetic and gravitational waves, planets, gravitational waves [10].

Stars are usually gaseous celestial bodies of enormous size, formed by small atoms, Helium and Hydrogen, but with a very large thermal agitation that is emitted in the form of light, radiation and heat.

While planets of smaller dimensions are solid masses formed by heavy atoms and atomic aggregates that, according to Einstein, modify the conformation of space-time and the energy content associated with it that can thus attract similar formations.

3.3.1. Elaboration and significance of environmental stimuli

Once the stimuli have been collected, they must be recognized and translated into useful information for the adaptation of the living to the environmental conditions.

If we were to define what is the essence of knowledge, we could say that it consists in the effects produced by the passage of ions or molecules selected through structures of a protein nature that form selective passages present on the membranes of all cells Fig.6.

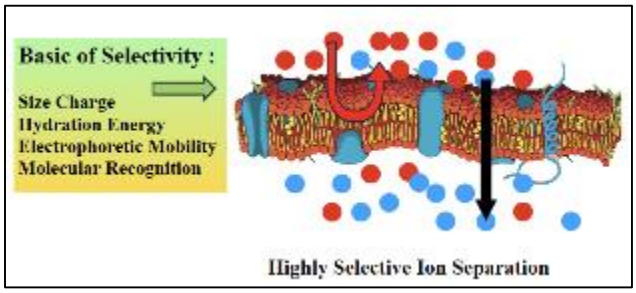

Figure 6 Ion pass selectivity and membrane potential formation

Observing the receptor complexes present in the living beings, we are astonished by the degree of structural specialization reached in order to answer to specific stimuli, Fig. 7.

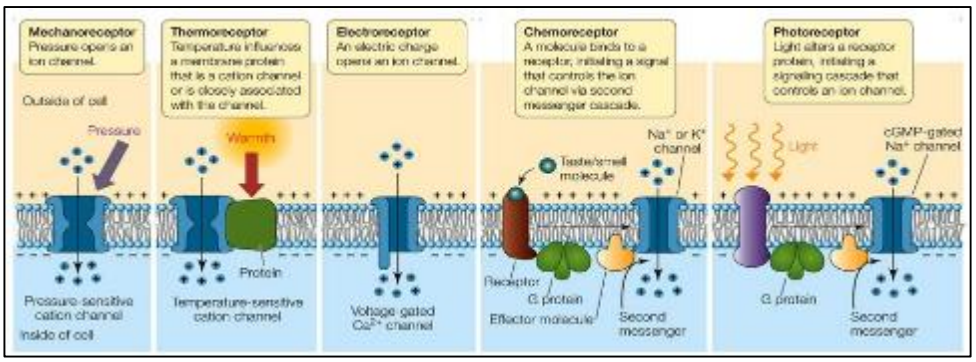

Figure 7 Schematic diagram of specialized receptor molecules to respond to various stimuli

The receptor complexes are formed by protein macromolecules, and it is understood why they play a fundamental role in the sensory transmission system.

As mentioned above, these proteins have adapted extraordinarily to the stimuli they must receive, be these of an electromagnetic or mechanical nature, and with the change of their steric conformation, determine the closure or opening of the ion channels and the passage of information to the parts of the cell or system that must process them.

In addition, they are under the strict control of the genome, and a point mutation in the genetic code on which their synthesis depends is sufficient to irremediably compromise their function.

Recent studies have confirmed the nature and fundamental importance of receptor proteins, an entire issue of the journal Biochimica and Biophysica Acta has been devoted to this topic [11].

3.4. The cognitive method in science

The epistemological history summarizes the different conceptions of knowledge, all focusing exclusively on the scientific method by which to examine natural events to discover the rules governing them, an exhaustive monograph is found in [12].

In all historical epochs philosophers and scientists have been confronted to build a logical system to investigate reality that represented it in the most faithful and objective way possible, without the interference of prejudice and opening theories.

In the various centuries we have passed from the dogmatic "ipse dixit" of Aristotle, to the method of Descartes, Galileo and Newton who adopted as an unavoidable principle the experimental verification.

The experiment involves the active intervention of the researcher, who reproduces the natural phenomenon examined under simplified and measurable conditions.

Galileo and Newton introduced a rigorous descriptive system with the use of mathematical language that translates the manifestations of the real world with formulas and calculations.

The method adopted by modern science is inductive and experimental.

Inductive means that it starts from the particular observations in order to extend the detected properties to the general reality, with the formulation of a law that represents them as faithfully as possible.

While experimental means that it is based on observations of phenomena artificially reproduced to obtain the confirmation of the hypotheses formulated for their explanation.

This procedure reproduces in the laboratory the conditions that produced the event studied and consists in deducing from the experiments the laws of their operation.

This method cannot represent the objective reality of phenomena, for two fundamental reasons:

- because it introduces arbitrary conditions in which phenomena can be observed, such as the use of ambient conditions of pressure, temperature, energy, etc. established by the experimenter who cannot fully reproduce the natural conditions, and
- because the instruments for examination and evaluation of results are necessarily represented by our sensory systems, which have limited receptive capacities [13].

4. Conclusion

Neuronal networks have evolved to process information and produce consistent responses to received stimuli.

At this point a problem arises, how is it possible that a limited number of ionic signals can produce such an extraordinary diversity of messages that characterizes the complex nerve networks?

The problem has been brilliantly solved by interposing between the channels, the ion ports and the final effectors a series of intermediate messengers that transduce the initial stimulus in the final result.

Further amplification of the informational possibilities occurred with the specialization of excitable cells, and the distribution of the different ion channels on their membranes.

Phylogenetic evolution has produced receptor organs specialized in responding selectively to specific stimuli of various physical or chemical nature Fig.7 and Fig. 8.

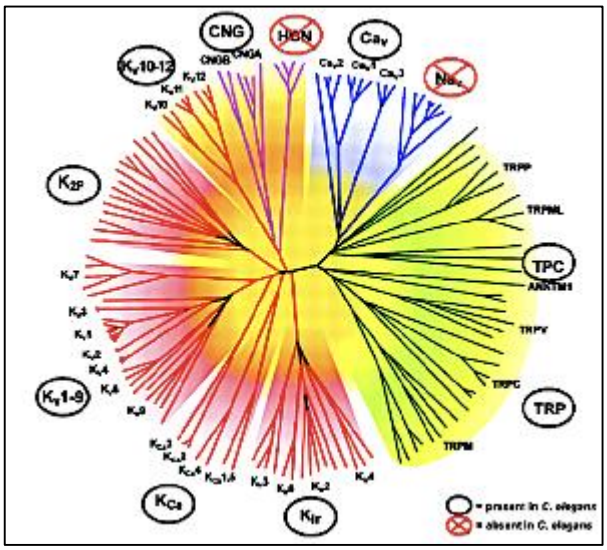

Figure 8 Phylogenetic **evolution** of ion channels

So it has become available the necessary organization in order to diversify and to implement all the possible receptor systems able to signal, if not all, the greater part of the messages to transmit.

It is a question of putting the complex system of information networks in a reciprocal and synchronous relationship with each other in order to obtain in real time a sufficiently reliable representation of the events taking place in nature.

And that's probably how the information networks in the various living species evolved.

But there is still one aspect that makes the whole receptor system not completely adequate for its task and consists in the inability to adapt to the entire infinite range of stimuli that change continuously and continuously in the universe. Keeping up with such rapid changes is impossible

With the result that we know the reality of the universe and its many manifestations as our senses represent it.

However, we strive to make it more visible and knowable, even if we adopt the most advanced technologies we have, in the end we still have to evaluate with our sensory systems the results that these technologies show us, and further elaborate them with our analytical and cognitive apparatus.

However complex and effective it may seem, our processing system cannot give more than it has. Unless it can evolve at the same speed as infinite universe events.

But we call the universe infinite because it is beyond our imagination.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

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