What if I know what it is like to be a bat: mapping phenomenology of the mind on the computational structure

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Abstract

This paper deals with a famous argument in analytic philosophy of mind presented by Thomas Nagel in his paper "What is like to be a bat?" This argument describes a thought experiment which criticizes the possibility of intersubjective study of mind.

Paper makes a hypothesis about the nature of relation between qualia and phenomenological experience in general and the way information is encrypted inside the brain tissue. It is stated that a special formal computational structure for processing of representations can be built. It then develops it so as to present a counterargument to Nagel's thought experiment basing on that formal structure.

The paper will be useful for those who interested in philosophy of mind, artificial intelligence, non-standard logic, theory of computation.

Keywords: "bat"-argument, computation, philosophy of mind, Thomas Nagel, qualia

Introduction

This paper is the development of the ideas expressed in a short early unpublished thesis. The thesis has explored the relationship between a belief of an agent described in a formal way and the actual phenomenology of the conscious experience of the real agent.

It states the common for philosophy of mind and cognitive science thought that there is no such thing as a separate belief in the mind of the agent – in order to act or plan his actions agent should operate with a large set of beliefs connected into a special type of a network (Searle 1984 p. 15). For example, in order to take and drink the cup of water in front of him, an agent should believe that he is thirsty and there is a cup in front of him and the liquid in it is indeed water, there is no law forbidding it et cetera.

However, it is evident that not all of these beliefs are placed into the scope of our attention. There is famous psychological research on an exact number of different objects that can be kept in the short memory and its results can be extrapolated on the abstract beliefs about states of affairs as well (Miller 1956, p. 83). The result of this is that we cannot concentrate on the whole net of our beliefs instead we can focus on one or only a few. It is tempting to draw an analogy with subconsciousness from psychoanalysis as well here.

There is also a whole set of epistemological issues appearing here but instead, the thesis follows on a different idea. The net of "supporting" beliefs not present in the scope of our attention is still present as information in the structures of our brain tissue. The thesis further raises a question of the difference between encryption of the ideas we have in the scope of our attention and all the "supporting" ones. It rather poses the question than answers it claiming that notion of qualia may be the key to that problem and a possible bridge between the formal presentation of beliefs (as in the formal epistemic or doxastic logic) and phenomenology of mind.

The paper will develop the idea about the connection of encryption of information in the brain tissue and phenomenological qualia in a next way. If qualia and phenomenology of mind is indeed the way of encryption of the information then consciousness is certain processing of information – computation.

The last is quite an old theory in cognitive science and philosophy of mind but there is an important new detail. We presume qualia to be nodes of this computational process. Then there is a certain

structure of qualia duplicating that of the formal structure of the underlying computations. And it is possible to assess it.

A famous paper by Thomas Nagel "What it is like to be a bat?" criticizes the possibility of the intersubjective study of the mind by giving the example of a creature (bat) whom being sentient posses completely different perception and according to mind's architecture (basing on its different biology) (Nagel 1974). This is not the central idea of Nagel's paper but it logically follows from it.

The given paper will provide a counterargument to this Nagel's idea using the previously mentioned concept of the qualia-based computational structure.

So the argument of the paper reconstructed is the following:

1. Qualia and phenomenological structures composed of them are the way information is encrypted and processed (computed) in the human mind.

2. If qualia are indeed the nodes of such a computation there is an according to the computational structure which can be defined formally.

3. If there is such a computational structure Nagel's idea about the impossibility of the intersubjective study of conscious experience is wrong.

Conclusion: Conscious experience can be effectively studied using first-person view taking intersubjectivity into account of the research. "I know what it is like to be a bat".

The first point is very questionable though it is just a starting hypothesis. Still, it deserves some elaboration. Qualia are stated within the framework of the representational theory of mind. The necessity of description of the discussion concerning the representational theory of mind follows logically. Furthermore, qualia should be estimated compared to other candidates for the mind's mental representations.

The second point is probably the hardest to prove in the whole syllogism. What is computational structure exactly? What is more important – how can we extrapolate such a formal structure on our phenomenological experience? Will the resulting structure make sense? All these questions concern equally the formal structure and phenomenology. Phenomenology from its inception is an attempt to find the structure guiding our experiences (Husserl 1931).

History of philosophy at least in the case of continental phenomenology knows examples when such structures were presumed to be logical or mathematical. These attempts were mostly unsuccessful and aimed more at the general ontology of the world than on the mind of an agent.

The third point should logically follow what was proved previously. Still, it is the important detail of the argument as it leads to its final aim. Nagel's argument remains one of the strongest criticisms of the optimistic views on studies of conscious experience. The counterargument to the "bat" idea should be an interesting development of the discussion.

Finally, it should be emphasized that though a paper provides the counterargument for the famous debate in analytical philosophy of mind its main value is to present the idea of formal computational structure and qualia cooperation. It will be interesting for researchers in formal logic, philosophy of mind, and artificial intelligence as it presents a new view on a strong version of AI.

The previously mentioned plan of the formal argument will be elaborated in the following sections.

Why qualia?

Qualia is probably the most controversial and interesting concept in the analytical philosophy of mind (Churchland 1985, p. 11). Qualia is "what it is like to have" a particular experience. It is like to see a red color as a distinct phenomenal conscious experience of an agent without a reductive explanation of this phenomenon or explanation in terms of causal history.

Many philosophers of mind tend to disagree on the existence and status of qualia. Those arguing against the psychic reality as a separate entity tend to state that qualia are a blurred and generally mistaken notion (Dennett 1990, p. 521). Those who vote for the existence of qualia often state the reason why consciousness can never be reproduced artificially. There are also some philosophers that state that qualia as part of the underlying nature of our conscious experience is an epistemological mystery and will remain so due to inner cognitive limitations of our own minds.

It was stated in the introduction that qualia are chosen as the best candidate for nodes of the representational theory of mind. The representational theory of mind (RTM) states that our mental activity is possible due to informational structures known as representations which are processed in our brain according to certain rules as the words of certain complicated language. An analogy with formal language can be drawn here as well. RTM opposes such theories as connectionism for example. The representational theory of mind is often considered to be a synonym for the Computational theory of mind. Processing of representations is obviously a certain kind of computation.

Of course, the idea about qualia as nodes for RTM is not new. Most of the existing ideas though center more generally on some kinds of mental states as the right candidates for the nodes of representations (and whether they "have qualia in them" is just one of their properties) place qualia for the important role in their schema. For those who admit the existence of qualia, it is obvious that perceptions have the "qualia-side" and perceptions are an important type of mental representation. The discussion here is more subtle than just admitting or denying the possible role of qualia in the RTM. It concerns more views on the conceptual side of the mental representations.

What is the exact difficulty with the classification of mental states in competing theories about the mind? RTM speaks of different mental states as the nodes for the computational process.

Apart from perceptions that obviously have their qualitative side, there are a lot of mind representations that turn much harder to assess for this case. Such are ideas, memories, abstract thoughts,

fantasies. All these representations bear a conceptual side with them – they strongly influence what an individual thinks, his inner mental life. But do they have a qualitative side?

Is it possible to say that when we have a particular thought, for example keeping a geometric triangle in our mind in order to solve the mathematical problem, there is "something it is like" to have this thought? Is there a qualitative side of imagining an abstract mathematical entity? It may concern not only the mathematical or abstract entities but the example with triangle vividly shows the difficulty with the general classification of mental representations. It is much easier to claim that there is a quale for imagining the giant purple cow because it bears a resemblance to the impressively strong perception that will influence the agent's emotions. But the abstract triangles are the same mental representations as purple cows and they influence our behavior in the same way sometimes even to a greater degree. So the proper theory of mental representations should have the apparatus to esteem both these types of mental representations and adequately show the conceptual difference between them (if the one exists).

Though the example seems to be very artificial the problem lies in the center of the understanding of the phenomenology of mind. A more simple example for this situation may be given. When someone imagines a red apple on the desk in front of him it is evident that the experience this individual has is different from the real situation when there is a real desk in front of the individual and he actually perceives that apple. But is this difference that fundamental? There are debates over this question even in the classical history of philosophy.

British philosopher-empiricist David Hume stated that the only difference between what he called an idea of an apple and perception of an actual apple is the strength of that perception (Hume 1999). The idea which is perceived directly has more impressive strength and the memory of the perceived apple is faint and weak. This concept of idea and its impressive strength was the foundation of Hume's theory of the individual's consciousness. If this is true then the mind's mechanism is quite simple. It is just a set of ideas with different impressive power ordered according to laws of the simple psychological association.

There are a lot of philosophers who oppose Hume's view including those who lived in his time. In general, their arguments concern the importance of purely conceptual ideas and their distinct difference from the actual perceptions which cannot be described by the grade of impressive power. In the history of philosophy, these philosophers are known as rationalists. Rene Descartes stated that ideas we produce and conceptually develop in our minds are the only strong ground for true cognition (Descartes 1998). The mental states of thoughts and intellectual reflections thus are very different from the perceptions of the external world. Taking such a view into consideration it is very hard to classify all the mental states so the perceptions will acquire the proper position in the system towards the conceptual mental states.

The discussion between empiricists and rationalists is a well-known episode in the history of philosophy but in the present context, it is important because in a different form it is present in contemporary philosophy of mind. It is the discussion about conceptual and non-conceptual mental representations.

What is the difference between conceptual and qualitative representations? Do conceptual representations have a qualitative side? If yes what does it mean for the general picture of the mind? These all are the questions that can be brought to one big question which is posed in the title of the chapter – why use qualia for RTM?

In the introduction, the basic hypothesis of the paper was stated – the qualitative side of the mental representation is a way the information is processed in our brain. So the existence of qualia is admitted and also the certain role of this phenomenon in the general mind's structure is stated. A strong connection between the phenomenology of the mind and abstract computational structures is presumed. The arguments for such a view of paper on mental representations are also provided.

It is obvious that from this point of view it is impossible to state that conceptual representations do not have the qualitative side. If the computational structure is to be applied to the qualia of our mind then conceptual representations are even more important than perceptions. Computations in the context of RTM are to present the process of thinking (Lycan 1998, p. 481).

So in order to proceed with the logical argumentation of the paper, the argument in support of the described view on the relation of the qualia and RTM should be constructed. It should contain two major points.

1. The positioning of the qualia in the conceptualist versus non-conceptualist discussion. The present ideas demand all the mental representations have their qualitative side.
2. Qualia are the best candidate for the nodes of RTM

Further connection of qualia to the computational structures should be done the according to chapter. The basic positioning of qualia is already stated – all the mental representations contain a qualitative side including the triangle example. Now it should be proved.

The main counterargument to the position is the examples similar to the mentioned example with the triangle.
Within theory itself, there are different views on what representations are themselves. The main property of qualia as the node of the mental representations is that qualia are something more than just a body of information. If we state otherwise we reduce qualia to a simple informational structure and tend to enclose our views to that which deny the existence of phenomenological aspect of the experience at all (Churchland 1985).

If to continue developing the ideas given in the introduction concerning the difference between the encryption of information within the scope of conscious attention of the agent and his unconscious processes it could be said that being qualia is a special property of the information processed consciously. That would explain a lot of things but also poses a strong problem.

Assuming this is true it should be explained if the information outside the scope of the immediate attention is also qualia.

The clarification should be made. It seems that the mentioned views on qualia as a simple property of some other entity (mental state) contradicts the view of this particular work which states qualia as the direct nodes of RTM. As it is it refers to the ontological status of qualia as an entity – whether it is a property or an object and as was said before qualia is a very controversial notion. This particular paper presumes qualia are separate entities rather than just the properties of some other entities. Those who oppose this view still call some separate entities by the name "qualia" - they name those mental states which have this qualitative side in such a way (Cummins 1989, p. 17).

Then the separate argument for qualia as the separate notion should be provided. The argument is based on the previous ideas about qualia as the way of encryption of information. Other competing theories establish certain ontological hierarchies depending on their view on mental states in general. The answer to the question of what are particular mental states and whether they have qualia-side in them is defined by these hierarchies. The "encryption" idea presumes a completely different approach.

In this framework mental state, in general, is just the way the brain processes information. Qualia is a specified type of this processing. It brings the distinction between conscious and unconscious brain processes. Accordingly, qualia are any conscious brain process. As a consequence, it is presumed that any mental state which is present in the scope of attention including those which are not perceptions has its qualia-side. Or it would be better to say it is a quale.

The other question if why this explanation of the system of mental states is better than all the other options. If it is the question of ontology it is indeed hard to answer this question as it is the topic of the big metaphysical debate. This particular classification is logical and clear but there are many other metaphysical theories about the mind that share these properties. In general metaphysical context, this theory is a statement of the certain ontology of information processing and mental states as nodes of this processing (Dietrich 1989, p. 125). It has ontological advantages in the scope of RTM but it is also the aim of all the critical arguments of the competing metaphysical theories. It should be mentioned that most of these critical arguments are the same as those against RTM in general.

However, there is this mentioned methodological property of the paper's view on mental states which also can play a big role. This view is the best option for interpreting mental states in terms of information processing and consequently for using logic to formalize some of the details of this processing. Given the scope and aims of the paper, this theory of mental states is the best candidate to proceed.

Taking these facts into consideration it can be said that the argumentative plan for the given chapter is complete. Qualia according to the view of the paper is positioned in conceptualist versus non-conceptualist debate and evidence for this view to be the most adequate candidate for the "information-encryption" version of RTM is provided. The next chapter requires introducing the computational structure.

Introducing the computational structure

What is the presumed computational structure? Computation in the formal sense is represented by a notion of the Turing machine (TM). TM transforms the set of symbols on its input into the different sets of symbols on its output. It does so due to the set of rules for operating with the input symbols. The process of this transformation is computation (Pitowsky 1990). Output can be negative (the output is a notification of an error as in the computer program) if there is a mistake in the process of computation. The problems which while being computed produce positive output are decidable. There is a separated gradation for the problems which are decidable according to what time and memory resource is needed to decide this particular problem.

Turing machine also defines the notion of the algorithm. Every decidable operation which can be processed on TM is an algorithm. According to the famous thesis by Church and Turing, this way of defining algorithms is completely analogous to other ways such as lambda-calculus and cellular automata (Pitowsky 1990).

TM can be represented formally as a set of few sets. There is a set of input symbols and sets of rules for processing them. TM states and particular rules for processing are represented by separate sets but this is irrelevant for the given context. The main thing is that computation can be represented by a set of symbols and a set of rules.

At the first sight, this is very similar to what RTM states about the mind. Thinking or more general mental activity is just the processing of mental representations by brain tissue. There are certain rules for this processing (at least in the case of rational individuals). It all seems the same schema as with the TM.

However, it is not so simple. Computers that are based on TM principles can model or simulate almost any human activity (which can be represented algorithmically) but artificial intelligence in the strong sense is still unreachable. Some researchers even doubt that it is possible. Why is that so is a big question of the philosophy of computer science? In the present context, a minor question is more important that is if TM is indeed a certain model for RTM-picture of mind what does it mean for our understanding of the mind? And is it possible to build with the help of classical TM or modified versions the computational structure for the phenomenological experience of the individual?

Mentioned state of research in the field of artificial intelligence seems to be an argument against the TM-theory of mind. If TM was an adequate representation of the RTM then it would be possible to build an AI on the basis of the existing computer technologies. Otherwise, it is something wrong either with the TM in this context or with the RTM. Taking this into consideration a separate study of the important differences between RTM and TM-representations should be provided.

Formally RTM is the same set of rules for operations with its information nodes. But in the case of the RTM, the nodes are representations and in the case of TM, they are symbols of some

formal language. This is the first important difference which also illustrates the advantages of the qualia theory.

Many theories of AI presume that the human brain also operates with formal symbols or at least the nodes with which it operates can be completely reduced to those symbols. If qualia are postulated as such basic nodes then it is impossible to provide with such a reduction. Qualia is a special way of processing information that involves complex phenomenological experience and it is evident that it is not the same as any formal system in any formal language.

The critic might say that reducing the direct experience to the symbol of formal language or even just a symbol is still quite an interesting idea. Actually, most of the human culture involves explicating some experience with the help of the symbols for that experience. However, this is the question of identity. No matter what symbol will be chosen phenomenological experience is a separate entity to which symbol only refers (Campbell 1990, p. 31).

Despite all of the power and usefulness of formal languages and logic, there are certain objective limitations to formalizing. It is impossible to reduce direct experience to the symbol of this experience. Qualia is a direct experience. What does it mean generally for the AI and in particular for the given paper?

First of all, it is impossible to reach a goal of strong AI without somehow incorporating qualia (phenomenological experience) into the artificial agent. This idea is well-known among researchers in the field of artificial consciousness. Secondly, the main reason why TM cannot provide the complete model for RTM is explained. Qualia are not symbols and processing qualia bears only some structural resemblance to the processing of formal symbols in TM.

There are of course some other factors including human reasoning being in certain details different than the structural rules of the classic TM. One of them is metacognitive reasoning – the human ability to reason about reasoning itself and plan according to actions and general reasoning strategies (Segerberg 1995, p. 535). But these are minor details that can be represented by using a modified version of TM.

Some of the elements of metacognitive reasoning may be represented by non-classical TM using double tape or a system of interconnected TM etc. There is also a question of whether peculiarities of the metacognitive reasoning have only formal rules as their source or the qualia factor also plays a role here. Maybe qualia instead of symbols allow for developed cognitive strategies for the human mind which are not accessible for the artificial agents.

However, if the fact about structural resemblance is admitted it can be stated that TM can serve as a model for RTM with certain restrictions for precision and power of that model. The level of that precision is defined by the existing computer technology. As was stated before many spheres of human intellectual activity are already formalized. Most of the behavior of human agents is algorithmic.

Models do not always reflect reality on the full scale. In this case, TM may serve as a partial model or general schema for the RTM picture of the human mind. Representations are nodes of computation and rational cognition is a set of rules for reasoning. Metacognitive reasoning and other similar factors may not be taken into consideration.

So there is a computational structure that can be defined formally and put into accordance with the structure of the RTM. The next chapter will interpret this fact for philosophy of mind and phenomenology and analyze it in the context of the famous "what is like to be a bat" argument by philosopher Thomas Nagel which criticizes the phenomenological study of the mind.

The existence of this structure is a strong critical argument against the main consequences of Nagel's philosophical idea and defense for the intersubjective study of mind both in phenomenology and philosophy of mind.

Knowing about the bat

The paper of Thomas Nagel "What is like to be a bat" provides a thought experiment that makes a strong criticism for some optimistic ideas about the intersubjective study of the phenomenology of mind (Nagel 1974). The bat is a creature that while being sentient and showing complex behavior possesses a completely different phenomenological experience of the world based on its different biology.

It uses echolocation for navigating the environment. Biology studies show that this biological property is quite effective for the bat's exploring the world and surviving in it. The thing is it is almost impossible to imagine the experience the bat is having while using echolocation. It cannot be compared to the sight or hearing of usual people. It cannot be logically developed from any experience a human agent has in his everyday life.

If indeed so the intersubjective study of the mind is impossible. The bat example is just a radical example. If there are such "localized" experiences in nature the same schema applies to the human experience in general. Individual experience is unique and any human would have "localized" experience areas. Then what is the point of phenomenology which mostly extrapolates the individual experience in order to study the experiences of others (intersubjective study) (Husserl 1931)?

Based on this it may be said that only third-person perspective of research is applicable in the field of study of mind and only biological neuroscience and similar disciplines are the sources for knowledge for human psychology. That is a metaphysical problem of understanding the mind and it raises all sorts of intuitive counterarguments. Some of them can be answered while saying that psychology is still a source of intuitions about the nature of human experience but for every hypothesis, it should find biological correlates.

This metaphysical debate again concerns the foundations of the philosophy of mind and psychology. For the purposes of this paper, it serves only as a background. There are a lot of arguments and thought experiments in this area and Nagel's argument is a famous

one but only one of those constructions. However given paper centers on the detail of this particular argument.

There were arguments given that qualia are the way information is encrypted in the brain and that it is possible to build according to the computational structure which will have qualia as its nodes. Now it is for proving the last part of the argument:

If there is such a computational structure Nagel's idea about the impossibility of the intersubjective study of conscious experience is wrong.

The RTM computational structure which has qualia as its nodes presumes that Nagel's argument is not eligible anymore. Why? When qualia are viewed just as the parts of the phenomenology of the experience it is quite rational to say that any experience is unique. Qualia for seeing and hearing are completely different and there are no other means to describe this difference as refer to the direct experience, particular quale itself. It is impossible to reproduce qualia artificially or put it on the formal scale and "explain" it using this scale. But it all changes when the computational structure is introduced.

In fact, this structure is a very complicated system of these "scales" to explain and describe qualia. The computation structure was not introduced ad hoc, it was proven that such a structure is a part of the mind itself, the underlying structure of the phenomenological experience at least from the point of view of RTM. So now it is possible to describe qualia using language and even more to that – it is possible to do that using formal language.

According to the scale metaphor if it is possible to describe one quale using the formal structure it is possible to describe the whole experience using gradations of the structure of this experience. A practical example can be given. Let us assume an agent X has an experience of a red color a scale of colors and the problem of explaining the other agent Y the blue color which was never seen by that agent (but the initial red color was seen). Agent X can do so using the scale and referring to the experience of the red color.

Of course, the epistemological issue immediately raises (known in philosophy of mind as "Mary's Room" thought experiment (Jackson 1986 p. 292)) if this is a real "knowledge" of blue color for the agent Y but in the center of this particular argument it is explaining experience and not the knowledge about it. The main inference here is that it is possible to explain the experience using the special formal language which reflects the underlying structure of this experience.

If this is a fact then the next is also a fact. Such a computational structure is universal for the whole experience and for every particular element of it. If it was not for that such a structure could not be used even for color description. So even if there is an agent with basic perception and very basic experience given this theory about computational structure all the possible experiences of this agent can be described using the formal language of the RTM. This includes modifying the human experience of the agent so it represents the experience of the echolocation of the bat.

If it is so then Nagel's argument is not eligible anymore in its "intersubjective consequence". The initial experience of the human

agent can be modified to represent the bat's experience. Or in other more metaphorical words, it is possible that a human knows what it is like to be a bat. So intersubjective study of experience is possible.

The conclusion can be drawn here. If all the parts of the reasoning provided in the paper are valid so the conclusion is valid too. Of course, despite that, every element is proved there are numerous opportunities to attack each of them. However, each attack and possible defense against those attacks can be a topic for a separate work as they will all concern general metaphysical debates about the nature of the mind and its relation to the physical world more than this particular argument by Nagel.

The paper provides both the counterargument to a famous thought experiment in philosophy of mind and a theory about the phenomenological structure of experience for RTM view on the mind.

Conclusion

The thought experiment of Thomas Nagel presented in a famous paper "What is like to be a bat?" explores the possibility of the intersubjective study of the experience of agents through a story about a bat who is a sentient creature with a complex behavior posses completely alien experience (at least compared to the human) basing on its different biology.

This thought experiment is a strong argument against the optimistic view on the intersubjective study of the mind of others including ordinary humans. This consequence of the experiment is put into the center of this particular paper as the argument against it is provided.

The central argument of the paper is based on one assumption about the nature of our mind and further logical elaboration of this assumption. First of all, it assumes the Representational Theory of Mind is correct in the general debate about the nature of the human mind.

The RTM states that the mental activity of the human mind is done through operations with informational structures known as representations. It is debated in the RTM itself what are nodes of this theory or representations themselves. Paper presumes that qualia are those representations and brings some arguments in the favor of this view.

Paper claims that for qualia at least in the scope of RTM due to their role as representations it is possible to build a formal computational structure – a set of rules for processing qualia in the phenomenology of human experience. It is debated if it is possible the mind's mechanism on a full scale using only formal rules but it is stated that it is possible to build such a model with a certain grade of precision.

It is then claimed that if such a structure exists it is possible to describe any possible experience in the communication between agents. And if so it is possible to describe even the experience of the bat. Then Nagel's argument's main point does not work anymore.

The paper centers on the consequences of the argument more than on the argument itself. The whole paper is written to prove that the intersubjective study of experiences which are made mainly in phenomenological philosophy is possible or at least the "bat" argument does not provide such a strong criticism for this idea as it seemed to be.

The method involves introducing the formal language or the possibility of creating such a language (as it is not described in detail) which describes the purely phenomenological experience. Thus the paper is interesting not only for scientists who work in the sphere of philosophy of mind but also for logicians who are interested in the intersection of cognitive science and formal logic.

Some of the elements of proving this or that statement may be criticized but mostly in the context of the bigger metaphysical debates. The logical development of the ideas written in the paper would be trying to describe the mentioned computational structure for RTM in a more formal way.

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