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The Element α Hypothesis: An Integrative Model of Brain Functioning, Consciousness, and Mental Activity

Amadeo Muntané Sánchez*

PhD in Medicine and Surgery from the University of Barcelona and Specialist in Radiodiagnosis and Neuroradiology at Bellvitge University Hospital and Graduated in Religious Sciences from the University of Navarra, Spain

***Corresponding Author:** Amadeo Muntané Sánchez, Passatge Josep Gelabert, 2, 1º-1ª, 08940-Cornellà, Barcelona, Spain.

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Abstract

Understanding the relationship between brain activity and conscious experience continues to be one of the main challenges of contemporary neuroscience. Although advances in neuroanatomy, neurophysiology, and neuroimaging have made it possible to explain numerous mechanisms involved in perception, memory, language, and behavior, open questions remain related to subjective experience, intellect, will, and personal identity. In this work, the hypothesis of Element α is proposed as a conceptual model of functional integration intended to complement, without replace, consolidated neurobiological knowledge. The hypothesis states that mental activity arises from a unique functional system constituted by the brain and Element α, whose interaction would occur through a continuous exchange of functional information called Information I. This approach rejects both a substantial dualism and an exclusively physicalist reduction, proposing a unitary organization in which the neural processes and the functional dimension of the Element α constitute a single act. The epistemological foundations of the proposal are analyzed, its compatibility with current scientific knowledge, its integrating capacity with respect to different contemporary theories of consciousness and the criteria that it should meet as a scientific hypothesis. Likewise, conceptual predictions are formulated, its limitations are recognized and possible lines of research that could contribute to its future empirical evaluation are pointed out. The model aims to offer a theoretical framework to stimulate new approaches to the study of consciousness and mental activity, maintaining a necessarily provisional character and open to revision as scientific knowledge advances.

Keywords: *Consciousness; Brain; Neuroscience; Philosophy of Mind; Scientific Hypothesis; Element α; Information; Cognition; Mental Activity*

Introduction

Recent research in neuroscience has revealed advances of extraordinary importance in the knowledge of the nervous system. The discovery of new proteins involved in brain function, the development of drugs for the treatment of neurological and psychiatric diseases, as well as the improvement of neuroimaging and neurophysiology techniques, are some of the most important achievements achieved in recent decades [1,2].

Among the most ambitious scientific initiatives is the Human Brain Project, which aims to develop a digital simulation of the brain by integrating data from multiple research disciplines. To this end, it uses high-performance computing platforms capable of building models of brain activity, which will allow a deeper understanding of the functioning of the nervous system and the mechanisms involved in numerous neurological and psychiatric diseases [3,4].

This extraordinary progress in neuroscience has provided an enormous amount of information about brain functions and has led some researchers to believe that we are getting closer and closer to understanding the global organization of human thought and, in general, of the so-called higher functions of the brain. In this context, several neuropsychological and neuroengineering studies explore the possibility of modulating certain behaviors through the selective stimulation or inhibition of brain areas and neural circuits responsible for the functional integration of the nervous system [1,5].

Likewise, the development of brain-computer interfaces has made it possible to control robotic devices by implanting microelectrodes in the cerebral cortex, recording neuronal electrical activity to mobilize external prostheses. In some studies, these microelectrodes have not been implanted exclusively in the primary motor cortex, which is directly responsible for movement, but also in the posterior parietal cortex, a region involved in the planning and intention of movement. Experiments carried out in both animals and humans have shown that this region transmits motor intention to the motor cortex, from where orders descend through the spinal cord until they reach the muscles responsible for executing the action [6,7].

On the other hand, within the field of computer science, the development of artificial intelligence deserves special attention, understood as the set of technologies aimed at providing computer systems with reasoning and behavioural capacities similar to those of human intelligence. Among these developments, artificial neural networks stand out, whose design is inspired by the functional organization of biological neural networks, although their operation is based on mathematical and computational models [8,9].

The most representative example of a system designed to mimic certain aspects of human behavior is the robot. From a strictly materialist perspective, some authors have hypothesized that, in principle, the functional elements of neurons could be replaced by equivalent electronic devices, such as transistors, as long as they adequately reproduce their functional behavior.

In this context, the Turing test, proposed by Alan Turing in 1950 as an operational criterion for evaluating the intelligence of a machine, acquires special relevance. The test consists of a computer having a text conversation with a human interlocutor, without the latter knowing whether he or she is interacting with another person or a machine. If the evaluator is not able to distinguish between the two interlocutors, the machine is considered to have achieved an intelligible behavior comparable to that of humans [10]. Although current artificial intelligence systems have made extraordinary advances, there is still intense debate about whether these results imply a true understanding or only a sophisticated manipulation of information.

In this sense, Roger Penrose takes up the well-known thought experiment of the Chinese room, originally formulated by John R. Searle, to argue that the mere execution of a computer program does not imply semantic understanding. The experiment presents the case of a person who is completely unfamiliar with the Chinese language and remains locked in a room with a set of rules that allow him to manipulate symbols written in that language. Although their answers may seem correct to an outside observer, that person does not really understand the meaning of the symbols they are manipulating. According to this argument, if the individual does not understand Chinese despite correctly executing the procedure, a digital computer would also not understand the language solely by applying a computer program. From this perspective, computers merely process symbols according to previously established syntactic rules, without necessarily achieving a genuine understanding of their content [11-13].

Are all mental processes reduced to brain activity?

How is it possible that this extraordinary biological set of cells and connections, with all its structural and functional complexity, is capable of generating mental processes?

Many neuroscientists argue that mental and cognitive activity can ultimately be explained by the physical-chemical organization of the brain. From this perspective, mental processes would be the result of brain operations, while gene expression would direct the establishment of specific neural connections during development. Neurons and glial cells—also called glia or neuroglia, whose main function is to provide structural and functional support to neurons, as well as actively participating in the transmission and modulation of nervous information—are highly organized networks responsible for information processing and higher functions such as language, thinking, and other cognitive manifestations [1,2].

In this context, neuroscientific research focuses on identifying the different patterns of activation of neural networks in order to understand the integrated functioning of the nervous system, especially the brain. These studies are based on the coordination and integration of millions of cellular connections and interactions. One of the main difficulties of contemporary neurobiology is precisely to obtain a global vision of this immense network of connections, capable of offering a complete functional representation of brain activity. The development of neural network theory and modern connectivity techniques has given rise to the concept of connectome, understood as the complete map of the structural and functional connections of the nervous system. This model aims to explain brain functioning more precisely and to explore the possibility of artificially reproducing certain neural circuits to simulate neurobiological processes [14,15].

From this perspective, it can be said that structures such as Broca's area, Wernicke's area, the auditory cortex, the cingulate gyrus and various regions of the frontal lobe play an essential role in the perception, comprehension and production of oral and written language. The organization of these neural networks is a consequence of the genetic programs that regulate the embryonic development of the nervous system. Genes direct the formation of these specialized areas, which are responsible for processing information from the cochlea, the spiral structure of the inner ear responsible for transforming sound vibrations into nerve impulses, which reaches the auditory nuclei of the brainstem, thalamus, and eventually the cerebral cortex. Likewise, language production requires the existence of functional connections between the associative regions of the left hemisphere and the motor areas that control the muscles of the tongue, mouth, and larynx [1,16].

However, despite the extraordinary complexity of this neural organization, these structures cannot generate language on their own. For these skills to develop, an additional element is essential: experience. Social interaction and communication with other people are essential factors for the different brain regions involved in language to reach their full functional development, allowing them to understand and produce language adequately [17,18].

On the other hand, mental illnesses have an important biological component, although their origin also involves hereditary factors, developmental alterations and multiple environmental and social variables. Research in genetics, neurobiology and molecular biology has contributed decisively to a better understanding of both the functioning of the brain and the mechanisms involved in numerous psychiatric disorders [1,19].

It is also well known that certain drugs and various drugs can modify mental status, in the same way that some brain diseases can initially manifest themselves through behavioral alterations, cognitive disorders or psychiatric symptoms. Numerous clinical cases have been described in which personality changes, hallucinations or memory alterations constituted the initial manifestation of a brain tumour, disappearing or improving significantly after neurosurgical treatment [20].

Pharmacological observations and the clinical efficacy of psychotropic drugs confirm that depression involves alterations in different neurotransmission systems, as well as modifications in synaptic communication and in various molecular signaling cascades, responsible for functional changes related to cognition and emotional regulation [21,22].

A paradigmatic example of the relationship between brain integrity and personality is the case of Phineas Gage. Gage was a responsible and respected railroad worker who was involved in the construction of a railroad line in the U.S. state of Vermont. On September 13, 1848, he suffered a serious accident when a metal bar used to compact gunpowder was thrown after an explosion and pierced his skull, injuring the frontal lobe. Remarkably, he survived the accident and kept many of his basic intellectual abilities intact. However, during his recovery he underwent a profound transformation of personality: he ceased to be a responsible, polite and sociable person to become an impulsive, irritable individual incapable of maintaining appropriate social behavior. This case is one of the most relevant historical examples of the participation of the frontal lobe in the regulation of behavior, decision-making, and personality [23,24].

Among the authors who have contributed decisively to consolidating this neurobiological vision, Antonio Damasio stands out. According to this author, human reason depends on multiple brain systems that act in an integrated way at different levels of organization, from the prefrontal cortex to the hypothalamus and the brainstem. Mental activity, from its most elementary manifestations to higher cognitive functions, requires constant interaction between the brain and the rest of the organism. Consequently, the body is not only the biological support of the brain, but also provides the information necessary for the construction of mental representations. From this perspective, brain and body form a functional unit integrated by biochemical and neural circuits that continuously interact with the environment, from which mental activity emerges [5,25].

Antonio Damasio argues that human reason depends on multiple brain systems that act in an integrated manner at different levels of neuronal organization, from the prefrontal cortices to the hypothalamus and brainstem. Mental activity, from its most elementary to the most complex manifestations, requires the joint participation of the brain and the rest of the organism. The body, as represented in the brain, is much more than just a support or frame of reference for neural processes: it provides the raw material on which brain representations are built. Consequently, the brain and the rest of the body form an inseparable organism, made up of biochemical and neural regulatory circuits that continuously interact with the environment, and it is precisely from this interaction that mental activity emerges [5,25].

Joseph LeDoux proposes that the essence of subjective experience and individual identity arises from the interaction between the limbic system, responsible for processing emotions, and the circuits of the cerebral cortex involved in cognitive and motivational functions. According to this approach, the mind is the result of the dynamic integration between the emotional and cognitive systems of the brain [26].

Steven Pinker argues that the mind can be understood as an information processing system developed throughout evolution to allow human beings to interpret and adapt to the environment. From this perspective, personal history, memories, emotions, desires, and frustrations are based on brain activity and are the result of natural selection processes [27].

Paul Churchland considers that the traditional conception of mind constitutes a pre-scientific theory destined to be replaced by a strictly neuroscientific explanation. According to this author, mental states such as beliefs, desires, intentions or feelings do not represent fundamental explanatory entities, but concepts belonging to a popular psychology that must be replaced by a neuroscience capable of explaining cognition based on the physical, chemical and electrical functioning of neurons. Churchland argues that, when neuroscience reaches a sufficient degree of development, the current psychological categories will be replaced by descriptions based on neurobiological and neuropharmacological states [28].

In The Astonishing Hypothesis: The Scientific Search for the Soul, Francis Crick argues that neuroscientific research finds neurons and neural processes in all aspects of mental activity. His well-known hypothesis states that “you,” with its joys, sorrows, memories, ambitions, personal identity, and free will, is nothing more than the behavior of an immense set of nerve cells and associated molecules. In the words of the author himself, taking up an expression inspired by Alice in Wonderland, “you are nothing more than a bunch of neurons”. Crick considers this idea to be revolutionary because it proposes that a complex system can be explained by the functioning of its parts and the interactions between them, ultimately reducing biological phenomena to physico-chemical processes [29].

J. J. C. Smart and David M. Armstrong defended the so-called mind-brain identity theory, according to which mental processes are identical to brain processes. From this perspective, the only scientific explanation of human behavior is the one formulated in terms of the physical-chemical functioning of the central nervous system. Information from the sensory organs is transmitted to the brain, where it originates experiences, perceptions, and other mental states, which subsequently trigger new neural processes responsible for behavior. Consequently, mental states would be identical to certain physical states of the central nervous system and psychology should ultimately be integrated into neurophysiology [30,31].

John Searle proposes a different position by considering that mental processes, both conscious and unconscious, are caused by brain processes, although they cannot be completely reduced to them. According to Searle, consciousness and other mental phenomena are high-level emergent properties that appear as a consequence of the organization of certain neurobiological systems during evolution. Every mental phenomenon has sufficient causal conditions in the brain, but it must be understood as a global property of the system and not only as the result of its microscopic components. To explain this idea, he distinguishes between microproperties, corresponding to particles, their movements and interactions, and macroproperties, such as the fluidity or solidity of water. An individual molecule cannot be described as liquid or solid; These properties appear only when a large number of molecules interact to form a system. Similarly, mental phenomena would be high-level physical properties that emerge from the organization of the brain as a whole [32].

For their part, Hilary Putnam and Jerry Fodor developed the functionalist theory of mind, according to which mental processes constitute functional states of the organism and do not necessarily depend on the material substrate that implements them. Thus, pain would not simply be a physical-chemical state of the brain or nervous system, but a functional state of the organism considered as a whole. From this perspective, mental phenomena cannot be understood exclusively by studying isolated brain processes, but by attending to the function they play within the global system. Just as a clock or thermostat is defined by the function it performs rather than by the material from which it is constructed, desires, beliefs, and other mental states are characterized by the functional role they play rather than by the physical nature of the system that implements them [33,34].

On the other hand, functional magnetic resonance imaging (fMRI) allows us to visualize the brain regions that are activated during the performance of different cognitive tasks. Various studies on working memory have demonstrated the predominant activation of the prefrontal cortex, while studies on remote memory using facial recognition paradigms have revealed the participation of areas of the temporal and occipital cortex. Likewise, mathematical reasoning is a complex cognitive process in which multiple functions are involved, including visuospatial skills, working memory, language, attention, and abstract reasoning, supported by the coordinated activation of different brain networks [35-37].

Memory, attention, and semantic representation are complex cognitive functions involving multiple brain networks. Functional neuroimaging studies performed during the execution of mathematical tasks have shown that numerical processing involves the coordinated activation of various brain regions. Likewise, in attention deficit hyperactivity disorder (ADHD), functional magnetic resonance imaging (fMRI) has revealed alterations in the circuits that connect the prefrontal cortex with the basal ganglia, thalamus, and cerebellum, which are considered fundamental elements in the pathophysiology of this disorder [36,38,39].

Considering all these investigations, it can be concluded that different areas of the cerebral cortex have been identified that are specialized in the reception and processing of sensory information, as well as in the control of motor activity. The auditory, visual and motor areas perform specific functions, while the so-called association areas seem to be responsible for integrating, interpreting and coordinating information from the sensory and motor areas. These regions play an essential role in higher mental functions, such as language, thinking, reasoning, memory, behavior planning, and creativity [1,2].

Likewise, both cerebral hemispheres present functional specialization. In general, the left hemisphere is predominantly involved in language processing, calculation, and analytical thinking, while the right hemisphere is primarily involved in spatial processing, pattern recognition, and various aspects of artistic and musical creativity. However, complex cognitive functions require the coordinated action of both hemispheres through extensive networks of interhemispheric connection. In addition, many functions, especially those corresponding to the primary sensory and motor areas, have a similar organization in both hemispheres. Consequently, although certain functions are preferentially located in specific regions of the brain, brain functioning should be understood as an integrated and global activity [1,40].

Are all mental processes only operations performed by neurons?

The foregoing discussion could lead to the conclusion that mental and cognitive processes are exclusively the result of the functioning of a complex neural network. However, this interpretation is not shared by all researchers.

John Eccles argued that subjective consciousness is a phenomenon that cannot be fully explained by brain activity. According to this author, the brain, despite its enormous complexity, is not sufficient to justify conscious experience, so he proposes the existence of a self-conscious mind, distinct from the brain and of a non-material nature, which performs superior functions of interpretation, integration and control of neural processes [41].

Eccles also states that the "I" exerts its influence on certain neuronal groupings located in the associative areas of the dominant cerebral hemisphere, closely connected to the rest of the brain structures. From this perspective, the mind would pick up and integrate signals from the brain and simultaneously act on these neural groups, thus modulating brain activity. Information from the sensory organs would reach the brain through neurophysiological mechanisms, but only in the mind would it be transformed into conscious experiences, which would be qualitatively different from the neural processes that originate them [42].

Consequently, there is an aspect of neuroscientific research that has not yet found a fully satisfactory explanation. There is no doubt that the anatomical and neurochemical substrate of the brain is closely related to all the functions that make up mental activity. However, it is also true that certain phenomena, especially those related to conscious experience and subjectivity, continue to pose difficulties when trying to explain them exclusively from a neural perspective.

At what point in the research are we currently?

To understand the current state of this question, the argument proposed by the biologist Rupert Sheldrake may be illustrative.

Sheldrake acknowledges that the brain is an extraordinarily complex physico-chemical structure; however, he argues that this fact does not prove that its entire function can be reduced exclusively to synaptic and neuronal activity. To illustrate this idea, he uses the analogy of a radio receiver. Imagine a person who is unaware of how these devices work and assumes that music comes only from the internal components of the device. After studying all its pieces in detail, he even manages to build an identical replica capable of playing the same music. However, it continues to ignore the existence of electromagnetic waves responsible for radio transmission. According to Sheldrake, this situation would be comparable to brain research: even if we were to know with absolute precision all the neurons, synapses, neurotransmitters, receptors and functional circuits, this would not necessarily prove that the overall functioning of the mind was completely explained by these elements [43].

From this perspective, even if it were possible to build artificial systems capable of reproducing certain cognitive functions or establishing sophisticated brain-machine interfaces, it would still be legitimate to ask whether the knowledge gained would be sufficient to fully explain the overall functioning of the brain and, especially, the nature of consciousness. Consequently, some authors consider that neuronal activity, although indispensable, may not exhaust the explanation of all the functions of the human being.

Looking for a new hypothesis

As noted above, consciousness continues to be one of the most complex problems in contemporary neuroscience. Despite the numerous theories proposed, the neural mechanisms responsible for the emergence of conscious experience are still not precisely known.

There is a broad consensus in admitting that consciousness requires an adequate anatomical and neurobiological substrate. This statement is supported by the clinical observation that traumatic brain injury, stroke, intracranial hemorrhages, brain tumors, or various toxic substances can significantly alter the level of consciousness as a result of the injury of neuronal structures or the modification of brain neurotransmission [44,45].

However, although the integrity of nervous tissue is an indispensable requirement for the development of consciousness, several authors argue that this activity cannot be explained exclusively as the result of neuronal function. From this perspective, the complete explanation of consciousness continues to be one of the greatest scientific and philosophical challenges of our time [46,47].

Awareness, knowledge, and perception

As explained above, consciousness has characteristics that some authors consider difficult to explain exclusively from a neurobiological perspective. Among them is the subjective perception of time, the experience of which does not seem to be reduced to a strictly physical phenomenon. This consideration has led several researchers to suggest that consciousness could have a component that cannot be reduced to mere neuronal activity. In this context, John Eccles explicitly opposed any attempt to explain consciousness exclusively through neurophysiological processes, arguing for the existence of a self-conscious mind distinct from the brain [41,42].

From classical philosophy, knowledge constitutes an immanent activity through which the knowing subject apprehends the form of things without materially appropriating them. According to this conception, an object is knowable by virtue of its form—understood as a principle distinct from matter—so that knowing its form implies knowing its nature or essence [48,49].

When we know an object, we do not materially introduce that object into the brain through the senses, because that would be impossible. What becomes present in the knowing subject is not the material reality of the object, but its intelligible form. Thus, for example, when several people look at an apple, they all know the same figure, but none of them physically incorporates that apple into their body. What is present in each subject is the shape of the apple and not its matter.

Consequently, knowledge can be defined as the operation by which the form of an object becomes present in another being in an immaterial way. The cognitive possession of the object does not, therefore, consist in a physical-molecular appropriation. When we look at an object we know its color, its size, its shape, or its other qualities, but we do not incorporate its material reality. We grasp their formal properties without the matter that constitutes them becoming part of the brain. From this perspective, the fact that an object is known or remains unknown does not in any way modify its objective reality; only the situation of the knowing subject changes, which acquires knowledge that it lacked before. For this reason, the act of knowing does not constitute, in itself, a physical phenomenon, although it requires certain physical conditions in order to be realized [48,50].

In short, human knowledge has its origin in sensible experience. In this first stage, the subject knows through perception. However, intellectual knowledge begins with abstraction. From the image provided by the senses, the intellect abstracts that which is essential and forms the concept. Through this process, the individual can know the essence of things independently of accidental characteristics such as size, color or concrete shape. Unlike imagination, whose function is to preserve sensible images, intelligence elaborates universal concepts through abstraction. Consequently, understanding an object does not consist in imagining it, but in intellectually abstracting that which constitutes its essence. From this perspective, the concept does not have a physical-material configuration in the brain, but constitutes an intellectual act of an immaterial nature. This would explain why between the knowing subject and the known object there is a simultaneity proper to the act of knowing, rather than a temporal succession of material events [50,51].

Likewise, it can be said that intelligence has a potentially unlimited openness to knowledge. There is no ultimate object capable of definitively exhausting human intellectual capacity. From this point of view, some authors consider that this openness constitutes an indication of the inorganicity of intelligence. Otherwise, one might wonder how a finite number of neurons could give rise to the understanding of concepts such as infinity, eternity, or necessity. From this philosophical perspective, intelligence would be a faculty of immaterial nature and, therefore, its act could not be fully identified with the synaptic activity of neurons [50,52].

Another particularly relevant aspect is the reflective capacity of the human being.

Intelligence not only knows objects, but it can also know its own acts of knowledge. In reflection, the understanding turns on itself and knows that it knows. It is not simply a matter of reflecting on a specific problem, but of the ability to take as an object the act of understanding itself. In this sense, it can be affirmed, in an intentionally repetitive way, that the subject "knows that he knows that he knows", an expression that aims to reveal the self-reflective capacity of intelligence.

From this perspective, when a subject understands an object, he simultaneously understands that he is performing that cognitive act. Some authors argue that this capacity cannot be attributed exclusively to the brain understood as a physical structure, since two material entities cannot fully coincide on themselves due to the principle of impenetrability of matter. Just as a hand cannot penetrate itself to touch itself, neurons could not literally reflect on themselves. This is a philosophical rather than a neurobiological argument [50].

In this sense, Leonardo Polo affirms that "in reflection, the act of thinking is about the act of thinking, and nothing turns on itself in such a way that it continues to be in that becoming" [50].

Perception is a neurobiological process that originates from information from the main sensory systems: vision, touch, smell, taste and hearing. It represents the first level of cognitive processing through which the organism obtains information from the environment. Perception begins in specialized receptors located in different organs: the taste buds of the tongue, the mechanoreceptors and other skin receptors of the skin, the olfactory epithelium of the nasal cavity, the retina and the inner ear. These receptors transform physical and chemical stimuli into nerve impulses that are transmitted to the cerebral cortex [1,2].

The main cortical areas involved in sensory processing are widely characterized. The primary gustatory cortex is located in the insula and adjacent frontal operculum; visual information is initially processed in the occipital cortex and later distributed to multiple areas specialized in the analysis of shape, color, movement and depth; auditory information reaches the temporal cortex; and somatic sensations, such as touch, pressure, temperature, and pain, are processed in the somatosensory cortex of the parietal lobe. The processes of transduction, encoding, integration and processing of sensory information take place in these regions, as well as their interaction with motor systems and higher cognitive processes [1,53].

However, although the brain structures involved in perception are now known with great precision, one of the fundamental questions of neuroscience remains unresolved: how the electrochemical activity of neurons gives rise to the subjective experience of perceiving a color, taste, smell or painful sensation. There is no doubt that neural networks are essential for conscious perception; For example, an injury to the occipital cortex can cause significant alterations in the visual field. However, the question remains open as to how ionic changes, action potentials, and synaptic transmission are transformed into the conscious experience of three-dimensional vision, colors, movement, or any other perceptual quality [46,47,54].

The question here is not whether a structural alteration of the retina prevents the perception of certain colors, a well-established fact from the neurobiological point of view, but the question of the very essence of perception. A similar consideration can be made with regard to hearing. There is no doubt that the auditory system is extremely complex and that the organisation of neural networks is essential to perceive different sound frequencies or distinguish music. However, the underlying issue concerns the subjective experience of perception. In other words, the question is the following: what makes it possible that, from the activity of cortical neural networks, the subject experiences vision, hearing or any other conscious sensation? This question continues to be one of the main open problems of neuroscience and philosophy of mind [46,47,55].

Numerous structures of the nervous system are involved in voluntary movement. Voluntary motor skills comprise, schematically, three stages: the intention or decision to act, the planning of the motor act and its execution. For a voluntary movement to take place, there must first be the intention to carry it out and the conscious decision to carry it out. Subsequently, neuronal activity reaches the motor areas of the cerebral cortex, from where the motor order is generated that descends through the corticospinal (or pyramidal) pathway, crosses the spinal cord and reaches the peripheral nerves responsible for muscle contraction. Injuries to the motor cortex or nerve pathways involved result in loss of strength or paralysis. In such circumstances, even if the patient retains the will to move a limb, movement is impossible because the neurons that generate the motor impulse or the axons responsible for transmitting it are injured [1,2].

Electrical stimulation of the cerebral cortex can cause involuntary movements in awake patients undergoing brain surgery, a procedure used to identify and preserve functional areas during the intervention. These findings show that electrical stimulation is capable of activating the neural circuits involved in the execution of voluntary movement [56].

A question of great interest then arises: is there a brain nucleus responsible for the human will?

Wilder Penfield addressed this question during his neurosurgical interventions on conscious patients. When electrically stimulating the motor cortex, he observed that the patient moved his arm involuntarily. However, when I asked him if he had wanted to perform that movement, the patient replied that it had not been his own decision, but that it was the doctor who had made him move his arm. Penfield concluded that electrical stimulation activated the neurons responsible for the execution of the movement, but did not generate the will to perform it. Despite his numerous investigations, he never managed to identify a brain area whose stimulation directly produced the subjective experience of wanting to perform a movement [57].

The question remains: is neuroscience today in a position to fully explain human freedom? Can freedom be reduced to exclusively neurobiological processes?

From a philosophical perspective, freedom is a fundamental property of the person and of the rational will. Choice, self-determination and exercising effective control over one's actions are essential manifestations of this freedom. In this sense, a distinction is usually made between freedom of action, understood as the absence of external impediments to act, and free will or freedom to will, which refers to the ability for the decisions taken to truly belong to the subject himself [50,52].

Faced with this conception, various authors maintain that none of our acts is really free, but that all of them are determined by previous processes. From this perspective, the so-called neurodeterminism arises, according to which human thought, will, and behavior depend exclusively on the neurobiological organization of the nervous system. According to this interpretation, the subjective sensation of freedom would constitute only an illusion generated by previously determined neurochemical processes. This view is inscribed within physical determinism, according to which every phenomenon is necessarily conditioned by the causal circumstances that precede it. Along with it, other forms of determinism can be distinguished, such as psychological determinism, which attributes human decisions to factors such as personality, character or education, and cultural determinism, which considers culture and the social environment as determining elements of human behavior [35,58].

One of the experimental works that has had the greatest influence on neurodeterministic theses was the one developed by Benjamin Libet. Their research showed the existence of a readiness potential recorded in premotor areas of the cerebral cortex approximately 350 ms before the subject declared to have consciously made the decision to perform a voluntary movement. These results were interpreted by some authors as evidence that unconscious neural processes precede and condition conscious decision, calling into question the existence of free will. From this perspective, human freedom could be understood as an appearance generated by unconscious neurobiological mechanisms [59].

However, this interpretation continues to be the subject of intense debate. Libet's experiments are based on the assumption that freedom can be identified with certain individual neural states that maintain a direct causal relationship with conscious decision. It can be argued, however, that freedom is not a property of an isolated mental state or of a particular brain region, but of the person considered as a whole. Likewise, other researchers have proposed that the anticipatory activity observed before the conscious decision could simply reflect the preparation of various alternatives for action by large associative cortical networks, without necessarily implying that the final decision is completely predetermined before becoming conscious [60,61].

The limbic system has also been pointed out as one of the main functional systems involved in the regulation of behavior and motivational processes. The brain uses this system as an important integrating center of information from multiple brain structures. However, it cannot be said that the limbic system alone is responsible for the control of all human behavior, any more than it can be maintained that sensory experience is the sole source of our actions. It is true that experience provides a great deal of information, but it is insufficient to explain other aspects of extraordinary relevance. As Rodríguez Duppá points out, "rectitude or ugliness, goodness or vileness are not captured by sight, nor by hearing, nor by touch" [62].

The description of alterations in moral behavior in patients with brain injuries gave rise to the development of the so-called neuroscience of morality, whose objective is to clarify the neural and cognitive mechanisms involved in moral behavior. The study of the neurobiological basis of morality is carried out both through neuropsychological evaluations of patients with brain injuries and through functional magnetic resonance imaging (fMRI) investigations, which allow the identification of brain regions activated during experimental tasks related to moral reasoning and ethical decision-making. These studies show that the prefrontal cortex and its multiple connections with the limbic system, the thalamus, and the brainstem play an essential role in the processing of complex norms, moral judgments, and ethical values [24,63,64].

However, accepting that the human being is exclusively the result of the activity of his nervous system poses important philosophical difficulties, since it questions the immediate experience of freedom and compromises the foundation of moral responsibility. Consequently, although the exercise of freedom requires an adequate functioning of brain structures, this does not exclude the possibility of admitting a component of inorganicity in the acts of knowing and deciding. This consideration invites us to propose that the understanding of the relationship between freedom and biological configuration of the human being requires a conceptual approach different from the purely neurobiological one.

The proper object of the imagination is the sensible image. Imagining an object, for example a book, does not imply the material incorporation of that book into the brain. The elaborate mental image lacks the atoms that constitute the paper, ink, or binding of the real object. The imagined content is not physically found in the brain: it does not occupy volume or mass. The imaginative act transcends the conditions proper to matter, since it does not fall directly on the things themselves, but on their representations. From this perspective, a fundamental question arises again: how is the subjective experience of this representation possible? [48,46].

The Element α hypothesis

The Element α hypothesis was proposed by Amadeo Muntané-Sánchez in the work Neurons and values, published in the Journal of Neurology in 2014 [65]. This approach is developed in greater detail in the following sections.

According to the above, in mental processes a neuronal component can be distinguished from another that cannot be defined as a physical-molecular structure. Consciousness, knowledge, perception, imagination and freedom require the participation of nervous tissue for their elaboration and manifestation; however, it is hypothesized that there is a component in all of them that does not have a physical nature.

From this perspective, the intellect, reflection, the subjective experience of perception, the subjective experience of imagination and will constitute realities that, considered in themselves, are not physical phenomena. Their own actions could not be explained exclusively by neural interactions. This does not mean denying the need for the brain to exercise these faculties, but affirming that brain structures are a necessary condition for their manifestation, although not sufficient to fully explain their nature.

Thus, the intellect, in the very act of understanding, would not require intrinsic organicity. In the same way, reflection, as explained above, could not be carried out through an exclusively material process. The subjective experience of the senses would not ultimately be solely due to the functioning of neural networks. Finally, the will would not constitute a physical entity either, although it would interact functionally with certain neural networks involved in the planning and execution of behavior (See table 1 and 2) [42,50,65].

Mental function	Neural substrate	Non-physical-molecular component
Awareness	Yes	Yes
Knowledge	Yes	Yes
Perception	Yes	Yes
Imagination	Yes	Yes
Freedom	Yes	Yes
Memory	Yes	Yes

Table 1: *Processes that require neuronal substrate and non-physical component.*

Non-physical-molecular intrinsic component
Intellect
Reflection
Will
Subjective experience of perception
Subjective experience of the imagination

Table 2: *Processes with an intrinsic non-physical component.*

It should be noted that the relationship between the brain and mental acts should not be understood as a merely external connection. Consequently, it is not appropriate to pose it in terms of which entity moves or actuates the other or what would be the point of union between the two. Neuroscience, by studying brain regions, neural circuits, and molecules involved in neurotransmission, has come a long way in understanding the nervous system. However, this analytical approach, although essential, does not seem sufficient to fully explain the global functioning of the brain, an information processing system whose complexity is unparalleled in its complexity. It is necessary to integrate the knowledge obtained through analysis with a synthetic perspective that allows us to understand brain functioning as an organized unit. In this sense, a new paradigm that combines analysis and synthesis may be necessary to adequately interpret brain activity [1,66].

From this perspective, the brain could be seen not only as a complex network of interconnected neurons, but as a systemic organization in which some additional component could intervene, the nature of which we do not yet know, but whose existence could be inferred from certain characteristics of mental and cognitive experience analyzed in the previous sections. In this way, it would be possible to propose the existence of an element capable of offering an integrative explanation of the unitary functioning of the brain.

When Wilhelm Conrad Röntgen discovered X-rays in 1895, he did so not because he could observe them directly, since they are invisible to the human eye, but because he experimentally identified the effects produced by this electromagnetic radiation [67]. Similarly, one can hypothesize a non-directly observable reality whose existence can be deduced from the effects it produces.

Consequently, a hypothesis can be proposed that does not pretend to be either mechanistic or dualistic and that consists of admitting the existence of an element not made up of atoms, which we will call Element α. This element, not yet identified by experimental procedures, would be functionally integrated with the neural support, so that both would constitute a single functional activity and not two independent processes simply correlated.

The proper function of Element α would be to integrate the neurochemical activity of the brain and mental processes, conscious and unconscious, through the transmission of highly elaborated information, of a currently unknown nature, which would underlie phenomena such as voluntary action, perception and the abstraction processes typical of human thought. This integration would make cognition, emotional experience and decision-making possible, especially in those behaviors that require evaluating alternatives and selecting the option considered most appropriate.

From this perspective, the content of thought would not depend exclusively on the molecular phenomenology of the brain, that is, on the propagation of the nerve impulse and the release of neurotransmitters in the synapses of millions of neurons.

Understood in this way, the brain would constitute a functional unit made up of the neural networks and the Element α, forming a single system that would act simultaneously, coordinated and indivisible.

The functioning of this systemic unit would take place through a bidirectional, synchronous and permanent exchange of information between neuronal activity and the Element α. This exchange would depend, on the one hand, on the neurons, synapses, the molecular structure and concentration of neurotransmitters, molecular movements, electromagnetic fields generated by neuronal activity, electrical activity, receptors and the whole cellular environment and, on the other hand, on the nature of Element α itself, still unknown.

This complex information would comprise a continuous process of encoding and decoding between neurons and the Element α, both constituting an inseparable unit. This permanent exchange of information can be called Information I. According to this hypothesis, Information I would allow the emergence of consciousness and conscious knowledge of one's own existence, of internal states, of perceptions and of one's own acts, making possible, in short, cognitive activity and mental phenomena.

In the proper nature of the Element α would reside the intellect, the will, the reflective capacity and the subjective experience of perception and imagination. However, Information I would be essential for these faculties to be expressed in the subject. In this way, the non-physical-molecular component of consciousness, knowledge, perception, imagination, freedom and certain aspects of memory would correspond to the Element α.

Will and intellect are closely related properties. The intellect rationally evaluates the different possibilities of action, while the will decides according to this evaluation. According to this hypothesis, the will would maintain a functional relationship, through Information I, with the motor areas involved in voluntary movement, with the language areas and with the limbic system.

Memory involves the knowledge acquired and stored through learning processes. It is widely demonstrated that learning induces structural modifications of neural networks, particularly through the formation and reorganization of synaptic connections [1]. According to the proposed hypothesis, the conservation of information would depend not only on the neuronal and synaptic organization, but also on Element α and, consequently, on Information I.

We are all aware of possessing a personal "I". We maintain the identity of that "me" even during periods of sleep. One manifestation of this identity is to experience moral responsibility for our actions. In the constitution of the "I" it is essential to recognize the participation of a biological basis, as well as the influence of social and personal experiences acquired both through the senses and through memory.

The "I" is closely related to thought and behavior and, therefore, is linked to brain functioning. However, so far no specific region of the brain has been identified in which it can be uniquely located. According to the hypothesis of Element α, whose proper operations would be the intellect and the will, the "I" would be part of this functional component, the conscious expression of which would depend on Information I.

Another question of interest then arises: what makes it possible for us to experience the beauty of music or art?

Music does not consist only of the set of sounds emitted by various instruments. Its temporal organization, melody, harmony, rhythm and also silences are essential elements that make the aesthetic experience possible. Thanks to them, subjective perception can be pleasant and even produce an experience of enjoyment when listening to a musical work.

Something similar happens with the contemplation of a painting or a photograph. The perception of beauty is often accompanied by a pleasurable experience. However, it is also known that what is beautiful for some people may not be beautiful for others. Consequently, it can be said that beauty is not a strictly physical property of the object, but a quality whose appreciation has an important subjective component. According to the present hypothesis, this valuation would correspond to the intellect as one of the properties attributed to the Element α.

The social and cultural environment, learning and life experiences influence the organization of synaptic connections thanks to brain plasticity. Similarly, genes play a decisive role in the formation of neuronal connectivity patterns and in the functioning of the nervous system [1,68].

Consequently, stimuli from the environment, by modifying synaptic connections, would have functional continuity in Information I, so that the individual's will could be influenced by these stimuli. Thus, for example, when a person learns to play a musical instrument, plastic modifications occur in the neural networks; however, the voluntary decision to learn also plays an essential role. From the perspective of the Element α hypothesis, Information I would constitute the theoretical mechanism that would allow both aspects to be integrated into a single functional act [65].

We are certain of our own existence. It is in self-awareness that we find an irrefutable starting point. The fact that we exist and that we know that we exist is the foundation of the certainty of our own existence. In the same way, intelligence knows ideas and apprehends the principles that should guide the exercise of the individual's free will. According to the hypothesis proposed here, Element α would participate in this understanding of one's own existence and in the experience of the conscious self (Figure 1).

An alteration in the exchange of information (Information I) could modify the bidirectional encoding and decoding processes that, according to this hypothesis, take place between neuronal activity and Element α. In general terms, those lesions that topographically

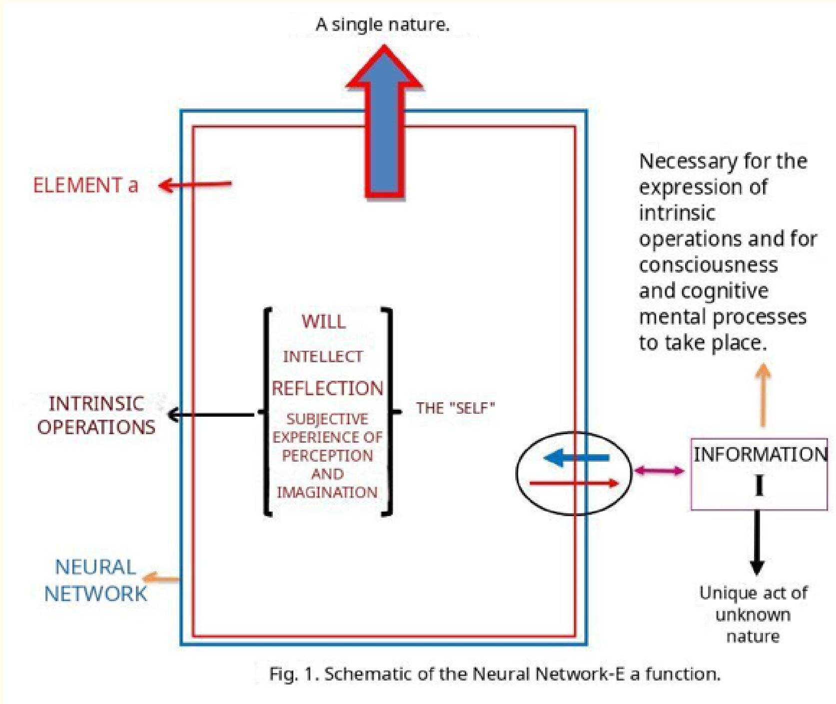

Figure 1

affect the cortical areas described in the previous sections would produce an alteration of Information I, giving rise to specific clinical manifestations (Figure 2).

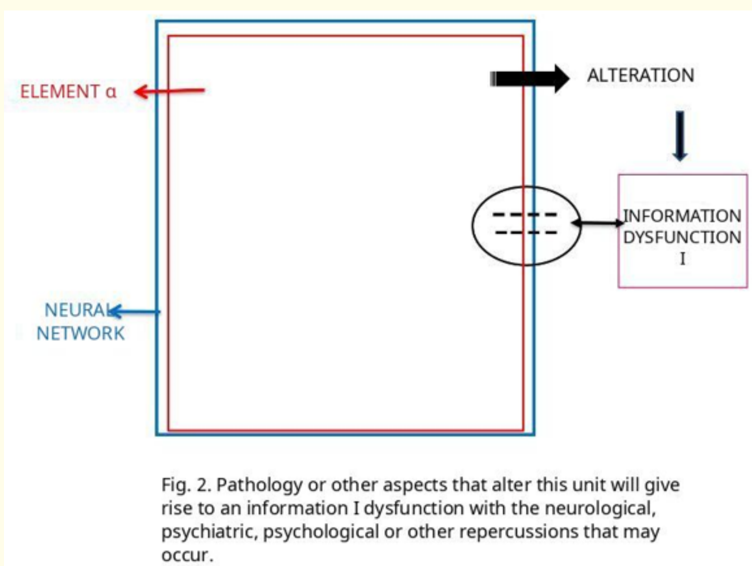

Figure 2

Thus, in apraxia there would be an alteration of Information I that would prevent the adequate functional activation of the cortical motor areas responsible for executing a certain learned motor skill, despite maintaining the muscle strength and coordination necessary to perform the movement [69,70]. Similarly, a lesion affecting the cortical areas of language would produce an alteration of Information I, manifesting clinically as aphasia, a consequence of the interruption of the mechanisms involved in the comprehension and/or production of language [71-73].

Likewise, certain pharmacological treatments capable of reducing delusions and hallucinations by modulating synaptic neurotransmission could be interpreted, within the framework of this hypothesis, as interventions that favor the partial or complete restoration of Information I, thus contributing to the remission of these clinical alterations [74-76]. It should be noted that this interpretation is a theoretical consequence of the Element α hypothesis and not an experimentally proven claim. In this context, Information I is proposed as a conceptual construct intended to explain the functional integration between neurobiological activity and mental phenomena [77-79]. Like any scientific hypothesis, its validity will depend on future research capable of empirically contrasting the predictions derived from this model [80-82].

Scientific testability of the Element α hypothesis

Every scientific hypothesis must aspire to be testable. Although Element α is currently a theoretical proposal and not an experimentally identified element, it is possible to propose some consequences that, in the future, could contribute to assessing its explanatory capacity.

The present hypothesis is based on the assumption that mental activity is the result of a functional unit constituted by the neural system and the Element α. Consequently, future research should be directed not only to the study of the cellular and molecular mechanisms of the brain, but also to the analysis of the overall properties that emerge from this functional organization.

From this perspective, the hypothesis would allow the following predictions to be formulated, among others:

1. Complete knowledge of neuronal connectivity and brain electrochemical activity may not be sufficient to fully explain the subjective experience of consciousness.
2. Two systems with a similar neural organization could differ in certain aspects of conscious experience if there were differences in the overall functional organization proposed by this hypothesis.
3. Advances in artificial intelligence could reproduce numerous cognitive functions without necessarily implying the presence of subjective experience.
4. The study of consciousness would require integrating neurobiological, cognitive, phenomenological and philosophical approaches, in addition to the purely molecular analysis of the nervous system.
5. Higher mental phenomena - such as reflection, self-awareness, intellection or moral deliberation - would continue to pose explanatory problems if they were analyzed exclusively from the synaptic activity considered in isolation.

These predictions are not demonstrations of the hypothesis, but logical consequences derived from it. Its usefulness will depend on whether future research allows confirming or refuting the explanatory capacity of the proposed model.

The hypothesis should be understood as a conceptual model open to review. If future research shows that mental phenomena can be fully explained by currently known neurobiological mechanisms, the foundation of this proposal would be seriously weakened. Similarly, if the development of new methodologies were to provide data compatible with the existence of an integrative principle of brain activity other than mere molecular organization, this would constitute indirect support for the hypothesis formulated here.

Nature of the proposed hypothesis

Up to this point, the main knowledge provided by contemporary neuroscience has been reviewed, however, there are still questions that do not seem to find a completely satisfactory explanation from an exclusively neurobiological model.

The proposal of the Element α hypothesis does not intend to replace the consolidated knowledge of neuroscience or to introduce an explanation of a dualistic nature, but to constitute an interpretative model aimed at integrating the experimental data currently available with those aspects of conscious experience that remain insufficiently explained.

The Element α should not be understood as an experimentally demonstrated entity, but as a theoretical construct whose purpose is to explain in a unitary way the interaction between neural processes and certain mental phenomena.

Like any scientific hypothesis, its validity will depend on its explanatory capacity, its internal coherence and, as far as possible, on future research that allows confirming or refuting the consequences derived from it.

The Element α model as functional integration

The Element α hypothesis should not be interpreted as a form of Cartesian dualism or as an actualization of classical interactionism. It is not proposed that there are two independent substances—one material and one immaterial—that subsequently come into contact through a mechanism of interaction.

The proposal is based on a different approach. The brain and the Element α constitute a single functional nature whose activity gives rise to a single act. There are no two parallel processes—one neural and one mental—that must be synchronized later, but a single integrated activity in which neurobiological processes and the Element α form an inseparable system.

Therefore, the question is no longer to ask where the point of union between the brain and the mind is located or which entity acts on the other. Such questions presuppose that there are two previously separate realities. In the present hypothesis, this initial separation does not exist. What is proposed is a unitary functional organization in which both dimensions constitute a single system.

The information exchanged between neural activity and Element α —called Information I—would not represent the communication between two independent entities, but the mechanism by which the functional unity of the system is maintained. Just as in a living organism it makes no sense to completely separate the function of one organ from the rest of the organism, so it would not make sense to consider the brain and the Element α as two autonomous realities acting independently.

From this perspective, the model can be defined as a hypothesis of functional integration, in which the neural system constitutes the essential biological support and the Element α provides those properties that do not seem to be satisfactorily explained by an exclusively physical-molecular description.

Fundamental principles of the element α hypothesis

- **Principle of functional unity:** The brain and the Element α constitute a single functional nature.
- **Principle of inseparability:** Neural activity and the Element α cannot be understood in isolation. Neither of them has a functional meaning separately, but only as members of the same system.
- **Principle of functional correspondence:** Every mental phenomenon has a neurobiological expression and, at the same time, a functional dimension of the Element α. Both are two aspects of the same process.

- **Principle of information integration:** The activity of the system takes place through a continuous, bidirectional, synchronous exchange of information between the neural organization and the Element α. This information (I) constitutes the functional mechanism that maintains the unity of the system.
- **Principle of biological dependence:** Mental activity necessarily requires a structurally and functionally whole brain. Neuronal alterations modify the expression of consciousness, perception, memory, language, reasoning and behavior.
- **Principle of functional irreducibility:** Although all mental activity needs neurobiological support, certain phenomena - such as subjective experience, intellection, reflection, will or freedom - do not seem to be fully explained by an exclusively physical-molecular description.
- **Principle of explanatory economy:** The Element α hypothesis does not introduce two independent processes or two externally interacting natures. He proposes a single functional system whose organization makes it possible to explain neurobiological phenomena and mental phenomena simultaneously.
- **Principle of verifiable:** Element α is a scientific hypothesis of a theoretical nature. Its acceptance will depend on its ability to explain phenomena that remain insufficiently understood and on the possibility of deriving from it predictions that can be tested through future research.

The element α hypothesis in the context of contemporary theories of mind (See table 3)

Theory	Main contribution	Aspects still open	Interpretation from the hypothesis of Element α
Cartesian dualism	It clearly distinguishes between mind and body and preserves the reality of subjective experience.	It does not satisfactorily explain the mechanism of interaction between the two substances.	Element α is not a separate substance, but a functional component integrated with neuronal activity through Information I, forming a single functional system.
Materialism Physicalism	It successfully explains neurobiological organization, neurotransmission, and the relationship between brain injury and cognitive impairment.	The problem of explaining subjective experience (*qualia*), consciousness, and the meaning of mental content exclusively by physico-chemical processes remains open.	The Element α fully accepts the neurobiological basis and incorporates subjective experience, intellect, and will into one functional system.
Emergentism	He proposes that consciousness and mental properties emerge from the complexity of brain organization.	There is no consensus on the mechanism responsible for the emergence of such properties.	The Element α shares the idea of functional integration, but bases it on Information I, also incorporating a conscious subject as a constituent part of the system.
Functionalism	Interprets mental states according to the function they perform, regardless of the physical support.	It explains in a limited way the origin of conscious experience and subjectivity.	The Element α maintains the functional organization, also incorporating subjective experience, intellect and will.

Integrated Information Theory (IIT)	It relates consciousness to the degree of integration of information and proposes a formal measure (Φ).	The debate continues on how integration explains subjective experience and personal identity.	Information I shares the principle of integration, but places it within a functional unit constituted by the brain and the Element α, incorporating the conscious subject.
Global Workspace Theory	It explains conscious access through the global diffusion of information among multiple brain networks.	It mainly describes the mechanisms of access to consciousness, with less attention to the nature of subjective experience.	Element α accepts the global integration of information and adds a functional component responsible for the subject's conscious experience.
Predictive Processing	It explains perception, cognition and action through continuous processes of prediction and minimization of error.	It is less developed to explain freedom, the conscious self and subjective experience.	Element α incorporates predictive processes into a larger functional organization that integrates intellect, will, self-awareness, and subjective experience.

Table 3: *Comparison between the main theories on the relationship between brain, mind and consciousness, their contributions, the questions that remain open and the interpretation proposed by the hypothesis of the Element α.*

What problems does the Element α hypothesis try to solve?

1. What is consciousness?
2. What are qualia?
3. What is the self?
4. What is will?
5. What is reflection?
6. What is freedom?
7. What is intellectual knowledge?

The element α hypothesis aims to provide a unitary framework for understanding these phenomena without denying the consolidated knowledge of neuroscience.

Predictions

If the hypothesis of element α were correct, it would be expected that there would be cognitive phenomena whose explanation could not be reached only by the study of isolated neuronal activity.

The study of neurons alone would make it possible to understand the mechanisms of brain processing, but it would not exhaust the explanation of conscious experience.

Computational models could reproduce certain cognitive functions without necessarily implying the existence of subjective experience.

These are not demonstrations, but logical consequences of the hypothesis.

Limitations

The element α hypothesis is a theoretical model and, as such, has important limitations. Currently there is no experimental method that allows directly identifying Element α or measuring the Information I proposed in this work. Therefore, the hypothesis should be understood as a conceptual framework aimed at integrating observations from neuroscience, philosophy of mind and conscious experience. Its acceptance will depend on its explanatory capacity and the future development of methodologies that allow its predictions to be subjected to empirical contrast.

Future lines of research

Here I would open up possibilities:

1. Neuroimaging.
2. Information theory.
3. Artificial intelligence.
4. Brain-machine interfaces.
5. Mathematical models of integration.
6. Philosophy of mind.
7. Neurophenomenology.
8. Physics of complex systems.

The element α hypothesis and the criteria of a scientific hypothesis

The history of science shows that the progress of knowledge does not begin with definitive demonstrations, but with the formulation of hypotheses capable of explaining observations that existing models are unable to interpret in a completely satisfactory way. A scientific hypothesis is, therefore, a rational proposal aimed at explaining certain phenomena and guiding new research. Its acceptance does not depend on the authority of the person who formulates it, but on its logical coherence, its compatibility with consolidated scientific knowledge, its explanatory capacity and the possibility of subjecting it to empirical contrast.

Logical consistency

A hypothesis must be devoid of internal contradictions and maintain a consistent conceptual development. The Element α hypothesis proposes that mental activity results from a functional unit constituted by the neural system and the Element α, avoiding considering both as two independent processes that subsequently interact. From this perspective, mental phenomena would be the consequence of a single integrated functional act.

Compatibility with established scientific knowledge

Any hypothesis must be compatible with consolidated empirical observations. This proposal fully accepts current knowledge about the anatomy, physiology and biochemistry of the nervous system. It recognizes that the structural and functional integrity of the brain is a necessary condition for consciousness, language, memory, perception, behavior, and reasoning. It also admits the demonstrated influence of neurotransmitters, synaptic plasticity, genetics and the environment on brain activity. The hypothesis does not question these facts, but rather states that they may not exhaust the explanation of certain mental phenomena.

Explanatory capacity

The value of a hypothesis also depends on its ability to integrate diverse observations within a common conceptual framework. The Element α hypothesis aims to provide a unitary explanation of consciousness, subjective experience, reflection, intellectual knowledge, will, personal identity, and freedom, understanding these phenomena as manifestations of the same integrated functional system.

Predictive capability

A scientific hypothesis acquires greater interest when it allows the formulation of predictions that can be evaluated. In this sense, the present proposal suggests that a complete knowledge of neuronal structure and neurochemical mechanisms may not be sufficient to fully explain certain aspects of conscious experience. He also argues that the study of consciousness will probably require models that integrate different levels of organization of the nervous system and that the artificial reproduction of cognitive functions will not necessarily imply the existence of subjective experience.

Possibility of contrast

Although Element α cannot currently be identified by experimental techniques, this does not prevent the hypothesis from being considered as a proposal susceptible to indirect evaluation. The history of science shows numerous examples of entities whose existence was initially inferred by their effects before they could be observed or characterized experimentally. However, this analogy has a methodological scope and does not constitute a demonstration of the existence of Element α. The scientific usefulness of the hypothesis will depend on whether it can generate observable consequences and predictions whose agreement or discrepancy with the experimental results allows its explanatory capacity to be assessed.

Provisional nature

Like any scientific hypothesis, the proposal of Element α necessarily has a provisional character. Its purpose is not to establish a definitive explanation, but to offer a conceptual framework that can be revised in the light of new knowledge. If future research were to provide a complete explanation of mental phenomena by means of currently known neurobiological mechanisms, the need for this hypothesis would diminish considerably. On the other hand, if phenomena persisted that could not be satisfactorily explained from exclusively neurobiological models and the hypothesis continued to show integrative and predictive capacity, its scientific interest would be reinforced.

Consequently, the hypothesis of Element α must be understood as a rational proposal, open to critical analysis and contrast with evidence, whose value will depend on its coherence, its explanatory capacity and its usefulness in guiding new research on the relationship between the brain and mental phenomena.

Epistemological justification of the element α hypothesis

The formulation of a new scientific hypothesis is only justified when the existing models leave relevant aspects of the phenomenon under study unresolved. The history of science shows that the progress of knowledge does not consist only in accumulating experimental data, but also in developing new conceptual frameworks capable of integrating observations that previously appeared scattered or insufficiently explained.

The hypothesis of Element α arises precisely in this context. It is not intended to replace existing neurobiological theories or propose an alternative explanation of known neural mechanisms. Nor does he intend to deny that all mental activity depends on the functioning of the nervous system. Its objective is to offer a conceptual model that allows us to interpret in a unitary way the close relationship between brain activity and certain mental phenomena whose explanation continues to be the subject of discussion.

From this perspective, Element α should not be understood as an entity introduced to arbitrarily fill gaps in knowledge, but as a theoretical construct whose purpose is to increase the explanatory capacity of the model. Its justification will depend exclusively on its logical coherence, its compatibility with established scientific knowledge and its usefulness in understanding phenomena that do not yet have a consensual interpretation.

Consequently, the hypothesis of Element α must be evaluated with the same criteria with which any scientific proposal is evaluated: its internal consistency, its ability to integrate observations, the possibility of formulating predictions and its openness to future empirical testing. Only the development of knowledge will make it possible to determine the real scope of this proposal.

Conclusion (Element α Hypothesis)

Extraordinary advances in neuroscience have made it possible to understand with increasing precision the anatomical, molecular and functional organization of the nervous system, as well as the mechanisms involved in perception, movement, memory, language and numerous cognitive processes. However, fundamental questions such as the nature of consciousness, subjective experience (qualia), intellectual knowledge, reflection, personal identity, freedom or will continue to be the subject of debate and do not yet have a fully satisfactory explanation from an exclusively neurobiological approach.

The Element α hypothesis is proposed as a conceptual model intended to integrate these phenomena within a single explanatory framework. It does not intend to replace the consolidated knowledge of neuroscience or introduce a form of Cartesian dualism, but rather to propose that mental activity could be understood as the result of a functional unit constituted by the neural system and an additional component, Element α, whose interaction would be carried out through Information I. From this perspective, higher mental phenomena would not be processes independent of brain activity, but manifestations of a single integrated functional system.

The proposal is compatible with current knowledge on anatomy, physiology, biochemistry, genetics and brain plasticity, considering that the brain is a necessary condition for all mental activity. However, he argues that such knowledge may not be sufficient to fully explain certain aspects of conscious experience, thus formulating a hypothesis capable of generating predictions and guiding new lines of research.

Like any scientific hypothesis, the model of the Element α necessarily has a provisional character. Its value will not depend on the acceptance of its postulates, but on its internal coherence, its ability to integrate diverse observations, the predictions it allows to be formulated and, above all, the possibility that future research will provide evidence capable of confirming, modifying or refuting it.

In this sense, the main contribution of this hypothesis is not to offer a definitive explanation of the relationship between the brain and the mind, but to propose a new conceptual framework from which to address one of the most complex problems of contemporary science. If this model helps to stimulate new research and to promote a closer dialogue between neuroscience, information theory, artificial intelligence, philosophy of mind and other disciplines, it will have fulfilled its essential purpose: to open a path of research that allows a deeper understanding of the nature of human consciousness and mental activity.

"The history of science shows that the most valuable hypotheses are not those that aim to close a problem, but those that allow us to formulate new questions and generate research capable of bringing us closer to a deeper understanding of reality. From this perspective, the hypothesis of the Element α should be understood as a proposal open to critical analysis and experimental contrast, whose future will depend exclusively on scientific evidence".

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