

Analysis of the Phenomenon of Integrated Consciousness as a Global Scientific Issue

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Summary

Scholars are paying increasingly close attention to brain research and the creation of biological neural networks, artificial neural networks, artificial intelligence, neurochips, brain-computer interfaces, prostheses, new research instruments and methods, methods of treatment, as well as the prevention of neurodegenerative diseases based on these data. The authors of the study propose their hypothesis on the understanding of the phenomenon of consciousness that answers questions concerning the criteria of consciousness, its localization, and principles of operation. In the study of the hard problem of consciousness, the philosophical and scientific categories of consciousness, and prominent hypotheses and theories of consciousness, the authors distinguish “the area of the conscious mind”, which encompasses several states of consciousness united by the phenomenon of integrated consciousness. According to the authors, consciousness is a kind of executor of the phenomenological idea of the “chalice”, so the search for it should be conducted deeper than the processes in the power of thought consciousness and transconsciousness, to which integrated consciousness can act as a lever. However, integrated consciousness may have the capacity to transcend into lower states of consciousness, which requires further study.

Keywords:

Transconsciousness, self-perception, qualia, mind-body problem, hard problem of consciousness.

1. Introduction

The category of consciousness is a key category for many sciences. It is used primarily by philosophy, biology, physiology, anthropology, psychology, etc. [1]. However, although mankind is getting closer to understanding the phenomenon of consciousness, this general scientific category still raises more questions than answers. Consciousness is considered to be both a mental state, the sense of self, the freedom of will, control of the self as a whole, and the overarching process of our personality. There is still debate as to whether consciousness is a biological or mental process, or whether there is a soul behind it all.

It would seem that consciousness should be a “simple” phenomenon. If it is so, it becomes unclear how such “simplicity” is still hidden from us, how it bypasses our gaze, how consciousness in its “simplicity” controls such global processes. Perhaps, we have initially wrongly set the

vector of intention on the object of research or, to put it in the language of V. Flusser’s phenomenology [2], we are not yet able to see the design of consciousness guided only by a scientist’s empirical intuition.

Although consciousness does have a certain form, it lacks an embodiment in the habitual understanding of a convenient thought-form. In the best-case scenario, we simply do not observe consciousness where we are looking for it. Possibly, all scientific disciplines should unite first, and only then, as argued by E. Schroedinger [3], should they discover new laws. In the modern world, the sciences are gradually integrating, especially with respect to the problem of consciousness.

The problem of interpreting consciousness is caused not only by the lack of precise criteria of consciousness in animate and inanimate nature (panpsychism) but also by the difficulty of deriving correlates of consciousness that would help in compiling the criteria. These nuances, namely the emergent nature of consciousness (the emergent theory of consciousness) and the ontological questions of the nature of consciousness and its perception of phenomena, represent what analytical philosophy calls the hard problem of consciousness [4-6].

The challenge also lies in assigning properties and statuses to the object of research. Thus, the essence of consciousness and qualia have different positions regarding the importance of this characteristic in the question of phenomenological, ontological, and epistemological research [7, 8]. When considering various monistic, dualistic, and pluralistic approaches to the problem of consciousness (biological naturalism of J. Searle [9], the naturalism of F. Peters [10], N. Humphrey’s theory of consciousness [11], theory of F. Crick and C. Koch [12], the panpsychism theory [13], G. Tononi’s theory of integrated information [14-16], Penrose-Hameroff’s theory of orchestrated reduction [17], etc.), we can note the absence of answers about what consciousness is and where it is located. The existing modern definitions of consciousness also do not offer a holistic understanding of this phenomenon. At times, they only blur the lines, bringing the question to yet another impasse. However, there is one fact we have to agree with, specifically that consciousness is a feeling of self (self-perception), but how far it extends

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remains a big question, and here we do not refer to about meditative practices or metempsychosis of Ferekid, Siddhartha Gautama, and palingenesis of A. Schopenhauer [18]; nor is it about questions of “what am I here for,” “why am I here,” “why now and not later”.

Modern science (philosophy, biology, psychology) dealing with problems of consciousness is still at the stage of developing the criteria of consciousness and its perception as an “inner world” responding to phenomena of the “outer world”. Empirical experiments not only repeatedly declare the criteria of the presence of consciousness, but also consistently refute them. This has led to the emergence of numerous hypotheses, theories, problems, and various “denominations” for each problem. Currently, one of the most discussed problems in the scientific community is the psychophysiological problem, the central concept of which is the mind-body problem [19-21].

Furthermore, there is no unanimous interpretation of the concept of “consciousness”, so it can be thought of as something that implies many different phenomena at the same time. The scientific novelty of the study lies in moving away from viewing consciousness as a superconcept, that is, a concept that has many formulations and interpretations but no specifics that would tell us the essence of the phenomenon itself. Science lacks clear criteria that can be used to ascertain either one of the many existing definitions.

2. Materials and Methods

The present work utilizes the following research methods: the philosophical method (analysis of philosophical categories of consciousness), the scientific-theoretical method, decoding (analysis of magnetic resonance imaging (MRI) scans), and the hypothetical method (hypothesis formation). This methodological complex allows considering consciousness from different sides and make an attempt in forming a new understanding of the principles of consciousness and related problems and issues.

3. Results and discussion

First of all, we argue the need to reset the concept of “consciousness” and remove the label of a superconcept from it, because it does not carry what it really is. The goal of this work is to formulate a new hypothesis in understanding the principles of consciousness operation when abstracting from the leading theories of consciousness – G. Tononi’s Theory of Integrated Information (TII) [14-16] and Panpsychism [13] – designating “the area of the conscious mind”, behind which is the phenomenon of integrated consciousness.

Let us present the null hypothesis as follows: if consciousness is a matter with its own form and design and a sense of self-in-itself with its characteristic properties and philosophical categories of space and time, then it must be realized in living matter through higher nervous activity, otherwise, the alternative is the absence of consciousness in the material zone in our sight or its complete absence (illusionism). In doing so, we proceed from the leitmotif of self-feeling, taking this feeling as a given.

The important point here is to approach the ontological side of the question, behind which is an understanding of why an individual organism, not necessarily a human being, needs self-perception, which acts as an admissible predicate of consciousness. How can the instinct of self-preservation work if one does not feel-self-in-itself? If it is only a “like effect” of Existence, then consciousness must act as its core or be part of it, consolidating all processes by letting them pass through and projecting the consciousness we are talking about. However, it is worth noting that Existence is not a predicate of consciousness for the lack of properties of the former [2], so the quantor of consciousness should be sought by abstracting from this category.

At the same time, the perceptual feelings we use are undoubtedly our own feelings, we are conscious of ourselves in our bodies and we think with our brains, so consciousness is a comprehensive notion, and at this stage, it would be erroneous to exclude different attributes of mentality from consciousness, because, at this point, we think of consciousness as the Greek apeiron or the Spinoza modus of a single substance [22] and have little idea of the structural and functional component of the phenomenon of consciousness.

Consciousness itself has no collective solidarity; it is a subjective perception of the world [23] that has been shaped by various social and psychological factors and cerebral sorting. One should look for this phenomenon in the field of cohesive scientific experience (biological, physiological, anatomical, physical, genetic, philosophical, etc.). Such a scientific approach could take as its basis another argument that consciousness is a certain nucleus that implements Plato’s phenomenological idea of the “chalice chaliceness,” which is capable both of accepting the property of “chaliceness” and of getting rid of it, i.e. there should be a property here that leaves the zone of the conscious and flows into the unconscious. The fullness of the “chalice” is proportional to the level of involvement of consciousness in the processes, i.e., the more conscious in any process, the more effort is required to achieve the result, and vice versa. Consciousness, intervening in something new and unknown, retreats when interest in the intentional object wanes. We recognize the object, but thereafter no longer sharpen our special attention and only have it in mind (the entire figurative object recedes into the background of memory into the unconscious through superpositions of rudimentary consciousness). But here a new question arises: what then

is the lever that connects consciousness and fills the “chalice” with the conscious, and empties it? To answer this question, we should turn to the anatomical features of the brain, which is currently much emphasized in the study of consciousness.

Thus, with the help of optogenetics, scientists from different countries have been able to demonstrate the results of finding consciousness “caught” by hydrogen nucleus protons on MRI and localized in a particular structural unit of the brain – claustrum [24]. This theory was first put forward by F. Crick who developed it together with C. Koch [12, 13]. They developed the hypothesis which states that consciousness is generated by the so-called synchronic oscillation of neuronal networks, yet the existence of consciousness requires one more element that would provide interaction with all structures of the brain, and in the authors’ opinion, that would be the claustrum. However, is this structure capable of being a connecting element of the “split” hemispheres endowed with an autonomous mind [25]? This is a real possibility, but there is no evidence that consciousness is a structure, and seeing such a structure even with 1 voxel MRI scan is unlikely. The fact is that consciousness is viewed by researchers in a rather limited way, it is still thought of as a thing-in-itself.

Here we should also decide on the object of study: the inability to move the right hand or the very nature of the stimulus and the desire to move or not to move it? Can consciousness exist specifically in a given place as a “singular position” with inputs and outputs of information? We must understand that consciousness is by no means a machine working by itself (although the schools of cognitive science, connectionism, philosophy, and even the biology of consciousness have long hinted at this), that there are levels or states of consciousness that are deeply rooted in our structural integrity, being a property of the cerebral cortex [2, 26].

Let us consider an example: if the person described by O. Sachs [27] lacks proprioception, then he cannot control the part of the body that he cannot see. Consequently, consciousness must receive information to be able to function. However, this is not consciousness. This is thought of as something prior to control and that one has a right hand to control. Consciousness is therefore called transcendent [28, 29] – it is what it is and simultaneously transposes into what it is not. These processes are unconscious. It turns out that consciousness should be “captured” during “luminescence,” i.e. before the state of consciousness switches, when it is still “glowing,” or active, and before the transgression into the unconscious when consciousness is not active. This is precisely what studies based on brain activity scanning techniques do.

Some scientists engaged in the “search for memory” and its study are inclined to understand consciousness as the motor of memory, i.e., “consciousness has the nature of an apostatized perception of the world, in other words, it is

possible when encoding information coming from the outside world, which may potentially act as skills acquired over time and before the onset of unconsciousness, when short-term memory has already passed into the long-term one” [30].

However, memory alone should not be regarded as a measure of consciousness, since consciousness constitutes a separate gestalt and is not only superior to the phenomenon of memory but also encompasses it.

Evolutionary biology, which has also long been concerned with the hermeneutics of consciousness and has relied on archeological research, refers to a specific time period and states that cranial and other indicators may suggest the presence of consciousness in ancient animals [31]. Archeological research also shows that consciousness fits into the evolutionary model, that is, consciousness evolved relative to the increasing complexity of the brain structure. At first glance, it seems easier to describe the consciousness of a primitive and small mouse than to engage in the study of human consciousness. This does not indicate that we have studied this animal well; on the contrary, there is still a great deal about it that we do not know. At the same time, the human brain is so unpredictable that we cannot even assume our own actions. Just by opening cytoarchitectonic maps (even the old editions made in the Soviet Union) [32, 33] or Ed Lane’s Atlas of the Brain [34], we can see how different all humans are. Therefore, it appears logical to search for consciousness in genetics, since it is, at first sight, the most convenient mechanism for the fast transfer of information. The organism does not need to invent new ways of delivering information from cell to cell when each cell during division already has a given amount of information enshrined in the genetic code. However, it is not entirely accurate to place consciousness entirely within genetic structures. Another question is whether consciousness can change. The artist W. Utermohlen, who was negative to the phenomena of abstractionism and expressionism in painting and had declared himself an enemy of these styles, as a result of developing Alzheimer’s disease [35], started painting expressionism reminiscent of F. Bacon’s brushwork, with limitation and confinement of figures in space. What was it that changed if not consciousness?

As argued by the French philosopher H. Bergson who combined the phenomenon of consciousness with episodic and semantic memory and with the properties of preservation, recognition, and reproduction assigned to it [36-38], consciousness is evidence of what is called reason, which guarantees, within possible limits, logical separation, distinction, and opposition. Are these properties ascribed to consciousness by Bergson really these properties? If so, then consciousness is part of the physiological processes of the formation of short-term and long-term memory described by E. Kandel and his team [39].

Assuming the neurobiological notions of the passage of the impulse, consciousness once again takes on the role of a collecting point. In other words, information gathered from the outside is eventually concentrated in one point – the brain. We sense changes that come to us in the form of information and depending on this, we can change, react, and adapt. Does this mean that consciousness is the brain and “we are our brain” innervating our body and thoughts [40]?

At this point, we have already accumulated a lot of arguments in favor of not only the materiality of consciousness but also its intentionality operating similarly to conductive neural networks. However, the question remains “where to look for it?” and the answer lies in the most complex organ responsible for our existence here and now. The search for consciousness should be carried out not just in the connectome, but much deeper. There is no consciousness per se on the surface of neuronal networks; it is only projected onto them, extending new terminals to the postsynaptic cell. Without going deeper than biological neural networks and nerve cells, it is impossible to find consciousness.

Perhaps due to the presence of self-perception, which is a product of the working capacity of nerve cells, consciousness could be ascribed three basic but not the least properties – usage, thinking, and perception. Another question is whether they exist autonomously from one another.

The study of patients with epilepsy suggests that the claustrum may act as that very information center with inputs and outputs of information, yet it is not the consciousness itself. This can be confirmed by studies with electric stimulation of the claustrum electrode and the resulting disturbance of consciousness or its separate properties, which are depressed both separately and in the aggregate [41, 42]. This serves as an argument for the existence of several states of consciousness.

If we omit that consciousness is a result of electrochemical interaction and continue to make a probabilistic map of consciousness, it would probably have a peripheral divergence from claustral consciousness. In this case, it would be as if consciousness is always present in the material substratum (brain) and reacts vectorially to phenomena, raising the level of intentional consciousness, and rudiments to “primitive” the awareness of phenomena whose experience is recorded by the memory defined by E. Husserl as “primary memory”, which results from retention [43, 44].

Modern theories that include quantum physics in the field of consciousness research have adopted from German irrational philosophy the categories of “chaos” and “randomness”, which are embedded into the information field and diffuse information exchange between brain structures by the laws of physics. Interdisciplinary interactions, in general, have produced a large number of

theories, which K.V. Anokhin [45] groups by the distinctive properties of consciousness. The scientist notes that each theory is varied in its approaches, for each of which consciousness has a qualitative property that is distinctive and expressed by its qualitativity.

There are numerous empirical examples of consciousness demonstrating the features of intentionality, for example, the “selective attention test” experiment with ball counting conducted by D. Simons and C. Chabris. Attention and noise filtering affect the variability of the state of consciousness, or its involvement in processes of perception, processing, and response, addressing both the “outside world” and the “inside world”. In other words, without intention, consciousness has no working space. Is it possible to call reflection the only property of consciousness as its qualitative manifestation? Since known definitions and theories of consciousness accept the subjective phenomenal experience as a given, we speak of the informational exchange of physical and mental bodies between each other, thus, the transgression of reflection beyond intentionality is impossible, as is its acquisition of a qualitative property.

Having evaluated contemporary ideas about the phenomenon of consciousness, we are convinced of it being a “superconcept”. Resetting the concept of consciousness, removing labels from it allows not only abstracting from the existing theories but also distinguishing the “area of the conscious” that is worth considering in the search for consciousness. First of all, we should not identify the concepts of “consciousness” and “the conscious,” since the latter implies where consciousness is at a particular moment in time. Consciousness manifests itself as “innervating thought.” This can be demonstrated by the following example:

$$\begin{aligned} \textit{sense organs intention} &\rightarrow \textit{object operator} \\ &\rightarrow \textit{experience reaction} \rightarrow \textit{response} \end{aligned}$$

The example shows that the perception of an object (intention) by the senses directly calls for thought (operator) experience, leading to a response, and presents the domain of the conscious, but each process is a separate component of consciousness. However, what is thought, and in relation to what does it exist within the realm of the conscious? Thought is to be understood as the invocation of experience, memory, images, language, representations, which characterizes this concept as a predicate of consciousness, the use of which is possible through innervation (arousal). When a part of the body (e.g., the hand) is innervated, thought manifests arousal.

Does it follow from the above contemplation that self-perception is another constituent part of consciousness, similarly expressed by the innervation of the senses? To begin with, it is necessary to understand whether a particular cell stores an individual image. The fact is that

the image of an object is a projection of the senses imprinted in memory or experience. We cannot imagine something we have never seen within the existing matter, so thought is not just an innervation but an innervating projection. Consciousness is limited to projections, and projections themselves are limited to the senses. Thus, it would be useful to isolate the concept of “mentis-conscientia” (“thought-consciousness”) by calling it, say, (alpha). Then consciousness in control over body movement – “motus-conscientia” (“transconsciousness”) will be denoted by (beta). As a result of the integration of the two types of consciousness, with α and β interrelated, we get “vestibulum conscientia” (“integrated consciousness”) assigned the symbol Δ (delta):

$$\alpha + \beta = \Delta,$$

This begs the question of what drives integrated consciousness. To answer this, we should first determine what is the desire to move the hand and what is the desire, in principle. Desire can arise in relation to an object that we know from our existing experience, that is, desire implies an innervating projection (I want what I know), which we previously referred to as “thought”. The acquisition of the quality of desire by thought is possible as a result of gathering information. The result of such collection can be needs of any level.

It is important that information is collected at several levels of the body: atomic, molecular, subcellular, cellular, tissue, and organ.

Table 1: Forms of consciousness

Vestibulum conscientia (Δ-consciousness)	
Desire	
Mentis-conscientia (α-consciousness) →	← Motus-conscientia (α-consciousness)
Thinking	Action

Thus, delta consciousness is the argument of alpha and beta consciousness. The desire to act leads to the desire to use thinking, and the desire to think leads to the desire to think of action.

Returning to the notion of “self-perception,” we may note that self-perception is not just the innervation of the sense

organs, but the innervation of the above-described complexes. If this is the case, then:

$$\Delta \rightarrow \text{self} - \text{perception}$$

Table 1 then takes the following form (Table 2).

Table 2: Forms of consciousness

Vestibulum conscientia (Δ-consciousness)	
Desire	
<i>Self-perception</i>	
Mentis-conscientia (α-consciousness) →	← Motus-conscientia (β-consciousness)
Thinking	Movement
<i>Realization</i>	

The table shows that integrated consciousness presents self-perception as a separate phenomenon, which also indicates that:

$$\Delta = \text{consciousness},$$

whereas thought consciousness and transconsciousness fall into the area of the conscious appear as:

$$\alpha, \beta \rightarrow \text{the conscious}.$$

The well-known philosophical categories can be considered within the framework of the highlighted forms of consciousness in the same vein (Table 3).

Table 3: The understanding of categories within forms of consciousness

Vestibulum conscientia (Δ-consciousness)	
Representation	
Mentis-conscientia (α-consciousness) →	← Motus-conscientia (β-consciousness)
Abstract	Actual
Image	Object

4. Conclusion

The provided examples demonstrate that consciousness is a synthesized form of the two dependent forms of consciousness that make up “the area of the conscious”. Neuroscientists searching for consciousness in “the area of the conscious” record its presence on various tomographs using fluorescent proteins, attributing it to separate anatomical structures. Yet analysis shows that consciousness lies deeper and is not a separate anatomical structure. This raises the intriguing question of whether and to what extent evolution and consciousness are interrelated. Perhaps the search for consciousness should be conducted precisely in this relationship not limited to the imaging methods focused on blood oxygen content (BOLD effect) but taking into account that consciousness appears to vectorially fill cells with the idea of a “chalice”. In future research, it is of interest to examine the relationship between consciousness and action potential. It seems logical that there should be something that does not simply refer to experience, memory, and information but acts as a lever, an operator of these phenomena. It is necessary to analyze what is capable of this and what processes are involved in this.

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