

WHAT IS IT LIKE TO BE BEETHOVEN ?

Easy Answers to the Hard Problem

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Abstract

A very common notion that researchers use upon discussing the scientific search for consciousness is the discrimination between the easy problems, and the hard one. The easy problems deal with the Neural Correlates of Consciousness in our brain, while the hard problems discuss Quale - the inner, most subjective experience of the world. It is said that while we clearly advance in our scientific approaches towards the easy problems - we still remain far from understanding anything with regards to the hard problem.

We show that some answers with regards to the hard problem can be achieved when one tries to look at the problem in aspects that regard the problem as an Information Theory one, where physical evidences and experiments, and mathematical notions won't suffice. We try to suggest an approach that doesn't try to "reduce" the mental activity into a physical/Mathematical explanation, but rather suggests a new method of discussing the problem.

Our approach suggests a connection between time, language, and evolution as key figures in the development of what we call Quale. Moreover, in this approach we try to suggest a way of measuring consciousness activity in various organisms as a way of better-understanding the exact needs we have from a scientific theory of consciousness.

Keywords: Consciousness - Hard Problem - Qualia - Information Theory – NCC

Introduction

One of the highly troubling notions that baffles the public in general and scientists in particular, is the inherent practice that lies within us all - our subjective experience. The various questions concerning the relation between the mind and the body, the objective experiences, and our subjective world, are all eventually reduced to the

single most inner troubling notion that gives rise to all of those: consciousness. Books, papers, piles of ink have been dedicated to its understanding, and yet we remain far from having an answer to questions concerning the way it interacts with us - it's scientific explanation. In this manner - Plato, Descartes, Kant, Schopenhauer, and various other researchers are as far from the solution as our most modern researchers. We haven't a clue even if we are getting any closer.

The goal of this article is to suggest a new theoretical model for answering questions concerning this notion of consciousness. A model that, like various others, suggests solutions still hard to test in empirical methods, but is ours to reflect upon.

The Question

Many, or should we say most, "consciousness" books/papers begin by citing and discussing the various experiments done in the last 50 years or so with regards to the above. Most share ideas and discussions of the questions for some one-third of the book, usually finishing by stating that we haven't any answers yet, nor do we have a method of searching for those. Alas, we find ourselves highly fluent with the various aspects of the questions, yet not having a single satisfactory answer or research method.

In order to shorten this ritual part of retaining the questions, we will briefly refer to only a single question that, to our belief, gives a good practice to the entire collection of possible questions lying ahead of us.

It was the philosopher David Chalmers who traditionally set the grounds for the discussion of the notions of consciousness by bisecting the discussions into two separate manners - the Easy Problems, and the Hard one¹. The easy problems are the ones concerned with the brain mechanisms that have to do with thinking, sensation, and behavior, which we can efficiently locate by neuropsychological researches, cognitive researches, and other experiments in the vast umbrella of sciences that are part of the one we generally refer to as "brain sciences". Brain imaging and tissue research among animals and humans will give a vast amount of knowledge on these mechanisms. The exact sciences - physics, math, computer science, and such -

¹ David J. Chalmers, *Journal of Consciousness Studies*, 1995, 2(3):200-19

contribute both to this research, and to the infrastructure of the global information we use.

To the contrary, the "Hard problem" is the one that concerns the understanding of the ways all those mechanisms can lead to the phenomenal nature of consciousness. The problem, according to Chalmers, is the inability of science to investigate consciousness, being subjective phenomena.

Realizing the advances we are encountering nowadays in the "easy problems" we can clearly notice the incompetence we suffer with regards to any progress with the "hard problem".

In the essence of these questions lies the elusive notion of "Qualia". Qualia are the inner hidden qualities that can't be directly located in the brain, the introspectively accessible, phenomenal aspects of our mental lives, our immediate sensations with regards to the world. The "blueness" of blue, the "painfulness" of pain. Qualia are the "nervous system" of the hard problem, the notion whose explanation will probably be the foremost question to be answered by "consciousness researches".

NCC

Today's practices bypass this question. Figuring out that we don't have the tools or mechanisms to overcome this barrier of sorting out the hard problem, we instead make an effort to advance in the right direction solely with the easy ones.

The general term given to the research done in the fields of answering the easy questions/problems is the NCC. NCC stands for the *Neural Correlates of Consciousness*, a term suggested by researchers Francis Crick, and Christof Koch². According to Crick and Koch our consciousness generates some neural activity in the brain while exerting its full strength. Researching neural activity while testing various aspects of one's consciousness can give us some understanding of the mechanisms underlying the conscious percept.

Various researches are done nowadays in the field, all giving highly interesting answers to the easy questions. However, this only emphasizes the problem we are

² Rees, G., Kreiman, G. and Koch, C. Neural correlates of consciousness in humans. *Nature Reviews Neuroscience*, 2002, 3, 261-270

facing since we still remain with the floating question: does this get us any closer to figuring out anything with regards to the hard problem?

The general assumption underlying these researches is that any advance in the direction of having more knowledge about the brain - having answers to the easy problems - will get us closer to figuring out something about the hard problem. We are yet to find out if this is true.

The Nobel laureate physicist Ernest Rutherford said in one of his famous quotes that "In physics, every **quality** is turned into **quantity**". This general statement can be easily associated with the NCC research. The NCC is a way of searching for quantities, which give rise to various aspects of consciousness - under the assumption that those will reveal some things about the quality - about the Quale. This, in general, is an orthodox belief that Quale, and the hard problem, can be somehow reduced to a mathematical-physical explanation.

Experiments

Both mathematics and physics rely on rigorous research. Assumptions based on assumptions, based on logic and rationality which eventually lead to a conclusion. Philosophy in general and Philosophy of Mind in particular, deal mostly with "thought experiments", with notions that can be mostly "talked about" and not scientifically asserted.

Such is the concept of Zombie, which Koch describes nicely in his book "The quest for consciousness"³:

In Haitian lore, a zombie is a dead person who, by the magical power of a sorcerer, must act out the wishes of the person controlling him. In philosophy, a zombie is an imaginary being who behaves and acts just like a normal person but has absolutely no conscious life, no sensations, and no feelings.

So what are zombies? Zombies are creatures that look and act exactly like us, but lack consciousness. We can think of a general concept of zombie when we discuss sleepwalkers who behave somewhat normally but are totally unaware of their actions.

³ Christof Koch, The Quest for Consciousness, Roberts & Company Publishers, 2004, 2

Either we can think of hypnotized people who, again, are under some state of awakening that is not conscious thus acting alive, however are unaware of their own doings. Would a sleepwalker or a hypnotized man say that he's indeed conscious is a key experiment in this research?

Dividing the scene

In order to identify types of consciousness researchers, some key terms were set, defined by ways of looking at the problem. Thus, making a dichotomy between the various research philosophies. The main distinction is between a "Materialist" and a "Dualist", with regards to their beliefs as to where consciousness would reside. A materialist would state that the easy problems and the hard problem are essentially the same, and NCC will eventually tell us everything we need to know about consciousness. The latter lies solely inside our brains, and figuring out the acts of those would be sufficient to understanding the collection of consciousness acts. This is a reductionist solution that says that the mental states in general, and Quale in practice can all be leveraged to a structural, physical processes model.

Contrary to the above is the Dualist view, who strongly believes that there ought to be something other than the physical explanation that can't be explained by pure physics, and that is external to our physical world.

Descartes' ontological division constitutes the very definition of dualist: two forms of substances, matter and soul. Weaker forms of dualist had been proposed earlier by Aristotle and by Thomas Aquinas. The most famous modern defenders of dualism are the philosopher Karl Popper and the neurophysiologist and Nobel laureate John Eccles⁴.

While researchers tend to see themselves as materialists when it comes to the general belief that science can ultimately explain most of our world, when pushed to the extreme by being asked, for instance, to give up their mental states and turn into zombies⁵, it shows that most of us are nothing but reluctant dualists who somehow believe that indeed, there is something unique to us that can't be easily explained scientifically.

⁴ Christof Koch, *The Quest for Consciousness*, Roberts & Company Publishers, 2004, 4

⁵ Elitzur, A. C. (1989) Consciousness and the incompleteness of the physical explanation of behavior. *The Journal of Mind and Behavior*, 10, 1-19.

While logically consistent, strong dualist positions are dissatisfying from a scientific viewpoint since the mode of interaction between consciousness and the brain, and the place where it's supposed to take place would have to be compatible with the laws of physics. This, however, would require an exchange of energy that needs to be accounted for, while we can see various inconsistencies in such. What happens to this spooky substance, the soul, once its carrier, the brain, dies, for example?

Given this decisive dichotomy we are still left uncharted as to where can we put ourselves in such a discussion. Be you a dualist or a materialist, does that, aside of defining a natural belief in the kind of answer you are to expect, get you any closer to figuring out a true solution to the question?

For the rest of this paper we will try to bypass the obstacle of having to make a choice, disregarding the author's own viewpoint, and leave both answers intact.

Complexity

Wanting to find an easy answer to the hard problem won't suffice. There are various such answers calling out for an audience, which are still not scientifically plausible. Several of the most common ones try to attach the answer to some sort of natural brain complexity. The common knowledge many neuroscientists share with regards to the functions of the brain as a complex organ sometimes leads to a belief that the nature of the answer lies in the complexity of the system, and possibly hold the key to the whereabouts of consciousness, they would say. We tend to believe that this is not the case.

We are familiar with various systems that are far more complex than our brain, but are still not regarded as conscious. The United Nations secretariat general, the internet, and many other bureaucratic systems, are way more complex than our brain - still, we don't associate consciousness to them.

When we look at the movement of a billiard ball hitting other balls and spreading them throughout a board we don't need any conscious activity in order to explain the movement of those. The laws of physics in general and the laws of Kinematics in particular are good enough for any explanation of such movements. We would look strangely at an explanation that attributes some sort of conscious decisions-making or

sensations done by the ball. We don't assume that balls "want" to interact with each other, that they are "angry" at one another and thus hit each other.

The same goes for flowers watering, for example. A dehydrated plant, being watered, flourishes. We don't assume that the plant was "thirsty". That he "wanted" to drink. That he became "satisfied" when we watered it. We just adhere to the biological explanation that states that the plant needs water in order to allow this mechanism to operate in such an order to would enable it to flourish.

The situation becomes somewhat difficult when we think of microscopic organisms such as amoeba, or combinations of cells. Should we associate consciousness with those? Does the fact that they are less complex than us say that consciousness isn't necessary for their understanding?

We surely assume that higher order creatures such as monkeys, and dolphins have some sort of consciousness - we sometimes state that the above are sad, hungry, and furious. We obviously assume that other living beings have consciousness, but still we find it very hard to draw a line with regards to the exact place where we become certain of the existence of consciousness. Plants aren't conscious, while a cockroach is? Computer is not conscious while amoeba is?

A line has to be drawn here in order to enable us to determine the "surely-conscious" from the "not-necessarily conscious", and from the "surely-unconscious" organisms.

Two things express the most evident difference between a plant and the amoeba, or between an amoeba and the ape. The first being its complexity in terms of amount of molecules and atoms it is made of, and the second being its internal neurological interaction. Conscious organisms are able to both generate interactions between various attention centers, and are made of complex systems that give rise to dynamic analogical data processing.

The thing that is missing among the "surely-unconscious" organisms is either their complexity, or their attention centers. The billiard ball obviously has a very low level of complexity. The same goes for the plant, or the amoeba for that matter. But even when higher order animals are discussed - ones whose nervous system complexity is far beyond our ability to grasp so far, we still can't surely assign consciousness to

them. We need attention centers that interact with each other in order to make sure that data analyzed among those can be transferred into the complex mechanisms. This, as we see it, is what would serve as the basic ground for consciousness.

The ladder

In order to set a basis for a thorough discussion of the above, we will begin by describing a "consciousness-ladder". This ladder would enable us to grade the consciousness level of various mechanisms.

This paper didn't begin by suggesting a definition for the term "consciousness" and detailing the various aspects that are entailed in the above. This was done mainly due to our belief that such a discussion is rather redundant and would certainly invite argument. Most readers will already have a working understanding of the notion of "consciousness". We don't necessarily need an exact definition of consciousness in order to be able to discuss the above. As the notion of Gene was not defined by anyone prior to its "revealing" by Crick and Watson, and no description of its qualities was required for it to be spontaneously examined and researched - such is our attitude towards consciousness. With this said and done we can advance to our description of the above-mentioned "consciousness-ladder". Here goes:

Grade	Degree of consciousness	Type
1	Not Conscious	Billiard ball
2		Computer
3		Zombie, Robot
4		Plant
5		Amoeba
6	Partially Conscious	cockroach
7		Monkey, Dolphin
8		Human being's Sub-Consciousness
9		Human being sleepwalker/hypnotized
10	Conscious	Human Being

The above is merely a suggestion of such ladder. We believe that various other interpretations can be suggested. Notice that computer, for instance, is referred in the above as a fully materialistic object, thus - unconscious. Is this really the case?

When we think of the Turing Test - which is Occam's Razor for a computer's ability to subvert under the Artificial Intelligence world - we assume that a computer is still a non-intelligent system that won't match our skills, and surely won't get any closer to being conscious. However, if a computer passes the Turing Test sometime soon, then we are faced with a new kind of dilemma, a need for us to grade its consciousness higher in the ladder. The act of turning off a computer might then be considered an act of violence, in essence - "killing its thoughts" - and might even lead to ethical debate, maybe even to our thinking twice before shutting its power down.

We do know now of various computer based robots who were considered by people to be higher above in the ladder⁶.

We leave it to the readers to decide where the Internet would lie in such a consciousness ladder, or where should the United Nation's general assembly be placed.

Mathematics vs. Physics vs. Mindics

So far we tried to formulate a mathematical ground for an answer by suggesting the consciousness ladder as a place that enables some weighting for levels of consciousness. But, a question rises immediately when such emerges: Is mathematics necessarily the tool needed in order to formulate an answer to the hard question? Can we surely know that a science that emerges from our logic, and intrinsic understanding of the world, be sufficient to explain that which is above our internal understanding of the world? The answer to this one should concern us too.

Mathematics in general deals with **relations**. The number "3", or the number "-10" have no meaning on their own. They become logical and clear only when looked at with relations to something else. Mathematics in general deals with "Tautologies". It's an axiomatic level of knowledge, meaning that by stating that something is a "Triangle" I automatically state that it has 180 degrees. There's no need for proof here. Above this tautological level lies the physical layer. The latest deals with causal

⁶ One famous robot is the Electrolux which - as its batteries are dying - plugs itself into an electrical socket. Although they were well aware of its being a robot, many spectators described their 'deep concern' when they were not sure if it will manage to reach the outlet before running out of power, as if he 'suffers' from the lack of energy

relations that are not derived from the first layer. Stating that mass is energy, for instance, or stating that there's a relation between mass, force, and acceleration is a way of generating a relation between three entities of the first layer into a single second layer notion. However, since the physical layer doesn't imply analytical relations, but rather empirical ones, it is inevitable that we can't form proofs in this level. Only experiments can be done in the second level. Given the mathematical axioms of force, mass, and acceleration we cannot reach the conclusion that $F = ma$, nor can we reach its contradiction $F \neq ma$.

The third layer that is of interest to us in this paper is the "mental" layer. The layer that deals with qualitative entities that cannot be described in the physical layer, but are connected to it, affecting it, and violating its conservation laws.

The search for consciousness nowadays aims at trying to describe the "mental layer" using elements from the physical layer. This is what we generally call an "eliminative reduction" - reducing a notion to a lower level until it becomes unnecessary. The third layer, in this case, is doomed to disappear - to eventually blend into the second layer.

The key problem with trying to find a solution of this kind to the mental activity - to Quale - is the fact that with regards to Quale we haven't even a single "relation" factor. All the Qualia I am familiar with are internal, and cannot be referenced by any external being. They are mine, and mine alone.

As it was wisely stated earlier by Archimedes in order to be able to generate a solution to a problem that relies on anything relative we need a "starting" solid standing point. "If I had one firm and immovable point, I could lift the world" was his way of phrasing it. In order for us to be able to generate a theory of consciousness we need to have a single point of reference that is either external to our subjective experience, or is shared among two beings. We need to have a single "blue" that we know for sure is the same for both us and someone else in order to be able to generate a full theory of consciousness. Sadly, this has never been achieved, making the essence of the Quale remain its epistemological subjectivity.

So far, we cannot prove anything with regards to external beings Qualia. We can't even clearly assume that they, indeed, have ones. From our point of view, there isn't any way of proving that the world isn't a crowded audience of zombies, apart of us, being the sole conscious being.

From our point of view, your giving me directions on how to get from point A to point B - be it highly descriptive, logical, and true - doesn't say anything on the kind of experiences I have during the following of those orders. It can be easily said that your "**turn right**" is my "**left**", and that I therefore have an opposite sense of the world. I might be seeing it upside down from your point of view - but still, as long as the entire collection of Qualia is consistent with my world, and your collection of Qualia is consistent with yours - we would never be able to tell the difference.

Is it only external?

So far we discussed only the problems of external reference. However, given the fluidity of the notion of Qualia, and our very limited understanding of it, we can't even know for sure that our Qualia are the same along the time. Under the assumption that our experiences and subjective notions reside in the brain - where our Qualia resides, and where our memory is located, we can't necessarily say, for instance, that yesterday's blue isn't today's red. We can't know for sure that a shift in our memory references wasn't tuned while we were sleeping for instance, giving rise to a new set of Qualia. If the shift was fully done then we would never be able to tell such a difference.

In "quantum field theory" there's a notion called the "calibration factor". This one enables a shift in any of the degrees of freedom available to a certain quantum field - without any change to the physical entities, or the field elements themselves. Assuming that our brain has such degrees of freedom with regards to its implementation of sensations, we can clearly imagine such a calibration factor that gives rise to a shift in our very own Qualia. Yesterday's blue might not be today's blue. Obviously this will go unnoticed, since we won't know that difference, having our memory form the same shift.

Therefore, we can clearly say that we would want a single Qualia to be shared among various subjects in order for us to be able to form a mathematical/physical theory of

consciousness. Since we lack this one we ought to look for a different way of formulating such a theory.

One extreme theoretical suggestion would be to implement a large brain tissue from one's brain onto other being's brain - assuming that it's possible for the second being to absorb this grafted consciousness or Quale. If this happens then we have a reference point giving us an initial understanding that, indeed, someone external to us has Qualia and knowing what his blue is like. This, however, is bound to many obvious criticisms with regards to the fact that we cannot really ever know that the tissue we implanted indeed gathers all that is required to form the Quale. We can always think of a single cell whose lacking made the difference.

Facts vs. characteristics

So what is it that makes the mental layer so hard to begin with? Why is it that we cannot withhold any type of answer to its characteristics?

Maybe it's the search for **characteristics** that generates the problem.

In our world we have no problems dealing with facts. We do have serious problems dealing with characteristics. As it was mentioned earlier, we can't ever figure out what is your "turn right", as the "right" part in the sentence is a characteristic of the world, which we can never be sure is "transferred" correctly using the methods of communication we have so far.

Facts are communicated regularly using the language. But, we can never entail that the entire collective information that links to the fact will be transferred along with it. It's actually a problem in "information theory".

Information theory

Information theory - which was suggested in the early 50s by Claude Elwood Shannon states the various ways of transferring information from a "source" to a "destination". Two major factors are part of this information transmitting/receiving process.

The first being a certain language both source and destination parties can understand. We sometimes ought to have a certain data communication protocol set between the two parties in advance.

The second - while the language, the protocol and the communications method are set - would be the need to make the data minimal while making sure it safely arrives to its destination.

Assuming, for example, that the channel we use for data transfer is noisy - making data-loss inevitable, we should form some data integrity mechanisms that would make information loss meaningless. We need to have a way of locating the places where noise entered our transported signal and fix those. The common way of doing this is by adding redundant data to our transferred data. If I, for instance, wanting to tell someone the name of my parents, would repeat each name three times. Chances are that even if a bus crossed during the second time, making too much of a noise for you to hear the second name, you'd still have two repetitions of it to cover up for the loss. This however would require much more time to transfer any data - tripling the bandwidth required for it to move throughout the channel. Information theory deals with the ongoing conflict between our willingness to make data transferred as short, accurate, and small in size as possible, and our willingness to make sure it is transferred correctly.

Our suggestion is that language - as our brains higher-order method of communication - is the main problematic factor in our inability to transfer information about our intrinsic states. The key factor in our inability to turn what is an internal **fact** to a **characteristic**.

Looking at our brains as a large database of facts and characteristics, we can imagine a channel between the brain's consciousness centers, and that database interface. We can also imagine a similar channel between the brain's consciousness and the language areas. Obviously, when we want to transfer information from our "database" to someone else's database, we would require language to transfer this information. However, our assumption is that the internal "modules" are decreasing the amount of data we transfer, thus disabling us from transferring the entire collection of information. In terms of bandwidth we can say that the internal bandwidth between

our consciousness and the internal modules is much wider than that of the language and consciousness.

When I think of the term "right", many other aspects of the term "right" come to mind. I might think of "no left", or of "right handed people", or of an accident I had a while ago when I missed a right turn. All those aspects of the word right are associated with my neural activity while "thinking" of right. However, when I communicate with someone else - saying "turn right" - I move only the "factual" information, without any of its characteristics. This may be the cause of the subjective difference in Qualia. We can never fully transfer all the information in our database. Our language has formed a method that allows only for a limited amount of data to move from one to the other, making Qualia reside solely in one's brain - not being ever transferred to the other.

Thought Experiment

The abovementioned "thought experiment" that discusses the option of taking one's brain tissue and affixing it into other's brain while assuming that Qualia go along with that tissue might be enlarged to a wider experiment now.

If we can somehow take someone's entire brain and put it into someone else's brain, then we are bound to have the entire fact/characteristics database transferred from one to the other. Without discussing the practical possibility of this one, and under the materialistic assumption that, indeed, the entire collective consciousness data resides in our brain - this could lead to one's ability to fully view the others internal Qualia database. Thus, having both the required point of reference that will lead to him knowing that the other is indeed not a zombie, and a reference to its Qualia.

This would turn the other's characteristics of subjective experiences into facts, and would give the recipient a full understanding of the other's Qualia.

This, of course, is true only if we ignore the fact mentioned earlier with regards to our inability of knowing that Qualia remain the same along time. Even upon our seeing that the NCC activity of both entities is the same when thinking of "red" - we can't assert that they have the same Qualia. Although this would be considered a higher-

order correlation we are still facing the problem mentioned earlier with regards to our inevitable to surely know of Quale's evolution with time.

How can we know that memory and time do not influence each other's Quale. We remain baffled with this one even if our thought experiment remains intact.

Interim reflections

The major assumptions made so far aim towards the facts that:

1. We can never know anything about the subjective experience of someone other than ourselves, given the fact that we can never really understand "what is it like to be" someone else, even if we fully understand his neurological behavior.
2. The closest we can get to having any understanding on the flow of consciousness in beings other than us can be reached by accumulating some knowledge on the "neural correlates of consciousness". This is done by getting data on the actions happening in one's brain during the behavioral processes that have correlation with consciousness.
 - During such correlation measuring we can assume that higher-order correlation would be indicating similarities if we find out that mechanisms and areas in the brain that correlate with one being's consciousness also correlate with other subject's consciousness. Giving rise to such assumptions might lead to the areas that are generating consciousness.

Answers

After thoroughly discussing the hard problems with the "hard problem" it is time to gather all the mentioned conclusions into a stand-alone solution. There are several apparent solutions that could follow the set of assumptions made earlier.

One very straight-forward solution would be to assume that there's a "consciousness" single (or small bundle) neuron. This one is "aggregating" all the sensory-conscious information and, alas, "firing" upon a conscious awareness. This falls within the abovementioned general assumptions: it can be "destroyed" thus giving rise to unconscious zombie. It can be screened while being asleep/sleep walking - enabling

the brain to act upon its signals without fully operating. It can also work with the theory of various attention centers - giving rise to the general idea of the existence of a couple of such neurons, being able to all perform the same actions on the given sensory-conscious input. In short, it seems like a good starting model.

We, therefore, suggest that our brain holds **various** consciousness base centers like the above. All may act as the "consciousness" itself. Our mind reflects only one of those at any given time, but all of them are contributing to the general building of a conscious experience. When we are born/young those centers are still developing altogether - without anyone being the "center of consciousness". They are all subject to competition and rivalry. The winner will become the "conscious" center. Upon one's "winning" this competition and becoming the "awareness" center, the others keep interacting with it, and performing conscious tasks - but their output is inhibited by the major center's final decisions. The non-winning centers - still operating on the incoming neural inputs - can reflect their existence and their decision various times where the central consciousness center is lowering its output signals. This, for instance, can happen when we are asleep. We can imagine our being asleep reflected in the major center also "lowering" its signal processing thresholds, thus letting the other centers take greater part in contributing to the incoming signals processing. This will enable other centers to "take over" the consciousness awareness during our dreams - and let them the conscious experiences. This easily explains why we sometimes experience - during our dreams - some deeper emotions and desires. Moreover, this can explain why during our dreams we sometimes see ourselves from external viewpoint - looking at our decisions as if they were made by sources external to us. This suggested solution would also explain the periods of "unconsciousness" acts that we sometimes hear of - where, for example, some criminals claim to have "lost their consciousness" for a short period of time. We can imagine the major center suppressed for a short time by one of the lower centers, thus letting emotions and actions that were originally inhibited take control of the motor systems, and of the brain. This can also explain this "unknown" center we sometime call the "sub-conscious". Our sub-conscious would actually be a "fully-conscious" center that just isn't the one we are attending to. It would necessarily keep operating on the inputs received by of the brain all our lives - processing inputs to his allocated memory areas, and processing it as if he was the conscious center. Sometimes when we dive

deeper into our reflecting of ourselves - letting go of the upper conscious (during meditation, for example) we enable the lower signals of the sub-conscious to interact with the higher levels of the conscious activities, thus enabling deeper thoughts and emotions to become active.

We can think of a general proof to the ability of various conscious centers to exist when we look at experiments done on patients with cut Corpus Callosum. Those practically lost the ability to share information between the two hemispheres, and are now operating with "two brains" controlling their single body. Experiments showing patients who perform strange acts, as if their right and left hemispheres each hold a conscious center of their own can strengthen such a theory.

These give rise to the assumption that the brain did have several conscious centers in advance, where only one was the attending consciousness. After gaining the control of all the others - when the Corpus Callosum was cut and the single minded brain lost its control of the attentive centers - the "second most influential" center in the other hemisphere immediately took control of his part of the brain.

This calls for the assumption that we might have such competition between consciousness centers daily in our lives. With training of the brain to allow all those centers to work altogether we can both improve our self conscious, but also enable deeper thoughts and experiences to rise. We know of Buddhist monks who are practicing the ability to moderate their own consciousness centers. This requires training because our brain is "used" to working only with a single conscious center - the one who "won" the initial competition. The Hebbian wiring of this one with the various systems of the brain is much stronger than any other center - thus, wanting to let the other centers operate would require a thorough training of our brains to allow such. This is not an easy task, and would require a plasticity adaptation of the brain due to external behavior.

The reason why our brain would hold various centers - although it can communicate only with a single one of them is practical. Since the consciousness center is a major part of our brain that can be very adaptive and very constructed - it has made various fallbacks. This means that the dominant center can be different within different persons. One person can have the winning center in his parietal lobe, while the other

in his frontal lobe. The winning center is mostly dependant of the skills each and every one of us required during our childhood. This explains why consciousness correlates are so hard to locate, as their locations might change from one person to the other.

The fact that there are various consciousness centers, although we communicate with only a single one, can be explained in a way similar to the one we used to explain why we can't ever communicate Quale to anyone other than us: bandwidth.

Our brain can't waste all their resources on communicating with more than one center, given the huge amount of bandwidth required for the communication with such a center. Our inability to communicate with them all is an evolutionary product of the need to work with the previously-mentioned information theory. We want to transfer the information in a fast, compressed, and accurate way. Within a single center, the information transfer is very fast, and accurate - and since it's internal and wired closely to the other centers, there shouldn't be too many "noise" problems along the way.

We can also assume that biology would allow only for one to be winning for costs of evolutionary fitness. While we say that we can assume that physics allows only for one to exist for reasons of systems lower energy saving.

The answer provided here works well also with many experiment on people with "multiple" personalities. Those people would be suffering from two or more centers with very close thresholds of controlling consciousness, thus having a flickering between the two centers on occasions.

The offered solution suggests that, at first, all consciousness centers could be the ones winning the competition control as they are equally fit for the task. Upon one's taking control the others wouldn't stop competing for the control. In a way we can say that all of them are under the impression that **they** are in control of the consciousness. They still processes the input received, and because of this the part referred to by us as "sub-conscious", for example - which is just another consciousness center who lost in the initial competition for the lead - would receive all the data that my attending

consciousness receive. It would, thus, be named "sub-conscious" only by me. For him, in a way, my central consciousness is a "sub-consciousness" center.

Language

A question that might rise would ask why such consciousness centers remain in charge for a long time? How come there isn't a "mutiny" among the other centers that enables them to gain control of the consciousness?

Our suggestion is the fact that whatever center is the one winning the initial competition is the one being able to set a direct communication with our "language" areas of the brain. Since language is a very complex system, that is one of the elementary mechanisms for high level consciousness, the language centers are very strict and can connect to only a single center. While language is developed during our childhood - in early stages of our growing - so is the consciousness winner developing. The winning of this competition by a single center is reflected by its ability to directly wire itself to the language centers. This enables it to ever after advance far beyond the other centers, since it can generate outputs to the environment reflecting its need for information. While the other centers also benefit from the inputs the winning center asks for, the winning center is the only one that can actually ask for whatever information it requires - thus advance faster than the other centers. It seems very obvious that language - as the sole mechanism that apparently exists only in humans - must have some form of positioning itself with relation to consciousness. The fact that consciousness surely belongs to humans, both according to our "ladder" and according to general views, along with the fact that language, too, surely applies to humans, is key to our assuming that there is connection between the two. Since we know that the language centers are located in certain strict places in the brain, and since we believe that consciousness may be coming from various areas of the brain - any of the centers - we believe that such a wiring between the two must exist. This also seems logical when we come to think of the fact that the competition between the centers must form some adaptation during our early childhood stages - that seems to meet the timeframe it takes for child to learn to speak.

It also comes in accordance with the fact that most of us have a reflecting consciousness of ourselves mostly from the days that we became aware of ourselves -

which are the ages when we started talking. We don't know of any evidence of people remembering themselves before they were able to speak.

We believe, therefore, that consciousness has a very strict relation to language, and that the winning center was the one that during our childhood era made a wiring with the Broke/Vernice centers.

Extrapolations of the Answer

When we come to think of this general explanation of the existence of consciousness in several centers we can clearly see its simplicity and its orderly solution - but we still remain baffled by a question which was introduced in the early stages of this discussion. We still don't have a proper answer to the "Hard problem". How does a competing centers solution solve the problem of Quale? Let us now elaborate on this one.

Time and consciousness

We have already mentioned our strong belief in the fact that consciousness in humans evolves hand in hand with the adaptation of language.

And so we clearly understand that consciousness is something that emerges, something that adapts, that changes, that evolves in space and time. This leads to the final fine tuning of our solution, to one that discusses consciousness as a notion that has to adhere to the laws of physics, and their boundaries.

We know that previous interpretations of the notion of "collapse" in quantum physics tried to create a relation between the moment of conscious being acting upon the wave function and the "collapse". We also mentioned earlier the fact that there's a general trend of "eliminative reduction" to dismantle the "layer" of mental states into a physical layer. Alas, we can definitely see a strong interaction between physics and the so-called "mental" layer - However, physical laws of conservation were also the ones that made us throw the "dualist" idea of having an immortal soul at first. So, what is it that we can use to connect the two now?

We set forth in this debate by relying on Bergson's stating that the brain is the facility through which we ought to be capturing the flow of time - since the brain is the factor

that takes "chunk" of data drifting within our world, and concatenating those into a fluent stream⁷. Physics relies on this fluency in order to describe its actions and its mechanisms. But our assumption is that consciousness might be the part in the brain that contributes to this mechanism - the system that gives the "context" to the fluidity of still life. If consciousness is what controls the experiences we have, and time is what controls the evolvment of those, then a question rises as to our ability to either control experiences or to give context to physics without either of those two. Can we assert anything on a world without Quale of experience -- or is it the same as thinking of the world as a system -- eliminating time of it⁸?

Our belief is that as zombies are to Quale as still life is to time. We can't think of a world of physics without time, and we certainly can't imagine a conscious world - without Quale.

This is absorbed neatly in Avshalom Elitzur's⁹ suggestion that a true proof of our not being zombies in this world is the fact that we are concerned with the question of consciousness. We are not zombies as we ask ourselves if we are ones. A zombie just wouldn't be concerned with this conundrum. As time isn't measured by any external element but time, so can't consciousness be measured by any element external to it.

Time has a context. The present, although for physics is nothing different than the past or the future, means much more to us then anything else. We live in the present. We control only the present. We see the world only from the "now" point of view.

The same goes for our experience of things. We experience only the current Qualia. We know things only on the current Quale. We can't even surely say if Qualia are consistent within our brain as it was mentioned earlier. We can't necessarily know that yesterday's experience of blue was the same as today's experience. We can't know that the pain we suffered yesterday is the same as the one we feel today. We can find out if the Neural Correlates of the blue and the pain are the same... but this doesn't tell us

⁷ Bergson, Henri. *The Creative Mind: An Introduction to Metaphysics*. New York: Kensington Publishing Corp, 1946

⁸ Piet Hut, Bas van Fraassen, *Elements of Reality: A Dialogue*, *Journal of Consciousness Studies*, 4.2, 1997

⁹ Elitzur, A. C., *Consciousness and the incompleteness of the physical explanation of behavior*. *The Journal of Mind and Behavior*, 10, 1-19, 1989

anything on the Quale. It's like stating that if the physical system acted today the same as it did yesterday then we can know that the particles of the system are the same. We just can't say anything on Quale. Not even if they are consistent within a single person. Although, our very own belief is that they are.

Even under the assumption that my own Qualia are the same, it still is certain that we can't extrapolate this to a general idea that Qualia along time are the same. We can't know that even if red is the same among various portions of time, that it indeed is the same throughout ALL time. Maybe Quale evolves with time and changes adaptively as our brain plasticity changes. Maybe the "third layer" is dependant on the second physical layer in such a way that a change to the brain plasticity changes our Qualia experiences. A rewiring of some sort makes this change persistent.

Very similar to time's present strong experience, do we feel that the experience of **my** red is very meaningful. While all other "reds" are meaningless, we have a strong feeling that our Quale is very important. Like the existentialist concept that discusses the option of nothing existing but what we experience, we can't really gather any knowledge of any experiences but the ones happening to us in the present.

This invites a belief that there ought to be a connection between Qualia and Time. Since we say that physics can serve as a mechanism for the establishment of the "third layer" as long as it doesn't eliminate it, we can decide to take the time notion out of the physical layer, and set it as an environmental factor of the mental layer. If time's flow is only a notion we process in our brains, and if so do Qualia, then maybe they, too, can "evolve" in our brain.

Our suggestion is to allow for a description of the process and flow of events, in terms of Qualia, as if it was a description of them by time. Such a description of the world can be: "There's a red, and it changes into blue, then there's pain, and again, happiness, and blue".... As we "tell stories" of the world - by putting them on a timeline, and advancing through it, we suggest telling the same stories in reference to Qualia. We always used the ticking clock of time to describe things, but we can easily change it to the "ticking" world of experiences. Instead of saying that "I was **happy**

for an **hour**", we might say that "During that **hour**, I felt **happiness, pain, blue,** and **joy** from Beethoven's music".



Theoretical graph of Quale instead of Time

Experiences we go through are very similar to our understanding of the present. Trying to tie all the early mentioned suggestions to this one we can go back to our Quantum Field Theory calibration factor. As time is basically a factor that is looked at as a degree of freedom - we can always set any time to be $t = 0$, as long as nothing else changes in the system, so are Qualia. As I can easily say that from now on I call the "blue" by the name "red", and henceforth nothing is changed among the Quale. It is just a factor change. We can imagine a calibration factor to Qualia - that upon a change would just reflect different Quale - not any difference in the world.

Some more extravagant suggestions

Should we stay at the wonderful correlations world? Is it enough? Should our theory be based solely on the fact that there's a wondrous relation between time and Quale? Here's a suggestion of ways to extrapolate this correlation into a stand-alone theory.

If we assert that Qualia and Time are very much alike, then we can go forward with this and even dare to say that they might be just the same.

We can assert that Qualia equals time. That, in "information theory boundaries, Quale travels with time, that Qualia are changing all the time, and that Qualia are the experience of moving through time. We can make Qualia the driving factors behind the physical layer itself - starting to "measure" things by Quale instead of time. Energy was 10 Joules, when I experienced red, and then it turned to 8 Joules while I was experiencing Sweetness.

This gives rise to a whole new physical theory. However, we would still lack a "comparison" mechanism between each person's own Qualia. We need an equation module. Something that would say that, for instance: 2 of my "being sad" equal 1 "happiness" of yours; my "boredom" is your "fright", and so on.

This gets us to the point where we seriously consider an internal change to physics, a change to the "second layer" itself. What can such a change be? For instance, it could be a change to the meaning of "experiment", and of the "characteristics" of physics. Instead of a layer of facts - it would, too - change to a layer of characteristics. This is done by adding to the above assumption another one suggested which we call the "Particles Uniqueness".

Particles Uniqueness

The particles uniqueness suggests that one way of solving the problem of uniqueness among us - the feeling that our internal self is existent and is not a mere bundle of molecules and atoms set in a certain order - is by adding another level of "uniqueness" to our building blocks.

A thought experiments we suggest discusses in a way a *macroscopic version of Pauli's principle* - can there be two "conscious" beings holding the same consciousness?

The experiment suggests a world where our knowledge of the brain is ultimate. We know everything there is to know about the brain, that is to say that we have answers to all the "easy problems". We now have the Neural Correlates of "everything". We know how memory works, how the motor-system is handling movement - and quite frankly - have all the knowledge we would require regarding the Neural Correlates of Consciousness too.

And thus begins our experiment. We take an arbitrary person, and given our very precise and futuristic technology perform a "duplication" of his brain. Neuron by neuron, synapse by synapse. We duplicate everything - from the state to the matter.

We now hold in an aquarium a duplicate of that person's brain. Including all his functions - and, according to materialists, including its consciousness.

Then comes the question. We suggest a million dollar prize to the subject for his agreeing to let us kill his brain. We would take his body and use it with the duplicated brain, giving the "new" self of him the awarded money. Will you agree?

This experiment basically deals with our belief of having an internal, cosmic, mystic nature that can't be duplicated, and the fact that we generally tend not to believe that there's nothing but our neurons/synapses that make us who we are.

What makes us cling to this brain if we believe it has nothing but pure atoms and molecules that make is what it is? Why do we believe that our "self" lies only in this brain and can't be duplicated with the rest of the materials?

Our answer is that that maybe material itself has a sense of uniqueness, thus can't be duplicated. Maybe atoms and molecules are, indeed, different than each other, thus not being able to really go through such duplication.

Contradicting Leibniz's suggestion that two similar atoms put in a closed box completely lose their uniqueness upon our opening that box, as we can't differ the one from the other anymore, we suggest that atoms are indeed different from the other. Each and every atom is different than the others. There are **characteristics** to atoms that we, generally, can't see - because we look at them only from the physical layer. So far we classified material according to numerous sections: spin, strangeness, electricity, and so forth, but what if there's another classification that turns each and every atom to a "class" of its own. This obviously would require a different kind of physics. Instead of a "generalizing" physics, we would now require endless equations that would describe the entire collection of atoms in the world at a given state. Endless polynomial equations will describe each and every single moment of our world. Physics obviously can't work with such equations. Experiments can't be made with such, since nothing is "repetitive" in an "endless information" world. Nothing but Qualia.

Qualia can now be easily explained. The fact that we are so "attached" to **this** brain and believe that replacing it with another won't do is due to our "consciousness" knowing that it's made of elements that do not exist in "other" brains. Our brain is different from any other brain in such a case, and obviously can't be "duplicated".

Moreover, the fact that such a world surrounds us - where every particle is different than the other **must** be disregarded somehow by our "own" information processor. We stated previous our belief that consciousness is closely concerned with theories of information, and we can clearly see now why a world where we would be "aware" of the fact that all particles are different would not be a practical one for us in terms of information processing. Our brain must be able to "disregard" these differences.

We can easily develop a theory of evolution where organisms with the ability to disregard the uniqueness of particles led to an evolvement of a brain that ignored this uniqueness. We could never work out a solution to any equation if we would always see the entire world before our eyes upon trying to generalize it.

We have to eliminate the "characteristics" of the atoms so that our finite brains would be able to process infinite amount of data. Our storage devices are finite. There had to be a way during the evolution of the brain for it to learn how to work with only a certain number of characteristics of nature. The uniqueness of the particles was therefore discarded.

In his famous short-story "Funes, the Memorious"¹⁰, Jorge Luis Borges describes a man with "infinite" memory who had the opportunity of naming each and every chair, sofa, apple he saw with different names. He found differences among similar chairs since he could. His brain enabled him to do so. We - with our limited information system - must generalize, categorize, and cluster our information for it to be accessible. But our consciousness doesn't necessarily work that way. It might see the world in its uniqueness, thus allowing us to overcome physical conservation laws within its information layer - the third one.

Obviously the flaws of such a model are very self occurring - as we can't think of a monetary system where each and every coin is different than the others, we could never pay at the supermarket if the clerk would not assume that one coin and the others are basically just the same.

¹⁰ Jorge Luis Borges, In "Ficciones", 1942. English translation, Grove Press, 1962

Conclusion

As we can see one can suggest various answers to the Hard Problem. The fact that there are various answers - few of which are contradictory, some are hard to test in experiments, and most are very complex to explain and work with - tells us something about the fact that we are very far from having a "single-minded" solution. We are very far from being able to even believe that one answer has the key, and we should just narrow those to a place where they can be both tested and discussed. This paper suggested some new answers. However, the problem remains - as shown by the extremist answers required - very Hard. We are still far from having an understanding of "How it is like to be someone else", how is someone else experiencing the Quale of music, "What is it like to be a bat"¹¹, "What is it like to be John Malkovich", "What is it like to be Beethoven".

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¹¹ This refers to Thomas Nagel's "What is it like to be a bat ?" (1974), *The Philosophical Review* LXXXIII, 4, 435-50

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