REVIEW ARTICLE

On the Hard Problem: Revisited, Re-Evaluated, Recast

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Abstract

This paper is an extension of our previous article, “What is it like to be an AI bat?[1]. Questions discussed in the first paper are quite complex and cannot be responded to in a brief, consecutive way. As a result, we divided more detailed discussion into separate topics, united under the umbrella of problems of consciousness and intelligence, artificial and natural. This first part investigates basic postulates associated with the hard problem phenomenon. There are two opposing camps that support the existence or non-existence of a hard problem, with quite a wide field between these two poles, where more opinions about different relationships of the phenomena exist. We try to create a comprehensive picture of opinions and simultaneously find the pathway through the thorny and unwelcome ground of divisive views. The mind-body problem is centuries old, and contemporary scientific views give little hope for a quick and easy compromise. There are several possible outcomes from the hard problem discussion: dual ontology persistence into the future; separation of two polar opinions into the positivist, scientifically approachable, and phenomenal, psycho-philosophical; full rejection of the hard problem as an illusory epiphenomenon, which gives little for practical research; a successful reunion of two positions as two sides of one coin or based on the third, more fundamental approach. We try to show attempts for development in all these directions, with further justification of the position firmly based on classical science. This position might look reductionist from the point of view of some novel scientific explanations, such as quantum consciousness, many minds world explanation or pure information-based consciousness. In order to limit every part of discussion by standard readable paper, we stop short of correlates of consciousness, which are discussed outside of this publication, in the next paper.

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1. Introduction

Human interest in consciousness and its important part, intelligence, has been present since its first categorical conceptualisation. Pre-scientific attempts to build coherent ontologies based on spiritual monistic systems are easy to explain.

Today, when scientific views are deeply rooted in research methodologies and the construction of relevant paradigms, there is still an uncomfortable gap between our presumably extensive, often first-hand, personal understanding of the consciousness subject and classical scientific consensus on this topic. Moreover, there is a demonstrable lack of agreement about the definition itself[2].

Certainly, there is no need to talk ourselves into silence in the Wittgenstenian mode. “Whereof one cannot speak, thereof one must be silent” - the finalising maxima of “Tractatus logico-phylosophicus”[3] is not considered to be principal in this domain of scientific knowledge. The rationale for it is much more fundamental than mere natural language polysemy. One of the reasons is the wide concord about the measurement of the presence or absence of consciousness and the possibility of unconscious functions[2]. There is also a positive vision of gradualism of consciousness levels. The less optimistic side of the second statement is almost all functions of consciousness are recognized by different specialists in the field as potentially unconscious. There is proof that even some linguistic and arithmetic abilities, once contemplated to be constrained by the strict requirements of consciousness, are less in need of it than thought before[4].

There is also growing evidence of the decoupling of working memory and conscious state, which was previously considered impossible by a significant number of researchers[5]. One of the principal chasms in the studies on consciousness lies in the divergence of approaches to the fundamental problem of qualia. Philosophical theses, as it was put by Daniel Dennett, are epitomised in “hard problem of consciousness” by David Chalmers and result in continuous debate, going much further than “Dennet-Chalmers” ontologic monism versus dualism discussion[6].

In a similar way, we can perceive an exchange of views on phenomenal consciousness and reflexive or access consciousness[7]. While one side claims the existence of two types of consciousness, the other argues about two different mental processes and not two different consciousness classes. These ontological differences are numerous enough to make the categorial descriptions of consciousness quite divisive. This is less so when we consider specific attributes of consciousness as necessary elements for the conscious state[2].

However, the principal obstacles with described ontological models do not solely stem from the categorical differences but might reflect the theory’s unsuitability to be studied with the appropriate scientific rigour, particularly when they do not possess clear metrics and cannot be easily measured. Levels of consciousness and alertness can be estimated with the help of the coarse but effective scales, such as the Glasgow Coma Scale. The scale is applicable in practical healthcare and can be used for clinical research in certain medical areas, but it suffers from a lack of nuanced measurable parameters. It is the empirical scale and roughly registers the levels of alertness. Richmond Agitation-Sedation Scale and Coma Recovery Scale Revised are other clinical scale tools[8] with similar features and applications.

There are also different instrumental scales for operative, intellectual and memory abilities, but they do not describe or measure consciousness as a fully-fledged phenomenon. Levels and states of consciousness can be measured with help of purely instrumental Trans-cranial Magnetic Stimulation (TMS)-evoked electroencephalographic (EEG) signals, as it is proposed in Perturbational Complexity Index (PCI)[9].

However, observation-based behavioural empiricism, which opens the possibility of recognizing other minds or building objective qualitative and quantitative experiments, does not satisfy those who hold the position of insufficient explanatory power stemming from sheer physicalism[10]. According to this position, the only viable alternative to physicalism and emergent panpsychism is idealistic ontology, a certain type of idealistic monism. This ontology discards dualism and leaves us with a potent explanatory instrument. In this paper, we will discuss proponents and opponents of the view that explanatory power is detached from the empirically based scientific worldview.

The other approach is to avoid dualistic ontology through complementary ontology and dual-aspect monism[11]. One of the arguments provided by this monistic position, such as neutral monism, is based on the physical non-locality and necessity of the certain type of observer in Copenhagen's interpretation. While delving into the realm of the quantum basis of consciousness, we provide an opinion of those who see it as a distraction from the real problems with the mere shifting of explanation beyond mind-body problems into the realm of subjective-objective perception dualism.

There are attempts to reconcile reductive physicalism, panpsychism, dualism and idealism[12]. This leaves us, according to authors, with an interconnective, mutually interdependent monism of consciousness and cosmos, similar to neutral monism. We have to raise the same question: Is the explanatory power of these models scientifically satisfactory for understanding consciousness phenomena without leaning towards one of the components in this supposedly neutralist monistic architecture? Other attempts to resolve the dual ontology through information geometry, where Markovian monism is claimed to be formally explanatory for the internal state of mind or proto-mind, with the possibility to include the external or physical world into the united information system[13]. Figure 1 combines the various views and opinions on the “hard problem”.

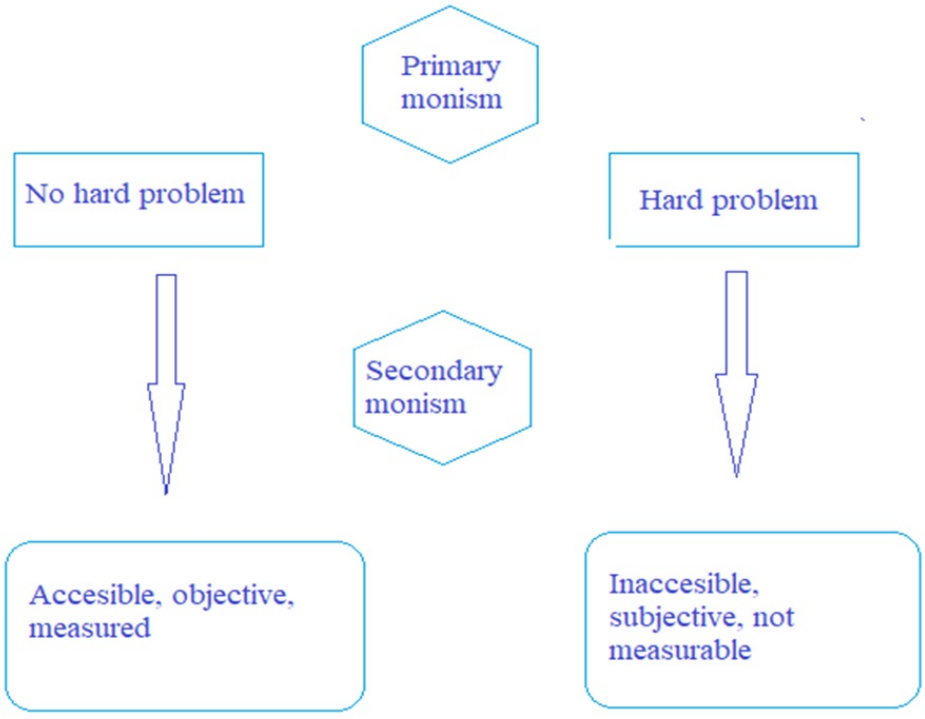

Figure 1. Different views on the hard problem

The formalisation of this kind of view allows for an uncontroversial explanatory theoretical system with the inclusion of stochastic thermodynamics, Bayesian mechanics, and Fisher information metric. This formalized framework can serve as the basis for the type of information geometry model consistent with contemporary physics-mathematical world models, measurable quantitative parameters and shared qualitative categories. This step is clearly directed towards the resolute consciousness-world information model, even if not with full explanatory power. It shows us that dual ontology prevents the possibility of a clear scientific approach to the consciousness problem and has to be re-evaluated. It also raises the question of whether it is possible to create an effective, internally consistent monistic position from any dualistic ontologies. The monistic approach necessitates a hard choice. It is preferable to be satisfied with explanatory power without sufficient scientific and formal mathematical basis or better to accept an inability to fully include phenomenal states into any consciousness model. Classical scientific research requires objective parameters, as commonly shared categories and associated quantitative metrics accessible for assessment. Phenomenal experience of consciousness closely correlates with neuronal brain activity and theoretical models have to be compatible with fundamental physical and biological, e.g. evolutional principles[14]. The structure of the paper is complex and consists of several parts, as reflected in Figure 2.

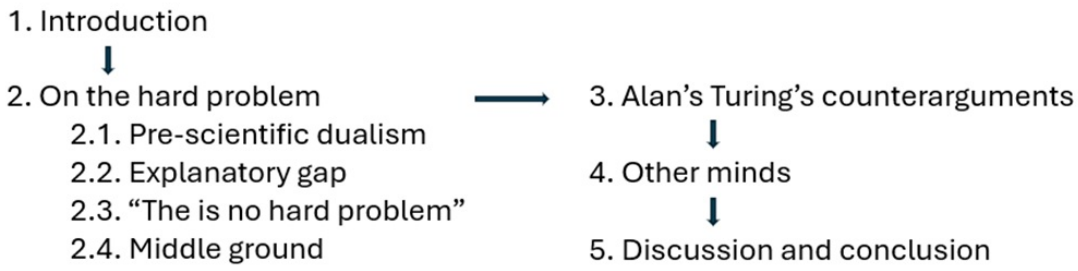

Figure 2. The article structure

2. On the hard problem

There is the spectrum of opinions regarding the hard problem of consciousness. At one extremum of this spectrum, the hard problem is considered unsolvable, while at the other extremum, it is viewed as a "non-problem".

2.1. Pre-scientific dualism

What is consciousness? We are aware of the phenomenon as a subjective experience and acknowledge it as an objective reality. The mind-body problem, known for centuries, was clearly formulated at least from the time of René Descartes[15]. The Cartesian approach represents a departure from the sensory nature of the mind, or soul if we use the terminology of Aristotelian tradition, refracted by one of the greatest medieval scholastic minds, Thomas Aquinas. While the Aquinate school emphasizes the role of sensory elements as predominant in soul formation, Descartes, in his "Meditations", concentrates purely on the analytical faculties, questioning the veracity of sensations[16].

Since the problem was formulated at least as early as Aristotle's time, three main constituent parts of the soul were identified: anima vegetativa, anima sensitiva and anima rationalis. While anima vegetativa, as described in “Parva Naturalia”, is based on physical phenomena and is considered scientifically accessible for objective study, as well as anima sensitiva, anima rationalis, on the other hand, according to “De Anima”, is less so. Aristotelian vision of “psuchê” as attributable not only to human beings but also to animals and plants borders panpsychism and stops with non-living creatures, excluding them[17].

The Presocratic and non-Socratic views on the soul, particularly those of the Stoics, are quite materialistic. Epicurean point of view divides the soul into higher levels: rational “animus” and more sensorial “anima”. The theory created by Epicurus and his followers is more developed, but the discussion on this topic goes beyond the scope of this paper. Still, it is worse to mention, together with the “pneuma” of Stoics, substances with different levels of complexity and responsible for emergency phenomena from the cohesion of inanimate objects all the way through the vitalic intermediate powers, responsible for life to the highest level of sensorial and cognitive abilities, granted to animals and, crucially, humans[18].

This brief overview of some pre-scientific theories of consciousness and intellect is important for further understanding of the quest for its scientific basis. There are several similar objections against the modern strictly positivist, purely physicalist, reductionist approach, partially manifesting in emergent theories of consciousness, resembling ancient discussions, which make fundamental scientific explanations look insufficient[19].

2.2. Explanatory gap

An explanatory gap is unavoidable in any discussion about the hard problems and qualia. However, there is an important difference between casual and property dualism. Even though deep causal dualism is not accepted by most researchers today, there is a possible place for the claims of property dualism. There is an explanatory gap between pure physicalism and the phenomenal nature of consciousness, the hard problem of consciousness[20]. The problem of consciousness is supposed to be hard enough to become an unsolvable obstacle for any development of Artificial consciousness theoretical models, let alone practical implementation.

Qualia, sensory or other subjective experience, cannot be easily categorised as part or direct result of consciousness's physical basis. Paraphrasing a famous author, all fundamental problems are hard, but some are harder. An intriguing argument of consciousness, possible on any unary basis, is not easily resolvable with dual ontology. Moreover, dual ontology directly reflects the impossibility of a monistic approach. The first-person experience of consciousness cannot be the proper monistic basis without discarding the objective part of our existence. On the other hand, as John R. Searle argues, consciousness is causally reducible to the neurophysiological brain processes, but it does not automatically imply ontological reduction[21].

Objective study on the neural basis of consciousness of the third person does not directly produce our objective knowledge of his or her qualia experience. This opinion is widely supported or widely contested. We can name some main proponents of hard problem existence, such as Thomas Nagel, David Chalmers, Peter Jackson, John Searle, Colin

McGinn, Ned Blocks, Daniel Stoljar, and Joseph Levine (among others, and some others). David Chalmers is an actual author of the term “hard problem”. Thomas Nigel showed evidence about implicit subjective states of qualia and advocated the impossibility of filling an explanatory gap with the help of objective reality instruments[22].

Peter Jackson goes to the roots of the physical world explanations[23]. Quantum physics requires holistic explanatory models, and one of them is the Many Minds non-collapse Everettian theory, first proposed by Hans-Dieter Zeh[24]. Jackson sees the Many Minds approach as a possible solution for an “easy problem”. At the same time, the “hard problem”, in his opinion, will remain unresolvable, and Michael Esfeld gives possible reason. Esfeld demonstrates a sceptical view of quantum holism and goes back to the cartesian epistemology[25].

Colin McGinn carefully builds his argument from the implicitly scientific, evolutionary basis, comparing the problem of consciousness to the problem of life itself: we know it evolved from inorganic matter with no non-scientific miracles involved in the process[26]. Consciousness is an emerging phenomenon, further biological matter development with the possibility to postulate some natural causes for it. Alongside it, McGinn bisects intellectual tasks accessible by human minds in the way they are divided by Noam Chomsky: into problems, which are in principle solvable by the human mind, and “mysteries”, which are unsolvable for us, regardless of how hard we try. The hard problem is a mystery because it is a state and not an object and cannot be accessible from inside of itself. Here, it is important to add a remark on mysteries made by Chomsky. Mysteries, if we revisit the history of science, are not permanent. The “hard problems” of the day are not solved; they are left for the future to be explained. This is applicable, for example, to the theories of movement and gravitation[27].

Ned Block argues on softer ground than McGinn that the problem of consciousness might even be accessible by the human mind and be potentially solvable. However, he finds the postulated equivalence of casual neurophysiological mechanisms and conscious state phenomenon explanatory inadequate[28]. In the development of his argument, Block calls this explanatory epistemological gap a “harder problem” because of the failure to differentiate between perception-based accessive consciousness, the domain of qualia, and the meta-conscious state, or phenomenal consciousness, which is even less accessible for analysis. From this conundrum also arises the “problem of other minds”, difficulty in accessing them. While naturalism and functionalism in the consciousness theories failed to explain on the same natural basis quite different minds, demonstrating in them the same or similar functions, there are formal and informal proofs that phenomenal consciousness certainly overflows its cognitive accessibility[29].

In his critique of the modular theory by Jerry Fodor[30], Block, in principle, for the sake of argument, agrees with the statement by Fodor about insufficient explanation made by perceptions or cognitivist approach and the importance of cognitive penetrability of the consciousness state. However, Block repeats his question again: if modules in the Fodor model allow the meta-conscious phenomenal representation in an adequate manner, and if yes, it does not include the neural basis for cognitive accessibility.

Robert Kirk is widely known as a “father” of “philosophical zombies” or, in fact, “non-father”, arguing for the impossibility of their existence. While not a proponent of hard problem “hardness”, he gave a good starting point for further development of David Chalmer`s ideas. The whole argument about p-zombies creates a dichotomy where p-zombies are physically

possible but cannot contact their epistemic qualia[31]. As the argument goes, people with qualia, caused by physical phenomena but which are consciousness epiphenomena by their nature, cannot physically be explained as conscious creatures. If qualia are not epiphenomena, they are physical by nature and have to be accessible as such. But if they are inaccessible as purely physical phenomena, there should be something more than physical in them. The argument is a detailed extension of the more general idea discussed by Saul Kripke: if the purely physical world during supposed creation required additional effort to make an additional entity, it shows more than simply the epiphenomenal nature of consciousness[32].

The reasoning done by Stoljar[33] may look more subtle. First, he produces the potential opposition of the phenomenal consciousness argument and all other arguments. In the next step, this argument is criticized through the powerful analogy with a Cartesian argument about physicalism and linguistic abilities, where language itself cannot be explained on an entirely physical basis. In the same vein, consciousness cannot be merely a casual product of a physical entity. The position of Descartes can be explained by the inadequate physical theory, lacking modern computational and information theories. Still, an extension of this postulate leads to the understanding that physics does not effectively describe not only the linguistic but also the consciousness faculties. It has to be something more than physical to describe it.

Joseph Levine actually coined the term “explanatory gap”. His accent is made, literally, on the explainability failure of any of the theories, constructing equivalence between any correlates of consciousness and conscious states and qualia. The mere formal logical connection does not give us more information. For example, conscious and unconscious states differ in the awareness[34]. However, the awareness itself cannot be representative enough for consciousness. Besides this, Levine objects to the consciousness as a higher-order state when there is an alleged absence of the first-order state. As a result, no correlative or emergent theories possess enough potential for the phenomenal explanation of consciousness.

Certainly, we could not list and describe here all the intricate details and complexities of reasons supporting the existence and proof of a hard problem. The debate over the decades became exceedingly sophisticated. Nevertheless, it does provide a comprehensive description of the main positions held by its proponents. Please see Table 1 for a summary of the main opinions provided in this chapter.

Table 1. Hard problem and explanatory gap

Author	Position on a hard problem and the explanatory gap	Statement	Reference
David Chalmers	proponent	The hard problem is not casually but ontologically determined. The explanatory gap between pure physicalism and the phenomenal nature of consciousness or qualia is impossible to close.	[20]
John Searle	proponent	There is no monistic explanation. The first-person experience of consciousness cannot be the proper monistic basis without discarding the objective part of our existence	[21]
Thomas Nigel	proponent	There is no possibility to fill the explanatory gap with real-world arguments	[22]
Peter Jackson	proponent	Many Minds Everettian quantum mechanics is the explanation for the easy problem, but the hard problem is unresolvable	[23]
Michael Esfeld	proponent	There is no quantum holism, and mind-body problem is unresolvable	[25]
Colin McGinn	soft proponent	Consciousness is an emerging phenomenon, further biological matter development with the possibility to postulate some natural causes that cannot be fully explained. This is an unsolvable problem.	[26]
Noam Chomsky	opponent	Some hard problems are left for the future. There is no scientifically based mind-body dualism from Newton's time	[27]
Ned Block	soft proponent	Epistemologic gap between qualia and meta-consciousness is a “harder problem”	[28][29]
Robert Kirk	opponent	P-zombies are not physically possible	[31]
Daniel Stoljar	proponent	Physics does not effectively describe not only the linguistic but also consciousness faculties. It has to be something more than physical to describe it.	[33]
Joseph Levine	proponent	Explanatory gap for correlative or emergent theories	[34]

2.3. “There is no hard problem”

In the words of Steven Novella, the so-called hard problem is “non-problem[35]. In accordance with this position, neurophysiologically approachable, biologically and physically explainable consciousness is a phenomenon secondary to its fundamentals and has to be perceived as such. Clyde Hardin builds his complex argument, besides all, on the objective nature of perception, in the particular case of colours, for example, in the Munsell scheme[36]. He proposes a lack of contingency in describing extrinsic facts in some sceptical arguments about perception. Leibniz, in his “Monadology”, presents perception as inexplicable by only mechanical causes, for example, in the case of the person seeing a mill[37].

Hardin continues that the process of perceiving a mill may include sufficient knowledge about the mill's mechanical operations. However, regardless of the complexity of the mill's mechanical operations understanding, the physiology of perceiving is insufficient to be satisfactory with the phenomenon of perceiving a thing. Only extrinsic facts about the mill may suffice. As Leibniz does not go into the explanation of the mill`s details, Levine proposes the possibility of inversion between “red” and “green” for different perceptors without explaining the particular details of “red” or “green”[38]

Hardin objects to it and builds the analogy. The macrostructural map of thermodynamics is successfully explainable by the microstructural statistical mechanics. Similarly, the existing map of colour phenomena is scientifically explained by

neurophysiological processes. Moreover, physical, chemical and cytological experiments help to establish a relationship mechanism between perception processes and perceived qualities. In this way, an explanatory gap can be successfully closed. Nevertheless, it leaves the possibility for the variations in the neural mapping differences and even inversions, when the same extrinsic qualities lead to the different represented qualia. Physical objects are perceived as coloured but not “coloured” in a true sense. Coloured objects are, in this sense, illusions, but not unfounded ones.

Harrison differs on this account. Accessibility of the same colour qualities by other minds should not be confused with different categorical linguistic systems of colour descriptions, says Harrison[39]. Hypothetical Martians, even possessing different colour qualia linguistic categories, cannot transgress more fundamental colour characteristics without violating basic objective principles, e.g. accessibility by other minds. There is no inversion of the spectrum in the perception of other minds, regardless of its categorical linguistic mapping. Paul Churchland continues and argument on colour perception and contravenes Hardin`s objections on the mapping between colours of the real world and neurophysiological mapping of it[40]. In his proposal, nothing prevents us from constructing an objective perception of colours, as well as sounds.

The delicate and nuanced philosophical discussion on the reality of perception only partially reflects the nature of the division of opinions about the hard problem. Steven Novella's radicalism is shared by a significant number of researchers. Patricia Churchland dismisses the claim about the potential inaccessibility of the hard problem of consciousness as unconstructive, prone to being discussed in terms of “semantic gerrymandering,” lacking proper imagination, and declared to be “hard” in advance[41].

Patricia Churchland dismisses thought experiments about consciousness as a feeble replacement for the proper scientific rigour. She cites Francis Crick, a proponent of a purely neurophysiological basis for consciousness: the statement about the imaginative world with gases staying cold despite their molecules moving at high velocity. This thought experiment says nothing about thermodynamics and cannot be used as a scientific argument. The phenomenal nature of consciousness should not obscure the understanding of the fleeting empirical nature of often-discussed qualia, such as colour, sound, pain or taste. The less philosophically explored proprioceptive or vestibular qualia do not give a good starting point for the hard-problem argument, even less by the possible “introspective quale”. The statement itself about the “hardness” of the problem moves aside from so-called “easy” problems without proper justification. The signature, made with a dominant or non-dominant hand, with foot or with mouth, is still recognisable as similar, without appropriate skills acquired by the neuromuscular apparatus in some of the listed cases. This shows an insufficient understanding of motor representation nature as problematic enough. There are other problems, such as learning and information retrieval, which can be better understood on the cellular level but not sufficiently conceptualised on the systemic level. Presenting “hard problem” as Aristotelian superlunary physics, devoid of tractability by its claimed ontology in the world, is not the strategy for better understanding. The propensity to start a discussion about consciousness from the premises of primary ignorance and the inability to understand or even imagine an explanation for it is not helpful. In a similar vein, the explanation of consciousness through the “really deep” quantum mechanisms or, possibly, new physics does not guide us towards the real solution.

Daniel Dennett is not less straightforward in his approach to the hard problem[42]. He compares the question of a conscious person about consciousness to the “hard problem” of vitalism. All the features of life, such as growth, development, reproduction, self-repair, and immunological self-defence, are serious problems for the researcher, but they do not represent, even in their unity, life in its entirety. Moreover, we can think about a creature with all these functions, but not alive, in the analogy with a philosophic zombie. The life phenomenon will always remain outside of our understanding. Similarly, functions of consciousness or its elements are not satisfactory explanations for the phenomenal consciousness, which goes beyond the simple summation. Here, Daniel Dennett goes to the main argument: if the conscious person goes to deconstruct the consciousness as a first-person experience, dissociating functions from the phenomenon, the result will be an obvious gap in explanation.

Peter Carruthers calls the hard problem question “non-question”[43]. Hard problem does not exist, and there is no reason for its existence. The only reason for the continuous discussion is the unbiased seriousness of materialists, with which they comprehend dualistic intuition seriously. It allows David Chalmers to produce the “leftover” argument: no matter how many easy problems of consciousness will be solved, there is always a hard problem. If consciousness is independent of mental states and functions, there is a place for hard phenomena. Hard phenomenon is also structurally and functionally denying explicability. However, it is hard to prove the problem from one's own experience because the subject cannot be fully trusted to be objective. Thought arguments, such as zombies, colour-blind scientist Mary or bat phenomenal state, are far from our normal experience or simply impossible. The question placed by T. Nagel postulates consciousness as a type of subjective experience, which is intuitively appealing but not convincing. This intuition is a source of the hard problem discussion and has to be understood objectively.

Robert Kirk has created “p-zombies” in order to deny such a possibility in the real world and defeat the hard problem idea itself. He argues that all complex theories about necessary language or states of consciousness do not answer questions about lower but functional conscious states, possibly less conscious perception experience, as for mice smelling cheese or children still in need of developed language[44]. Kirk defies authors who think p-zombies are conceivable or even possible. Any utterances by p-zombies about human-like experiences create problems for them[45]. Does this utterance reflect the truth? What is their relation to qualia?

Fred Dretske places qualities of objects as represented properties of perceived things[46]. In this case, he equates them to qualia. This also works in the case of hallucination when properties still represent a perceived thing on the phenomenal level. In such cases, experience is an important part of the representation.

Michael Tye sees consciousness at the heart of the mind-body problem. Many philosophers see the phenomenal consciousness definition as impossible to define. Any attempt to use a putative definition will invoke the argument of its impossibility, rendering the definition circular. Ned Block proposes the China-Body problem to reflect on qualia, but this is the same as imagining a fully functional body duplicate with no phenomenal consciousness[47].

At the end of this chapter, it is important to mention the classical positivist position of Karl Popper, who famously claimed: “Quine puts the matter in a nutshell by saying: 'The bodily states exist anyway; why add the others?' Interestingly, very

similar questions were asked by philosophers like Berkeley and Mach, who said: 'Sensations exist anyway; why add material things?' I admit that the denial of mental states simplifies matters. The difficult body–mind problem simply disappears, which is no doubt very convenient: it saves us the trouble of solving it"[48].

Please see the summarization of the main opinions provided in this chapter in Table 2.

Table 2. "There is no hard problem"

Author	Position on a hard problem and the explanatory gap	Statement	Reference
Steven Novella	opponent	The hard problem is non-problem	[35]
Clyde Hardin	opponent	Only extrinsic facts about the object may suffice for perception. Perception can be an illusion but not an unfounded one	[36]
Bernard Harrison	opponent	There is no inversion of the spectrum in the perception of other minds, regardless of its categorical linguistic mapping	[39]
Patricia Churchland	opponent	Dismisses thought experiments about consciousness as a feeble replacement for the proper scientific rigour.	[41]
Daniel Dennett	opponent	Compares the question of a conscious person about consciousness to the "hard problem" of vitalism. All the features of life do not represent the life in its entirety. If the conscious person deconstructs the consciousness as a first-person experience, dissociating functions from the phenomenon, the result will be an obvious gap in explanation.	[42]
Peter Carruthers	opponent	Hard problem does not exist, and there is no reason for its existence. The only reason for the continuous discussion is the unbiased seriousness of materialists, with which they comprehend dualistic intuition seriously, leaving a place for a "left-over" argument.	[43]
Robert Kirk	opponent	All complex theories about necessary language or states of consciousness do not answer questions about lower but functional conscious states	[44][45]
Fred Dretske	opponent	Qualia are equivalent to properties of perceived things	[46]
Michael Tye	opponent	China-Body is the same as imagining a fully functional body duplicate with no phenomenal consciousness	[47]
Karl Popper	opponent	"The denial of mental states simplifies matters".	[48]

2.4. Middle ground

The divide between the two camps is quite wide and looks irreparable. The split in the opinions sometimes looks Manichean, albeit there is a wide middle ground with different intermediate positions. Any of these positions are usually based on cautious support of many arguments provided by the "neurobiological" and "physicalist" pro-side. At the same time, it includes a number of objections from the con side, such as their opponent's radical biological reductionism and excessive physicalism. One-sided monism is not accepted on the middle ground as an adequate viewpoint, be it neoclassical materialism or nearly idealistic phenomenalism. Explanatory gap and ontologic dualism are not taken at face value but also not cast away as irrelevant. It harbours more nuanced views on the hard problem and provides explanations, often based not only on "objective reality" or personal experience of consciousness but on the deeper understanding of nature as seen by humankind. This also marks functionalist or emergent theories, reductionists or non-reductionists, as incomplete.

The classic example of an attempt to build holistic scientific theory is made by Bertrand Russel[49]. Neutral monism by Russel postulates underlying unitary world ontology, which, at its basis, is not divided into the events, materia, sensations, perceptions or states of mind. This does not mean we are able to percept the world or ourselves in any other way if we do not apply the fundamental analytical approach. At the same time “world is full of events”, but little of it is given to us for experience.

Critics mentioned complexity in the “neutral monism”, expected to give answers simple enough to comprehend and yet making some parts of the explanation more obscure, not less. There are remarks about tendencies of neutral monism, which hide but do not eliminate reductionism, materialism or dualism. Spinoza is recognized as an early monist of the “priority monism” type, contrasting with “existence monism”[50]. The last category claims that there is only one object. Priority monism postulates temporal and existential pre-eminence of monistic cause, where all other objects are non-basic and exist as its modes. Some other philosophers and scientists are named upholders of neutral monism: Ernst Mach, Willam James, Moritz Schlick, John Dewey, Rudolf Carnap, and Alfred Ayer, to name just a few. Simultaneously, Carnap is often recognized as a positivist of logical empiricism type.

Strict monism is not a necessary foundation for the elimination of ontologic dualism. Quine states that the reality perception depends on multiple meaningful “translations” or utterances of it[51]. There is no independent reality beyond meanings, even though there are “indeterminacy of meaning” in some cases. They are different from the “underdetermination” of scientific theories.

Noam Chomsky is an ardent critic of Quine's linguistic behaviourism. His Universal Grammar theory is the foundation for functionalism by Putnam and Fodor, and they are also criticized by Chomsky[52]. His own theory of the linguistic basis is deeply placed in the universalist approach to the linguistic abilities and universal rules for any language. The position in the mind-body discussion is taken as a reflection of the vision from the blend of his theory and the history of science and philosophy[28]. Chomsky mentions Stephen Yablo and his paper on cartesian dualism[53].

Yablo extensively discusses the metaphysical source of cartesian mind-body dualism and the possibility of mind embodiment. As a result, he concludes, “I am not identical to my body”. In the process, he reflects: “Substance dualism, once a main preoccupation of Western metaphysics, has fallen strangely out of view; today’s mental/physical dualisms are dualisms of fact, property, or event”. When Yablo develops his argument about “selves” as substances, not minds and certainly not only bodies, Chomsky claims that: “it is a matter that has lost its presumed status, and not “strangely.” He sees one part of the renewed argument in the position of reconstituting physical, as shown by Galen Strawson[54].

The important interpretation of the world's physical nature is the impossibility of radical emergism. Physical is spatiotemporal and experiential, where there is no place for the physically inexplicable consciousness emergence: “...it seems plausible to suppose that all physical stuff can potentially be part of what constitutes—is—experientiality like ours in living conscious brains like ours”. There is no mystery behind the slow emergence of the mind or consciousness, and there is no place for neutral monism. If to speak about monism, it is of panpsychic nature. Physical is capable of micropsychism and panspychism[55]. In his paper, Strawson famously put it: “It seems rather silly to prefer to attach it to

something of a so-called ‘concrete’ nature inconsistent with thought, and then to wonder where the thought comes from.” In his vision, physicalism is not a counterargument for panpsychism, rather panpsychism is nested in the physical nature.

Stephen Pinker postulates an evolutionary modular model of consciousness, where every module is developed for the particular problem solving[56]. The physical and biological nature of the brain facilitates information exchange between these computational modules. The language and Universal Grammar basis are important elements of this informational exchange. In his paper[57], he goes on to argue for the Darwinian intelligence developed evolutionally and against the view of Alfred Russel Wallace, who did not see abstract thinking as evolutionally explainable, merely redundant for the ancestral humans. Despite the old nature of the discussion, it gives the basis for the answer to similar contemporary arguments. Pinker sees the solution in two ways: abstract thinking provides universal cognitive instrumentation for practical tasks and occupies a “cognitive niche”, the term proposed by Tooby and De Vore[58]; the metaphorical abstraction is developed for social coordination and cooptation of physical problem-solving on a higher level of productivity. Language and social cooperation are important for cognitive functions and consciousness development. Without claiming pure biologism, he detects an irony in the hierarchy of problems provided by David Chalmers. If the emergent consciousness comes from the unconscious state, it is an “easy problem” when we compare it to the hard one[59].

An informational approach to consciousness is proposed by Giulio Tononi[60].It is based on the information integration and claims its subjective experience. Tononi declares that his theory attacks hard problem “head-on”. The information integration is supposed to be on par with energy or mass, where fundamental quantity is important. Certain quantity and quality of information congregates into the phenomenal consciousness experience.

There are some other more abstract schemes. It is also proposed that the first-view perspective not only creates the phenomenon of what-is-like but also denies us the possibility of the subjective experience of what-is-it. Experiences are heavily embedded in biology because of the possibility to make intelligent choices[61]. In this way, we do not speak about consciousness but conscious processes. Qualia incorporates neural surrogates and language, which is why it is possible to experience things that are not real: pain or sensation without a clear cause, dreams, illusions, and hallucinations. Qualia also include phenomenal “aboutness”, which is also not what-is-it.
Please see the summary of the main opinions provided in this chapter in Table 3.

Table 3. Summary of authors’ position on the ground of middle problem

Author	Position on a hard problem and the explanatory gap	Statement	Reference
Bertrand Russel	middle ground	Neutral monism postulates underlying unitary world ontology, which, at its basis, is not divided into the events, materia, sensations, perceptions or states of mind.	[49]
Stephen Yablo	soft proponent	“I am not identical to my body”	[53]
Galen Strawson	middle ground	There is no mystery behind the slow emergence of the mind or consciousness, and there is no place for neutral monism. If to speak about monism, it is of panpsychic nature.	[54][55]
Stephen Pinker	soft opponent	Consciousness is evolutionary, emergent, modular, and task-related. The brain's physical and biological nature facilitates information exchange between these computational modules. Language and the universal Grammar basis are important elements of this informational exchange.	[56][57]
Giulio Tononi	middle ground	Monistic, fundamental. Consciousness is based on information integration and claims its subjective experience	[60]
Jose Musacchio	middle ground	Experiences are heavily embedded in biology because they allow us to make intelligent choices. We do not speak about consciousness but conscious processes. Qualia incorporate neural surrogates and language, which is why it is possible to experience things that are not real: pain or sensation without clear cause, dreams, illusions, and hallucinations.	[61]

3. Alan Turing`s counterarguments

The examination of the hard problem question is dividable into ways of thinking about it: the problem is hard despite physical/biological correlates of consciousness or, regardless of physical/biological correlates, it is more a problem of logical formalism, “software” organisation. Alan Turing remarkably focused on the second option. In his seminal book[62], he considered the question, “Can machines think?” Before any attempt to answer the question, we have to deal with definitions of “machine” and “think”. Turing created a theoretical concept of the Turing machine, and it might be the shift towards the meaning of the word “think”, which moved him to reformulate the question. He proposed an imitation “game”, where the nature of answers itself will provide us with a solution. According to Turing, there is no fundamental difference between the potential of digital machines and human thinking machines. They might be comparable in “thinking power” with adequate computing power, and in that case, there would be no way we can recognise the other mind as human or artificial. Turing lists a number of counterarguments against thinking machines. We will omit the theological and “head in the sand” objections and firstly focus on the mathematical one.

It goes as follows: there is a verification made by Gödel about the inability of any formal system to prove its own axiomatic basis. The logical system can be described in terms of machines, and machines can be described in terms of logic. It means machines cannot give satisfactory answers to some questions, being an implementation of the logical system. Any questions posed outside of this system cannot be answered adequately. Does it mean the machine cannot think in a human way? The answer given by Turing is “no”. We do not have enough evidence that human thinking machines do not meet the same limitations.

The next objection is called “Argument from consciousness”. Turing cites the Lister Oration by Geoffrey Jefferson. The impossibility of machines composing a concerto or writing sonnets with necessary self-reflection on them and feelings, comparable to human emotions, invalidates all attempts to make a parallel between thinking humans and thinking

machines. The necessity of not only reflection, but self-consciousness is debatable, given our assessment tools for other minds. AI and LLM can write sonnets and compose music, and, according to Turing, it is difficult to enquire about the phenomenal state of the artificial mind while the results of its functioning are before us. The argument can be extended into the “Variable disabilities” objection. The machines cannot make human-like choices or be in possession of a sense of humour, like or dislike something. Again, this argument is fended off by the inability to judge by behaviour or by possible future computational power sufficient for the phenomena. In the same way is answered the argument from informality of behaviour.

Lady Lovelace's Objection is compatible with the automatic vs all poetic argument which we discussed in our previous paper. Machines will never learn by themselves, originate or create anything really new as long as they are all poetic[1]. Turing believes it might be overcome with the ascent of learning machines that successfully mimic learning behaviour. The argument is still creating significant debates about the possibility of creating anything psychologically or historically new[63].

Heuristic approach and fuzzy logic can give at least a partial solution for it. However, it is still argued[64] that our consciousness emergence co-creates reality when it supersedes the sum of observed parts and is not given for full analysis. Lovelace's Objections can be presented as Whitehead Objections: analysis and concreteness are sufficient to understand the real. It is a tendency of our thinking to mix formal ontologies with the “real” world. There is also Gödelian limitation at the basis of the objection: inability to expand basic axioms by the machine. And, with all Turing optimism, it is possible to say that at the heart of his behavioural counterargument lies non-behavioural one[65].

The other important argument is based on a comparison of continuous and discrete calculations from Continuity in the Nervous System. Discrete-state machines are different from continuous state machines, but Turing is positive about ability of the last ones to imitate human behaviour. However, the objection can be fundamental: brain is not exactly computer, it is only metaphor[66]. The difference between analogue computers and digital computers is still seen as significant and the objection is not refuted yet[67].

Turing's behavioural explanation raises another difficult problem. The ability to read the behaviour of another entity as conscious requires the possibility of “reading other minds.”

4. Other minds

The “other minds” problem is supposed to be hard enough. What makes it associated with the dual ontology, mind-body problem or “real hard problem” is an attempt to answer the question about the ability of other minds to comprehend information about anything conscious or sentient outside of its self-referent experience. The human ability to “read minds” is certainly not direct and comes from secondary sources, such as behaviour observations, intuition or reports by others[68].

However, behaviour is not a state of mind but 'logically adequate criteria' for the ascription to others of states of mind[69].

According to Strawson, we have to conceive signs of consciousness's presence and state[70]. It might produce a dilemma: is behaviour a clear sign of consciousness or just an extrapolation based on the experience? Why, for example, should emotions, as a phenomenon, be observable by others? And how we or other creatures will infer through the feeling, thinking, and observation of other minds' existence[71]?

If we have a non-anthropocentric Darwinian interpretation of biological organisms as surviving and reproducing machines, the neural basis of behavioural capacities is explainable. What is less explainable is the necessity to evolve minds. It is excessive. Robots can be built on a behavioural and ethological communicative basis, but they can operate mindlessly[72]. Cartesian view of the sentient state[71] is connected to feeling but not cognition. In the same tradition, experience is conditioning first-hand, and there is no need to read other minds. For some reason, we are the most acute mind readers among all mammals and known biological creatures. The ability to speak is important here, but we also can “read the minds” of children who are still unable to speak or other people who do not possess or have lost the ability to speak. This is based not only on cognitive but also on emphatic abilities. It opens the possibility for the categorical options of affective and cognitive empathy[73].

If we consider other sentient species, there is a possibility of anthropocentrically generated bias in the perception of non-human minds and cognitive or affective emphatic reading from feelings of mammals, birds or other animals. But if we will discard the cartesian sceptical view on the animal mind, there will be bridging between our mind-reading capabilities and non-human creatures’ behavioural states[71].

There are proposals to reassess autistics' lesser ability to read other minds as both behavioural and cognitive, with a certain basis in less developed neural interconnections[74]. Hobson asks a similar question about visual perception by young chimpanzees as not exclusively a behavioural act but also a mental one. In this case, “interpretation” can be replaced with “understanding”[75]. This can create the basis for “aboutness”, the judgement of others` experience` content. There is evidence from studies that when young chimpanzees observe “eyes” abstracted from the face, they do not respond as mature humans. From this, it is possible to assume they do not possess the capability to comprehend mental status from their eyes alone and do not have a concept of mental life.

It raises the question of comprehension and cognitive, mental self-awareness for “reading other minds.” Minds can be assessed only by other minds. In order to do so, these minds have to operate in a similar way or be based on similar principles[76]. This can be rooted in perceptibility[77] or phenomenological intersubjectivity[78]. There might be disagreement about the behavioural evaluation of other minds, but behaviour can reflect more on the mind itself and not on its nature.

Today, other mind problems can be renamed “ecological view”[79]. An interesting neurophysiological mechanism is proposed as a fundamental tool for reading other minds. Mirror visuomotor neurons from ventral pre-motor cortex area F5 activate during perception of corresponding movements when observed in other monkeys or humans and show similarity in activation when making similar actions. Observation of the hand mimicking the action or object alone does not produce a response from mirror neurons[80]. In this view, it is possible to speak about the co-development of “Self” and “Other”[81].

There is also a “mentalizing network” (MENT), discovered as an additional substrate factor of intersubjectivity and joint factors[82]. There are findings of decreased interconnectivity in the mirror neuron system (MNS) and mentalizing network (MENT) of patients with schizophrenia. This network is normally activated when the brain is not involved in a particular task[83]. The activity of this MENT network of networks decreases with occupation of the brain by cognitive tasks. The network is a substrate of the integration/segregation mechanism in the brain. Developmental delay or disruption of the MENT network can play a role in Autistic Spectrum Disorder (ASD), Attention Deficit Disorder (ADD), Attention Deficit Hyperactivity Disorder (ADHD), Gilles de la Tourette's syndrome (GTS) and possibly some other conditions and disorders.

5. Discussion and conclusion

In view of the opinions discussed above, it is hard to clearly separate the phenomenal state from the perceptive one and other minds' reading process. It poses the question of an instrumental approach to the hard problem despite its supposedly subjective nature. We are not going deeper into the nuances of arguments about hard problems provided by either side for reasons of the extensive nature of the discussion and fundamental ontological differences at its base. Instead of the herculean task of disentangling the Gordian knot of hard problems or cutting through it in the Alexandrian way, we can try, partially following Allan Turing's approach and, in part, applying research data from neurophysiology, to go straight to the utilitarian grounds, where classical scientific solutions will take us from the still valuable, but often highly theoretical, even scholastic arguments to the potential experimental frameworks, with clear metrics, feasible architecture and pragmatic procedures. The task is nowhere less ambitious, and, if we compare it to the comments made by Stephen Pinker about David Chalmers` “easy problem of consciousness”, “it is as easy as to go to Mars”. But it can provide us with manageable solutions and experimentally proven models.

Most of the supporters of the vision of hard problem occurrence as a problem, even the most ardent ones, agree with the neurophysiological basis for consciousness and all its phenomena. If we can separate the phenomenal state from the neurophysiological correlates only subjectively, there is a clear possibility not only to build a comprehensive system of functional neural correlative basis but also to connect every phenomenal state with descriptive states of the correlates and their ensembles. Neurophysiology can be a common denominator for any opinion party, regardless of its position on the explanatory gap, mind-body problem or phenomenal consciousness, with the ability for experimental assessment and quantitative evaluation.

This does not mean this “reductionist” solution will get rid of the psycho-philosophical issues of the hard problems. There is a common ground for agreement with those researchers who are sceptical about real scientific abilities to understand all subtleties of subjective states in any other than sometimes not very adequate empirical way. We as conscious beings can acquire knowledge about these states, but not in the untainted, spotless objectivist-positivist way. There is still plenty of space for social, psychological and other phenomena, which are not fully subject to clear categorical division, metrics, statistical analysis, anatomic dissection or objective observational methods. Nevertheless, there is a positive note for those who believe in an instrumental scientific approach to consciousness. Correlates of consciousness provide all necessary options for objective, quantitative and qualitative research. There is a lot of space for operational experiments

with elements and states of consciousness, which provide the possibility to actively modulate phenomenal states.

Here, it is possible to agree with Noam Chomsky, who mentioned the approach to hard problems of science in the past. Some of the problems were left outside of the scientific framework for centuries, such as the nature of gravitation or thermodynamics. In due course, the explanation gap was filled enough to satisfy answers to most of the theoretical and practical questions. This does not mean we reached the end in the understanding of the mentioned hard problems. Nevertheless, partial or patchy explanations for the hard problems did not stop the progress of knowledge acquisition in the domain. Building an analogy with emergent theories of consciousness, it is easy to believe in the incremental character of gaining knowledge about consciousness. The progress in neurophysiology, neurobiology, genetics, proteomics, cytology, cognitive science, computer science and other related fields is promising and can give us enough clues for a deep understanding of underlying mechanisms for consciousness phenomena. Despite the obvious necessity of the discussion on the mind-body dualism and the inability to formulate an all-encompassing monistic theory for the explanation of natural and subjective phenomena, there is a clear possibility to move forward in studies on the objective basis for consciousnesses. It is hard to see any other scientific solution besides the traditional way of building additional parts of the all-encompassing scientific knowledge network, as formulated by Willard Quine. It is impossible to discard all the knowledge obtained by humankind until now, and there is certainly not enough space for a purely theoretical or subjective approach. Physicalism, scientism, biologism reductionism and other names used to disapprove of the scientific standard approach to the consciousness problem are well placed: there is no alternative in our scientific framework for an entirely speculative or wholly theoretical approach. Any successful thought experiment has to be placed into the already existing knowledge architecture, as it was proposed by Ernst Mach, and we could see from famous gedankenexperiments made by Albert Einstein. This does not require the gedankenexperiment to be practically possible in the experimental environment. In this vein, p-zombie does not require a biological model. At the same time, parts of these thought experiments or supporting frameworks of arguments have to be reproducible practically. Otherwise, their value will be significantly diminished to the position of no more than scholastic argument.

The question of the nature of phenomenal consciousness is still hotly debated, and a number of answers are put forward by different groups of researchers. The dual ontology discussion facilitates novel scientific discoveries, playing its role more as a feed for process and less as a postulated end by itself. There is a choice for any researcher to stay in the position of dualistic mind-body split and treat the hard problem as partially or fully insolvable or to choose classical “objective” ontology and invest time and other resources into practical steps of discovering underlying working structures and studying the behaviour of “other minds”, which are not the only basis for any signs of consciousness, but also only the possibility achievable in the scientific environment.

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