compos mentis

Concepts, String Theory, and Separate Mental Reality

Candice Wiesner
Eastern Michigan University

ABSTRACT
Concepts are an enigma. How is it we are able to interact with abstractions such as mathematics, or, concepts? This perplexity has proven ripe fruit for philosophers. For many philosophers, concepts have a definite structure and exist in a separate realm. Conversely, for psychologists, concepts exist in the head and as such do not have a definite structure; concepts take on a probabilistic structure for psychologists. These two views are conventionally seen as at-odds, however, this paper presents arguments supporting both views. Both views are accommodated when we allow for separate realms, separate realities, to exist. String Theory is consistent with there being such realms. In the following, a number of concepts are combined, each in essence consistent with accepted ideas, resulting in a qualitative explanation for concepts, with the promise of an eventual clear cut basis for understanding consciousness in general.

KEYWORDS
Concepts, String Theory, Multiverse, Informational System, Biological System

If there were no mathematicians, would there be prime numbers, and if so, where would they be? We can certainly think about prime numbers, therefore, they exist in our consciousness; but if we do not think of them, they would not be anywhere. Mathematical concepts do not exist as anything more than representations in our conventional world. This puzzle has long been proven ripe fruit for philosophers; concepts are an enigma. How is it we are able to interact with abstractions such as mathematics? One suggestion is that perhaps mathematical concepts are somehow located 'in the physics'. However, such a drastic solution is not necessary to explain our ready access to mathematical ideas. Instead, this paper puts forth neural networks as providing an adequate explanation to abstract concepts. In shifting the locus of concepts (or mathematical thinking) to another realm what begins to emerge is an argument for the existence of some kind of separate realm. Perhaps we have only replaced one mystery by another; why should such a separate realm exist at all? String theory, involving as it does spaces having more dimensions than the usual three, and also a non-unique vacuum state, is consistent with there being such a 'separate realm'. This paper puts forth the idea that some aspects of mentality involve a realm of reality largely, but not completely, disconnected from the phenomena manifested in conventional physics. I will support this analysis by first explaining the difference between philosopher's idea of concepts and psychologist's idea of concepts. While these two views are conventionally seen as at odds, the analysis put forth accommodates both positions. Next, I argue that it is possible to accommodate both views through the acceptance of separate realities. Explaining string theory, we see it is consistent with there being such a 'separate realm'. Following, I bring the analysis together with explaining how one might access such a separate realm. It is natural to postulate a shared mental 'bubble', realized by neural networks, whose contents are available to life-forms. I will also address critics concerns such as the empirical testability of such an analysis. In the following, a number of concepts are combined, each in essence consistent with accepted ideas, resulting in a qualitative explanation for concepts, with the promise of an eventual clear cut basis for understanding consciousness in general.

Concepts are a contested issue. To philosophers, many believe that concepts are abstract objects. Since abstract objects do not have a spatial location, it follows that concepts are not located anywhere. In contrast, psychologists insist concepts are located "in the head." They characterize concepts as mental representations.

According to Shapiro, "whether concepts are abstract objects, or whether they are physically realized mental representations, is an issue about the ontology of concepts - about what they are" (Shapiro 2019, 81). This raises questions about the nature of their structure. For many philosophers, concepts are like definitions: they consist of a collection of other concepts that constitute individually necessary and jointly sufficient conditions (Shapiro 2019, 82). Take, for instance, the concept of 'triangle'. The conditions necessary for triangularity are three-sided plane figure. If we see a four-sided figure, we know this does not meet the conditions necessary for a triangle. For psychologists, according to Shapiro, "a dominant view treats concepts as something like packages of information about a topic" (Shapiro 2019, 82). Take, for example, the concept 'dog' consists of a potentially open-ended list of features such as four-legged, paw-footed, fur, snout, and tail. Some of these features may be more representative than others. Whether the object falls into the extension of a concept, that is, an instance of the concept, depends, then, not on whether the object satisfies some set of necessary and sufficient conditions, but on whether the object possess enough of the features that comprise the concept (Shapiro 2019, 82). To the philosopher, a definition is either satisfied or it is not. It makes little sense to think about a three-sided plane figure as being only 45% triangle. For the philosopher, it either is or is not a triangle. To the psychologist, concepts allow for graded application or judgements. This is similar to the judgement a whale is not a mammal. Owing to the fact whales exhibit less mammal-like characteristics: they do not have fur and live in the water, for instance. For the psychologist, the ability to judge helps us categorize things that may not be representative of all the features of that kind. We can notice that the ontological and structural questions are independent of one another. Shapiro writes,

> One might hold that concepts are abstract objects with a probabilistic structure. Or, one might conceive of concepts as mental representations with a definitional structure. It just so happens that many of the philosophers who have defended the idea that concepts are abstract objects are also committed to their having a definitional structure; and psychologists who assume that concepts are located in the brain have abandoned the idea of definitional structure. (Shapiro 2019, 82)

The two views need not be at odds, necessarily. Surprising as it may seem, separate mental realities can allow for both views to hold. This is the idea that some aspects of mentality involve a realm of reality largely, but not completely, disconnected from the phenomena manifested in conventional physics. In a separate reality abstract concepts exist. When we interact with these abstract concepts in conventional reality, they are mental representations only because the true concept exists in another reality. Concepts existing in a separate mental reality have a definitional structure, while the mental representations we construct have a probabilistic structure. These mental representations are based on the definitional structure, but, because they are merely representations, they take on a probabilistic structure. In fact, concepts in conventional reality need to be probabilistic because it is how we identify kinds that assist in the classification of particulars into kinds. Take, for example, the concept 'bird'. If the definitional structure includes "critter that flies," birds that do not fly could not be classified as birds. We use the flexibility of concepts in conventional reality to make easier the identification of kinds. Biologically speaking, it makes sense to lessen the cognitive load to allow for flexibility in identifying; think of how much more information one would need to remember if we sterilized the process of identifying. Psychologists are right to explain how we interact with concepts in conventional reality, while philosophers are correct in identifying a separate mental reality.

According to Brian Josephson of the Department of Physics at the University of Cambridge, "the idea of a disconnected realm does have precedents, for example in the way two of the fundamental forces (the strong and weak forces) play no role in large areas of physics and chemistry, whilst in other contexts they have a very important part to play" (Josephson 2003). The fundamental forces are the gravitational force, the electromagnetic force, the weak nuclear force, and the strong nuclear force. What Josephson is referring to is that since the weak and strong nuclear forces act over an extremely short range, the size of a nucleus or less, we do not experience them directly, although, they are crucial to the very structure of matter. Nuclear forces determine the relative abundance of elements in nature because they indirectly determine the chemistry of the atom. Everything we experience, on the tiniest level, owes itself to the strong and weak forces. Note that string theory, involving as it does spaces having more dimensions than the usual three, and also a non-unique vacuum state (in fact, a very large number of such states), is consistent with there being such a 'separate realm', in a way that the Standard Model, with its unique vacuum state contained within a limited number of spatial dimensions, did not (Josephson 2003).

The idea of a separate reality is a strange one; we were raised to believe the word 'universe' meant everything. Speculative though string theory is, there is reason to take it seriously. I am going to describe the possibly of a separate reality in three parts. In part one I will highlight a Noble Prize winning idea and a profound mystery that arises from the results of these findings. In part two, a solution to this mystery will be provided. It is based on an approach called string theory; this is where the idea of a multiverse, or separate reality, will come into the story. Finally, in part three I will describe a cosmological theory called Inflation that will pull all the pieces of the multiverse theory together.

Part one starts in 1929 with the great astronomer Edwin Hubble establishing that space itself is stretching, or expanding. This was revolutionary as the prevailing wisdom was that on the largest of scales the universe was static. In 2011, scientists Saul Perlmutter, Brian Schmidt, and Adam Reiss were awarded the Nobel Prize in physics after making pain-staking observations of numerous distant galaxies to find that the universe's expansion was not slowing down, but was, in fact, speeding up (Greene 2012). This raises the question: what is causing the universe to expand at an ever-increasing speed? Einstein's theory of gravity provides a compelling answer. According to Einstein, gravity not only attracts but also pushes things apart. Einstein believed the universe to be full of a sort of cosmic mist and the gravity generated by this mist would be repulsive (Greene 2012). Repulsive energy explains why the universe is not only expanding, but also speeding up in its expansion. The mystery (as promised) is that when astronomers worked out how much dark energy must be infused in space to account for the cosmic speed up they found a spectacularly small number: 1.38x10^-123 (Greene 2012). The mystery is in explaining this peculiar number. Why is it we live in a universe with this particular amount of dark energy instead of any other? The only approach that has made any headway to explain it invokes the possibility of multiple universes.

Moving on to part two. According to physicist Brian Greene,

> The central idea of string theory is if you examine any piece of matter, ever more finely, at first you will find molecules. Then, you find atoms and subatomic particles. The theory says if you could probe smaller, much smaller than we can with existing technology,

> you would find something else inside these particles: a little, tiny, vibrating filament of energy. A vibrating string. (Greene 2012)

Just like the strings of a violin, they can vibrate in different patterns. The different kinds of vibrations produce different kinds of particles: electrons, quarks, photons, etc. They all arise from vibrating strings, a kind of cosmic symphony. All of the richness of the world around us emerges from the music of these little, tiny strings. The mathematics of string theory has internal inconsistencies, however, unless you allow for extra dimensions of space. We are all used to the three dimensions of space: height, width, and depth. String theory says that on fantastically small scales there are additional dimensions, crumpled to a tiny size, so small we have not detected them (Greene 2012). Even though the dimensions are hidden, they would have an impact on things we can observe because the shape of the extra dimensions constrains how the strings can vibrate. In string theory, vibration determines everything: the strengths of forces, particle masses, and most importantly, the amount of dark energy, would be determined by the shape of the extra dimensions (Greene 2012). If we knew the shape of the extra dimensions, we should be able to calculate these features. However, we do not know the shape of the extra dimensions. As the list for potential candidate shapes soared, some scientists dismissed the idea of string theory as never being able to empirically testable. Other scientists have turned this perplexity on its head taking us to the idea of the multiverse. According to Greene, "each of these shapes are on an equal footing with every other shape. Each is as real as every other in the sense that there are many universes each with a different shape for the extra dimensions" (Greene 2012). This proposal has a radical effect on the amount of dark energy reveled by the Nobel Prize winning results.

If there are other universes, each with its own shape for the extra dimensions, then the physical features of each universe will be different (Greene 2012). In particular, the amount of dark energy in each universe would be unique. The mystery of the number 1.38x10^-123 takes on a wholly different character. In this context, the laws of physics would not explain one number because there is not only one number; there are many numbers. We find ourselves in a universe with the particular amount of dark energy we have measured because our universe has conditions hospitable to our form of life. It may seem like we are allowing for a lot of speculation, that these ideas are mere conjecture. However, we may be able to account for multiverse theory. This brings us to part three.

When we speak of the Big Bang, we often have an image of a cosmic explosion that sent space rushing outward. However, the Big Bang leaves out something important: the bang. The theory tells us about what happened after the Big Bang, but gives no insight to what powered the bang itself. As stated by Greene, "this gap was filled by an enhanced theory of the Big Bang called Inflationary Cosmology. It identifies a particular fuel that would naturally generate an outward rush of space" (Greene 2012). The important detail for us is that this fuel is so efficient, it is virtually impossible to use it all up. It is likely that the Big Bang was not a one time event. The fuel not only generated our big bang, but countless others as well, each giving rise to its own separate universe. Our universe becomes one in a cosmic bubble bath of universes. If we meld this with string theory, each of these universes has extra dimensions. The extra dimensions take on a wide variety of shapes. The different shapes yield different physical features and we find ourselves in this universe because our universe has the right amount of dark energy for our form of life (Greene 2012). A big question remains: could we ever confirm the existence of other universes?

There is a way that in the future it might happen. The inflationary theory holds that when the bang happened, it generated a kind of cosmic finger print. A pattern of slightly hotter and slightly cooler spots throughout space that modern telescopes have observed. If there are other universes, the theory predicts that every so often universes collide. If our universe got hit with another, that collision would generate subtle temperature variances across space that we might one day be able to detect (Greene 2012). As exotic as this theory is, it may one day be grounded in observation.

So far we have established the possibility and precedent of separate realms. The logical question that arises next is how do we interact with these possible realms? Consider all of what the brain does in visual perception. Here, the primary information from the visual receptors goes through various levels of processing until it ends up as a high-level representation of the content of the visual field. It is not unreasonable to identify mathematics as a similar process, except that higher levels of abstraction are involved in this case. With the visual case, the mechanics are straightforward: the visual field typically contains, for example, edges, for which abstraction a dedicated neural system has evolved, related to our ability to perceive edges. It is hard to see why we should have such ready access to higher mathematical abstractions having little connection with experience (Penrose

1994). One resolution of the problem would be for mathematical concepts to be in some way ‘in the physics’, rather than being emergent properties of brains. Such a drastic solution is not necessary to explain our ready access to mathematical concepts; neural networks can provide an adequate explanation. The explanation is of a biological character, taking account of the fact that information processing is an essential component of biological functioning, but with only very specific informational processes having a life-supportive character. According to Josephson,

> While it is commonly taken that the informational processes involved are mediated by ordinary physical means, it is not a logical necessity that this should be the case. Some informational processes in an organism are specialized to the nature and circumstances of the organism concerned, however, some have a more abstract and universal character, and so could be mediated by a quite different system with which individual organisms would interact. (Josephson 2003)

Next, we observe that a form of proto-life, defined as the first life, or fluctuation patterns surviving longer than typical patterns do, can be hypothesized as occurring at the Planck scale. Briefly, the Planck scale is a tiny number; it is hard to wrap ones mind around how small it is. An analogy might help: if you were to take an atom and magnify that atom to be as big as the observable universe, then the Planck scale would be roughly the size of the average tree. The tree is to the observable universe, as the Planck scale is to an atom (World Science U 2015). Evolution of such proto-life is expected to involve evolution of the accompanying informational systems also. We get to the proposed model by supposing that the ordinary physical component and the informational component can evolve separately and that the informational component can even survive the creation and destruction of individual universes, remaining as an ever-present background with which new universes, Planck scale fluctuations, and more developed life forms can all beneficially interact. Assuming an indefinitely extended time scale, the most persistent part of the informational background can evolve indefinitely, so that its dynamics might come to include features corresponding to mathematical concepts and operations as well.

We need to add another piece of detail to our model. In order that it can model individual thought, we suppose that individual life forms can perturb the background state so as to create a localized 'thought bubble'. The concepts exist in a separate realm and our neural networks have evolved with the capacities to access such a realm. We create mental representations to make use of the information we access from these separate realms. String theory is consistent with there being separate realms.

The problem such an analysis has to face is that of explaining that, if such a mechanism for concepts and mathematical thinking exists, why do we not have ready access to these separate realms in a more concrete way? In other words, why does consciousness mostly interact with conventional physics? This is not an insuperable objection. We must bear in mind that in the biological realm the phenomena that manifest are governed not only by what is physically possible, but also by which of those physically permitted possibilities are likely to be of overall benefit to the organism concerned (Josphenson 2003). An undifferentiated sensitivity to all the realms would result in chaos, and tend to be disadvantageous rather than of benefit, leading to the individual being overwhelmed by the resulting chaos. This would be distracting and interfere with constructive activity. The right way to think about concepts is that we can access them in favorable conditions, such as learning or memory tasks, but we are not overwhelmed by our abilities to access other realms. True concepts are not located "in the head," but, after accessing these separate realms where concepts exist, the mental representations we create are accessed in our minds. We use the flexibility of these models to understand better and interact with our environment. This lessens the cognitive burden placed on us by allowing for flexibility in our models to account for the classification of particulars into kinds.

The implications of this speculative theory offer interesting insights into the understanding of consciousness in general. The picture that emerges is one of an everlasting informational system that has existed through many, many creations and destructions of universes. This is a shared system, among all beings. In essence, there is a part of us that is shared by all beings. While our biological organism appears separate from all other living creatures, this is not the full story. It is a story of compassion; all beings are connected through their shared participation of the informational system. It also implies a reduced role of our biological system and the importance we place on it. The Buddhist concept of ‘we are not these bodies’ applies here. Conventionally, yes, we are. However, we when exit the mundane world and begin to see ourselves outside the ego construct, that is made to protect our very biological system, we can play with the notion that we are not these bodies only. We are connected to a much deeper, much more mysterious force. An understanding such as this, if proven correct, would alter the very way we conceive consciousness.

We set out to show that philosopher’s idea of concepts and psychologist’s idea of concepts do not need to be at odds. Both hypothesis can be accepted and accommodated for if we allow for separate realities. String theory is consistent with there being such separate realities. The evolution of our neural networks includes mechanisms designed for abstractions, such as edges. It is not illogical to reason our neural networks have evolved to perceive other abstractions such as concepts (also referred to as mathematical thinking), or having connections with separate realms. As we can penetrate the background informational system, we can formulate what is referred to in this paper as a ‘thought bubble’. This is the basic interaction between us and the separate realm. We use the thought bubble to create mental representations in the mind of concepts. We can then use these models in conventional reality by applying them to the classification of kinds to particular kinds. The flexibility of these models reduces the cognitive load; we do not need to categorize in finer and finer detail. Both the psychologist and philosopher’s view correctly identify, they are simply identifying different aspects of the same thing. Mainly, concepts exist in a separate realm with a definitional structure and when we interact with them we create mental representations of concepts with a probabilistic structure. This exhilarating picture is the crossroads of modern science with ancient philosophical ideas. To accommodate something that is as foreign to our current physical picture as is the phenomenon of concepts, we must expect a profound change- one that alters the very underpinnings of our philosophical viewpoint as to the nature of reality.

REFERENCES

Josephson, Brian. 2003. “String Theory, Universal Mind, and the Paranormal.” *Publisher not listed*.

Penrose, R. 2005. “Shadows of the Mind.” *Oxford University Press*.

Shapiro, Lawrence. 2019. "Embodied Cognition."

Sheehy, Noel, Chapman, Antony J, & Conroy, Wenday. 2016. "Biographical dictionary of psychology."

WorldScienceU. 2015. "Can you put the Planck scale into PERSPECTIVE? How small is it?" *Youtube.com*.