4-24-2013

A Physicalist Account of Consciousness and the Conceivability Argument

Christopher John Owen
University of Missouri-St. Louis, cjoy8b@gmail.com

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Christopher J Owen
B.S. Physics, B.A. Mathematics, University of Missouri - St. Louis, 2009

A Thesis Submitted to The Graduate School at the University of Missouri - St. Louis in partial fulfillment of the requirements for the degree
Master of Arts in Philosophy

April 2013

Advisory Committee

Berit Brogaard, Ph.D.
Chairperson

Gualtiero Piccinini, Ph.D.

Jon McGinnis, Ph.D.

In what follows I argue that David Chalmers's Conceivability Argument is just as easily applied to a physical account of consciousness as it is applied to dualism, which implies that the Conceivability Argument yields absurd conclusions. To do so, I give a physical account of phenomenal consciousness within the brain, and then argue that conceiving of zombies is begging the question. I also suggest that because I have a plausible account of phenomenal consciousness based within the physical, such a consciousness is just as conceivable as a zombie would be in the Conceivability Argument. As I have given a conceivable account of physical phenomenal consciousness, one can use the Conceivability Argument for both a dualist and non-dualist account of consciousness.

Introduction

The methods we use to explain phenomenal experience are quite a bit different than those required to explain purely physical phenomena. The former often requires a familiarity with the subject to teach someone something new about the way something is felt, seen, heard, etc. The latter often requires a knowledge base about physical processes. Consider the following scenario:

You wake up and start your morning by stumbling down the hallway. Although groggy, you start to register noises coming from the kitchen just as the bitter aroma of coffee wafts in front of you. Images pop into your head as you recall your lover cooking breakfast for you in the past. You smile as you think about what to expect when you make it to the kitchen; a kiss on the cheek, a thoughtful glance, gentle reminders of why the two of you are together. This is how you spend many mornings, and your spirit is often uplifted by being with the one you love.

The above scene is intended to show how easy it is for an individual to relate to conscious experience. Even if someone hasn't had a lover that would cook breakfast for them

like in this particular scene, they have most likely had the experience of smelling coffee in the morning, hearing someone working in the kitchen, or recalling the past after viewing a familiar scene. It is easy to envision what's going on in that scene because we've all experienced similar events to the ones that were described. We find the events *familiar*. When we try to explain the experiences like the roasted coffee smell to someone who hasn't experienced something similar, then we start to run into problems. In fact, we start to run into problems without even talking about complex experiences. How can we possibly explain what green or red is like to someone who has never seen color at all?

This is simply just not the case with respect to facts within physical reality which are not experiential facts. For example, a black hole can be discussed in theoretical terms, and their effects can be seen on other celestial bodies. For humanity, this is as far as black holes can be experienced as they are facts about the universe to be learned through physics, mathematics, and astronomy. The same can be said about other physical objects, such as electromagnetism, gravity, quantum mechanics, chemical reactions, etc. These physical aspects can be taught through instruction and ordinary communication, and we can theoretically learn everything about those aspects through those lessons. The minute we start talking about our experiencing of these physical things, we hit a wall and we can no longer talk about teaching them in the same fashion.

The lesson we can learn is this: there is something peculiar about qualia, or phenomenal experience, that cannot be taught in the same way that facts about the physical world can be taught. Some philosophers, such as David Chalmers, have addressed this issue extensively. Chalmers suggests that there is something special about the mind; the mind is fundamentally

different than physical substances. Chalmers argues that the aspects of the mind are non-reducible to purely physical terms and the mind must be explained in its own mental terms. He offers three arguments, the Explanatory Argument, the Conceivability Argument, and the Knowledge Argument (Chalmers, 2003). I have already outlined the essence of the Explanatory Argument in my introduction: there is an epistemological gap. The epistemological gap stems from the inability to know physical truths about phenomenal consciousness from simple observations. Since the Knowledge Argument is less about a gap in ontology but more about a gap in epistemology, I won't be discussing the Knowledge Argument in this paper any further. The Conceivability argument, which is also known as the Zombie Argument is one of the two foci for this paper. The other focus of this paper will be an effort to show that the mind may in fact be reducible to the physical, which I will talk about in the first half of the paper.

In the first half of this paper, I put forth two brands of physical reductionism that are in their beginnings. Dr. Marcus Raichle and Dr. Biyu He discuss an electric potential in the brain which might be indicative of a neural correlate of consciousness. Also, Anthony Hudetz explains how different processes in the brain contribute to consciousness. After expounding upon those views, I'll give several reasons why their views do not work on their own terms, and then offer my own view which has been very heavily influenced by Douglas Hofstadter. In the second half of this paper I wish to discuss the Conceivability Argument (CA) on its own and again with the physical reductionism set forth in this paper. I intend to show that not only is reducing the mind to physical causes plausible, but with the understanding of a physical mind as it is outlined in this paper, I show that CA is an argument which supports neither physical reductionism *nor*

dualism, the view that CA supposedly supports.

1. Talking About Consciousness

There are two ways one can talk about consciousness. One is to talk about consciousness as phenomenal experience. The other way is to talk about consciousness in psychological terms[1]. This distinction is well fleshed out in Chalmers' 1996 work, but I will give a summary of their differences here. The phenomenal experience is what I attempted to illustrate in my introduction, the way things are experienced and how they *feel*. The second kind is the psychological aspect, or how conscious beings make decisions. In other terms, the psychological aspect is what consciousness does. Chalmers points out that this second aspect may not involve any kind of experience associated with it, the psychological aspect just pertains to the way decisions get made (Chalmers, 1996). The difficult part of consciousness to explain is, of course, the former aspect - phenomenal experience. That will be the focus of this paper.

Phenomenal consciousness is the way things feel. What's implicit in this definition and explicitly said in Chalmers's 1996 work is that phenomenal consciousness is a subjective quality in experience. When we perceive things we do it from the first person perspective, and we can't share this perspective. It's uniquely our experience. We also aren't just reacting to stimuli, like a venus fly trap; we take in stimulus, pay attention to parts of it and ignore other parts. We mull things over and form memories. This definition is not just a good starting point for any understanding of phenomenal consciousness; it is necessary. As a result, the following discussion

[1] The division I'm referring to here is between a psychological aspect and a phenomenal aspect. It should not be confused with a distinction made between qualitative character and subjective character.

must be seen through the question of "How does this relate to subjective experience?"

2. A Physical Framework

If the mind is reducible to purely physical processes, then we must talk about what brings about the mind in terms of brain physiology. In what follows in this section, I hope to illustrate a connection between specific physiology related to the local field potentials and brain activity.

2.1 The fMRI

Functional Magnetic Resonance Imaging (fMRI) is used to track changes in brain activity. Unfortunately, an fMRI without any understanding of the underlying physiology will not tell us much about how brain physiology causes "activation".

The fMRI measures something called the Blood Oxygen Level Dependent (BOLD) signal (Raichle and Mintun, 2006). In simple terms, if a part of the brain is activated, then the oxygen content of the blood in that area increases and we get a measurable signal. An image can be formed of the entire brain based on the BOLD signal, but the BOLD signal on its own does not tell us anything else other than how blood in the brain is behaving. To understand the physiology associated with brain activity, we have to talk about some current theories as to what neurophysiological activity corresponds with the fMRI signal.

It's often thought that an increased need for oxygen and glucose cause the sudden increase in blood flow to an activated region. That's not technically true as those areas don't use much more oxygen than normal, but activated brain regions still end up metabolizing more glucose than at a resting state (Raichle and Mintun, 2006). If the brain is requiring more glucose

to be active, it seems natural to ask, "what neuronal activity actually produces the need for glucose?" We can look at Raichle and Mintun's article (2006) to find a few more answers.

There are two neurophysiological events that may be responsible for the increase need for glucose, Local Field Potentials (LFPs) and neuronal spiking. Currents flow through dendrites into neighboring cells, and those currents produce electric fields. Local Field Potentials are averaged electric fields from multiple signals surrounding terminal axons (Mazzoni, Logothetis, and Panzeri, 2012). Neuronal spiking is the output from individual neurons and occurs at cell bodies. Raichle and Mintun believe that the evidence is in favor of the LFP, and they provided some experiments to back up their claims. They mention that in an experiment by Sokoloff et al. from 1977, it is shown that metabolism greatly increases around the axon terminal, but not around the cells of signal origin. The spike originates at a cell, causing a chemical cascade down a dendrite, and then creates a potential gradient at an axon. The ionic gradient (electric potential) is the *input* that averages into the LFP, and the spike is the output from the originating cell.

Raichle and Mintun continue their discussion of evidence by discussing some older experiments and some more recent experiments that support the evidence from Sokoloff et al. with regard to metabolism around LFP. They say that in two papers, one by Lauritzen and another by Thomesen et al., the LFP changes with the blood flow while the neuronal spiking is *anti-correlated,* or negatively correlated (Raichle and Mintun, 2006). This implies that the blood flow associated with fMRI activity is correlated with LFP and NOT neuronal spikes. Although spiking is not always anti-correlated with the fMRI signal, the fact that spiking does

not always correlate with the fMRI signal implies that it should not be associated with potentially generating or simply supervening upon the fMRI signal. The Local Field Potential is another story as it seems to be a good candidate as a neural signal which corresponds to an fMRI.

2.2 The Local Field Potential

The Local Field Potential (LFP) is the average electrical field potential (voltage) in an area of the brain around multiple synapses (Mazzoni, Logothetis, and Panzeri, 2012). Since the LFP is essentially the voltage for a particular part of the brain, it must depend in part on the current running through that part of the brain. The current corresponds with the activity of neurotransmitters in the area of the LFP; since neurotransmitters are often ions (charged particles), they produce a current when they cross the synaptic divide. As a current changes, so does an electric field. Since there's a pattern of increasing and decreasing electric current in the area of a LFP, then there's a frequency associated with the LFP. A LFP's frequency is usually lower than 300 Hz (Mazzoni, Logothetis, and Panzeri, 2012). Different frequency ranges are associated with different cognitive activities (Mazzoni, Logothetis, and Panzeri, 2012).

I have hopefully connected the dots convincingly enough that it seems as though LFPs are a good candidate for a correlate to the fMRI signal. This is not to say that the LFPs themselves are the cause of brain activity, but merely indicative of it. The physiology associated with the LFP is most likely the true neural correlate of fMRI signaled brain activity.

3. Slow Cortical Potential and Consciousness

Since consciousness is often thought of as many different parts (vision, taste, hearing, etc) coming together to form a single experience, He and Marcus Raichle give an account of

consciousness as being a form of information integration (He and Raichle, 2009). They suggest that the neurophysiology underlying the SCP can fulfill this requirement for two reasons: 1) the SCP has a slow rate of change which makes it easier to synchronize across large brain distances, and 2) long range connections connect areas of the brain with apical dendrites (associated with SCP) which then branch out into "arborizations", tree like divisions of nerves, that spread across the top most layers of the cortical region.

3.1 The SCP at Work

The Slow Cortical Potential (SCP) is a type of especially low frequency local field potential of a bit less than 1 Hz, but can be up to about 4 Hz (He and Raichle, 2009). There are several factors contributing to the SCP, the most influential of which are apical dendrites. Apical dendrites are the dendrites at the top of a pyramidal cell (so named because of its shape). He and Raichle (2009) point out that it is this input to the top layer of apical dendrites that contribute most to the SCP. This input is from long-range intracortical (between areas of cortex) and *feedback* loops between cortical regions that output into the top layer of apical dendrites (He and Raichle, 2009), so the input which is producing SCP comes from around the brain in addition to the local area.

The long range communication of SCP allows neuronal information to travel all over the brain, and the arborizative branching allows the termination of such information to affect a larger area than just a single cell. Additionally Biyu He and Raichle (2009) suggest that deeper neurons affected by neuronal transmission in this manner may contribute to localized, specialized processing, or even unconscious processing. This aspect of SCP physiology, in particular, will

be important later.

In addition to potentially facilitating the free exchange of information within the brain, the SCP can be correlated with conscious awareness of different mental processes such as attention, perception, and volition and also unconsciousness (He and Raichle, 2009). In what follows I discuss He's and Raichle's collection of research into attention, perception, volition, and unconsciousness.

3.2 Attention

Attention, for instance, has a top down effect on perception (He and Raichle, 2009). It seems almost asinine to point out that we are more consciously aware of those stimuli to which we pay the most attention. Biyu He and Raichle give two examples of how our visual cortex behaves in a top down fashion, both of which center on the function of the SCP. The first example is the feedback[2] pulse emanating from the SCP physiology of higher order visual areas down to the lower order visual areas (He and Raichle, 2009). This suggests a top-down (attention controlled) aspect to perception (Roland PE, et al., 2006). Second, attention modulated the power of high frequency LFP through a very low frequency mechanism (He and Raichle, 2009). From the equation power = current **x** potential, this implies that modulating the power of a LFP will increase the current, which is also the flow of neurotransmitters. He and Raichle (2009) point out that these effects were only seen in the areas which correspond with the SCP. If the physiology associated with the SCP is responsible for this, then this is another reason to associate SCP with directed attention.

[2] By feedback, I mean a signal which goes in the opposite direction of the original signal (Roland PE, et al., 2006).

3.3 Perception

In the case of conscious perception, several more experiments were given as examples. In one experiment, Pins and Ffytche showed participants visual stimuli that were just barely visible (He and Raichle, 2009). A SCP response occurred between when the visual stimuli is first revealed and when a response is given, but no significant SCP changes were detected when there is no conscious perception (He and Raichle, 2009). Leopold et al. showed that perceptual suppression, as within an illusion, only induced changes within the low frequencies (He and Raichle, 2009). In other experiments testing electrical stimuli on the cortex itself, it is shown that the physiology associated with the SCP is necessary but not sufficient for conscious perception (He and Raichle, 2009).

3.4 Volition

Choice can be predicted through looking at the SCP as well. It has been repeatedly shown that a change in the SCP precedes both voluntary movement and the intention to move (He and Raichle, 2009) . Current experiments involving an fMRI are able to predict a free choice up to 6 seconds before the outcome is consciously accessible, but it is not yet known if the SCP is associated with this predictive fMRI signal (He and Raichle, 2009).

3.5 Unconsciousness

Finally, Biyu He and Raichle discuss the significance of the SCP with respect to unconsciousness. In one type of experiment, unconscious human patients or in one situation, anesthetized rats, had specific areas of the brain associated with the SCP stimulated. Stimulating the thalamic pathways, which seem to have their endpoints in the top layer of apical dendrites,

evoked an increase in behavioral response in the participants and rats (He and Raichle, 2009).

3.6 The Subjective Experience

He and Marcus Raichle's account still needs to be put into some perspective. When introducing the concept of consciousness, I mentioned that it must be subjective. The strength of the aforementioned account is that it acts as a good foundation upon which we can understand consciousness, not that it explains how experience works. There is a lot of talk about how the brain operates to bring about volition, attention, perception, or that the physiology associated with the SCP might be necessary for consciousness, but no talk of how experience is formed. Fortunately, it seems as though we need the answers to the soft problems (how we perceive, pay attention, etc) to understand how to get at the hard problem.

To understand how knowing some potential answers to the soft problems can help us find the answers to the hard problem, it would help to look at another account of consciousness. In what follows, I'll discuss Anthony Hudetz's view of consciousness, which stresses how subjectivity might come from a combination of multiple brain processes. While Biyu He and Raichle do a wonderful job of explaining how the processes might fit together, Hudetz's view shows why we need the different processes to connect. I wish to illustrate how the mind is a form of mental coordination or orchestration, which is a mash up of multiple different brain processes.

4. Hudetz's View of Consciousness

Anthony Hudetz gave an overview of his own particular view of consciousness in a 2010 article, which is also centered on information integration. What follows is not meant to be

outright compatible with the aforementioned view of consciousness, but another way of looking at a physical consciousness. After I cover Hudetz's view, I will attempt to combine the two views being discussed.

4.1 A Single Subjective Composite

Hudetz cites two papers that distinguish between wakefulness and sleep (Hudetz, 2010). The first paper by Steven Laureys suggests a two component definition of consciousness, wakefulness and awareness (Laureys, 2005). Laureys argues that you must be either awake or dreaming to be aware, but awakeness and consciousness are not necessarily correlated as those in vegetative states appear to be awake but are not aware of anything (Laureys, 2005). The second paper mentioned by Hudetz is one written by Hobson and Pace-Schott, and is not too terribly useful for this paper but does distinguish between a few more states of sleep (Hubetz, 2010). What do these differences in states of wakefulness have to do with consciousness? At first glance we can say that this distinction points to the obvious aspect of an awareness of our surroundings or awareness of our inner lives in consciousness.

There's another way to think about consciousness that comes to mind when considering both the Laurey's distinction and the parts of consciousness discussed in section 2. Consciousness is a composite. We perceive stimuli, we have different levels of alertness, different forms of memory, and motivation. This idea is nothing new, G. Bryan Young and Susan Pigott have already discussed these parts of consciousness in an Archives of Neurology paper (Young and Pigott, 1999).

Different parts perform different functions. Short term memory, for instance, seems to

make it possible to carry on normal activities and apply attention. Without short term or working memory, there would be no temporal component to activities we perform and our existence would be just a series of instances of time. Alertness might be akin to different stages of wakefulness. Motivation explains *why* a person wants to do the things we do, and volition would explain *how* we do what we do. Consciousness is an amalgamation of aspects from each of these different qualities of experience. We feel a drive from motivation, the willful action of volition, we notice the things we pay attention to, and sense the passage of time.

There are multiple functions, but one consciousness. We must have a kind of mental coordination, a one from many, if we are to explain consciousness. We must look at how these things come together in a single conscious experience of what phenomenal experience feels like, which is not unlike integrating information.

4.2 Reactions to Sensory Stimulation

Hudetz discusses several experiments in his paper on cortical disintegration, each of which provide insight into what Hudetz believes to be an account of consciousness. The first experiment I wish to discuss is based on the fact that brains remain reactive to stimuli when anesthetized, which seems to show that cortical parts of the brain are still active and running when under general anesthesia. However, as active as they are, they are not excited as often as they would be during a wakeful states (Hudetz, 2010). Even under very heavy anesthesia, a person's brain still responds to stimulus. The anesthetized states involve a dilation of a neuron's ability to recover from excitation, explaining why the processing circuits run at a slower frequency than in a wakeful state (Hudetz, 2010).

Hudetz was able to measure the changing interhemispheric cross-approximate entropy of an EEG by changing the amount of anesthesia agent within a rat (Hudetz, 2010). An interhemispheric cross-approximate entropy is a measure of the number of brain states across hemispheres, and as the anesthesia was administered in higher doses, the number of brain states decrease. This suggests that as general anesthesia is administered, the brain approaches a kind of unity that's unlike the coordinated communication caused by normal gamma oscillation. Instead of specific cortical groups becoming synchronized and coordinated with one another, the whole brain becomes synchronized under anesthesia creating that unity associated with an anesthetized state (Hudetz, 2010). Since gamma oscillations synchronize during wakefulness over different sections of the brain, rather than the brain as a whole becoming synchronized, I suggest that consciousness must be a coordinated effort from many different regions of the brain. The brain's processes are like an orchestrated group of instruments coming together to make a single piece of music.

This is not a new idea. In 2004 Giulio Tononi suggests that consciousness relates to the capacity to integrate information within the brain, not unlike what He and Raichle are after. The more information could possibly be integrated (the higher quality and quantity of relations available), the more conscious the being (Tononi, 2004). Now, the way Tononi (2004) uses the term information is a bit different. He says that information is the "reduction of uncertainty among a number of alternative outcomes when one of them occurs". Tononi considers brain states to be different bits of information, so that consciousness is quite literally the configuration of the brain.

These conclusions, that consciousness is an orchestration or coordination of brain processes, reinforces the idea that the subjective experience may depend on a particular configuration of states discussed in section 4.1. If this is the case, then we would also obtain a sort of uniqueness in the subjective experience. Consider how a configuration of brain states would come about. You'd have both internal and external forces. The external forces might be the stimuli that produce an experience: the angle of sunlight through a window, the shade of purple in a scarf, etc. The external forces that help create a configuration would be unique to the situation. The internal forces that help shape an experience, or a configuration, would be unique to the individual since the brain structure, chemistry, and any past influences would be unique to the individual. This gives a sense of subjectivity to experience that I have yet to found in my discussion of the material. Subjectivity must be unique to the individual, and if experiences must ultimately depend on external stimuli creating an internal configuration of states, then the experience is unique to the situation and person.

This isn't quite enough for a complete concept of subjectivity as it doesn't explain why experience comes about from these coordinated processes. Why does crosstalk amongst different areas of the brain yield an experience of the color red? For now, it does not seem that it ought to. I wish to argue that phenomenal consciousness comes about from a specific feature of organized systems, a feedback. At the moment, I will go on an aside to discuss a bit more of the brain's organizational structure to give more credence to the brain's ability to integrate information, and to also talk about feedback in some detail.

4.3 Anesthesia and Gamma Oscillation

Gamma oscillations are a type of synaptic excitation rhythm found in different regions of the cortex and are about 30-80Hz (Bears, Connors, Paradiso, 2007). It's possible that the synchronization between multiple regions of the brain's rhythm is a way of transmitting information from one part of the brain to another (Bears, Connors, Paradiso 2007), and as a result, gamma oscillation may be a key part in sharing information between different areas of the cortical regions of the brain. Hudetz also mentioned that gamma oscillation, along with local field potentials and neuronal firing rates, are involved in attention, short-term memory, feature binding, conscious perception, and voluntary action (Hudetz, 2010). In addition to its involvement in mental activities, consciously perceived stimuli produce a long-distance gamma oscillations between widely separated regions of cortical matter (Melloni et al., 2007). In other words, conscious perception involves the interaction between cortical areas all around the brain. This is consistent with the idea of consciousness's being a configuration of brain states and that consciousness necessarily involves information integration.

Hudetz talks about information integration as it relates to transfer entropy, which is defined as a way of measuring information transfer (via gamma oscillation) between regions of interest in the brain (Imas et al., 2005). Volatile anesthetics produce a reduction of feedback transfer entropy, where feedback transfer entropy is the measure of how backwards flowing signals transfer information. This reduction in feedback transfer entropy occurs in several areas of the brain while leaving feedforward (non-looped) direction relatively unaffected in the same areas (Hudetz, 2010). Hudetz has this to say about the roles of each kind of feed, "the forward connections represent and analyze incoming sensory data, whereas the feedback projections

play a modulating role in the selection and contextual interpretation of information" (Hudetz, 2010). Hudetz is suggesting that because anesthetics attenuate the feedback of information, the brain is no longer aware of the information it's receiving. It is the difference between simply taking in stimuli and actively perceiving the stimuli. Physical feedback is crucial for phenomenal perception.

This gives us a sense that the coordination of brain processes required for experience is achievable, but more importantly, feedback may be the key to understanding phenomenal consciousness. This is not the first time I've mentioned feedback, either. I mentioned that the SCP transmits feedback signals in section 3.1 and that feedback is crucial for attention in section 3.2.

The ways in which the brain connects through gamma oscillation, local field potentials, the slow cortical potential, and neuronal firing create a foundation for communication from region to region. If feedback is properly built into the structure of the brain, then phenomenal experience might just come about.

4.4 Brain Structure

There's been a bit of discussion of how regions of the brain talk to one another. The functions and processes of the brain pass information back and forth. Now it's time to consider the form of the brain, and how that form influences the cross talk between areas of the brain. Hudetz suggests that there are two possible mechanisms for brain topology to influence connectivity: long range connections through modules of signal correlated regions and physical networks of neurons and regions (Hudetz, 2010). There is a "resting state functional

connectivity," (RSFC) which consists of low frequency correlations of the MRI BOLD (Blood Oxygen Level Dependant) signal from several brain regions (Hudetz, 2010). The BOLD signal is most likely correlated with the local field potential (Raichle and Mintun, 2006), which, as I mentioned earlier, is involved in different aspects of cognition. These regions of correlated frequencies may make connections to one another or connect one part of the brain to another (Hudetz, 2010). This suggests that different parts of the brain are connected through local field potentials in addition to gamma oscillations.

The physical layout of the brain seems to follow a small world pattern, which is structure that maximizes the space used (Hudetz, 2010). A small world configuration uses clusters of important structures with numerous connections to one another, making the brain efficiently connected. The important features of the brain seems to mimic the small world configuration, which suggests that the brain is structured in a way that the transmission of information is efficient over the whole of the brain. If communication is efficient enough, both feedforward and feedback signals are more effective communicators.

5. A Combination of Views

Each of the two views I have discussed offered something different. Biyu He and Raichle seemed to give a view of consciousness that went into the nitty gritty aspects of how brain functions might correlate with aspects of consciousness, while offering the slow cortical potential as a foundation for information integration. Hudetz picks apart what exactly is required to experience, piece by piece. Looking at Hudetz's article, it is made abundantly apparent that not only is consciousness a sum of many parts, but consciousness is very much a coordinated

effort relying heavily on *how neuronal pathways connect to one another*. There still seems to be something missing, something David Chalmers would likely point out.

5.1 An Objection

There's a problem with this idea of consciousness as "information integration" or as a configuration of states. These views of consciousness do not account for how phenomenal experience really comes about and often discuss what psychological consciousness *does* (such as processing but not experiencing information). There is something missing in this explanation as it seems to describe a lot of how brain processes are associated with different aspects of consciousness, but no connection to what it means to have a phenomenal experience.

We can obtain a sense of how experience is put together through many of these ideas, but not a true sense of subjectivity. We still don't have a clear sense of how it "feels to be a certain way" might come about. There's still something that distinguishes what it's like to be human from what it's like to be a bat. This is where I bring in ideas about feedback and try to make phenomenal consciousness clear.

5.2 The Mind's Medium

Illusions shed some light on the problem. The Kanizsa triangle, for instance, is the optical illusions that a triangle is formed in negative space, which is the space that is unoccupied by the drawn figures. Our minds perceive a triangle within the negative space formed by the three pac-man like circles and three angles create a negative space that our mind fill with a triangle. The experience has to be created or constructed. That's why just thinking about brain states, brain configurations, or information integration is unsatisfactory, none of these options tell

us intuitively that the brain is creating the experience for us. There should be some creative aspect to the brain which produces experience. The creative aspect must come in two parts, one of which is a medium as in art and the other is the force of creation.

When you sculpt, you have your different mediums, clay, wood, stone, etc. A creative agent couldn't be a medium in the traditional sense, but it could act as a source or some kind of abstract material from which or within which change occurs. It must also be responsive to both the physiological aspects of the brain and to mental phenomena.

This seems to be exactly what He and Raichle were getting at while they were researching the SCP and associated physiological phenomena. The SCP synchronizes across a large area, and the SCP connects to areas that may specialize in specific tasks which in turn affect a large area through arborization. Huditz also sheds light on the transfer of information as he discusses gamma oscillations, neuronal firings, the LFP, and brain structure. Each seems to contribute to information transference within the brain. The brain's mechanisms and structure together is the medium required for creation of the p experience.

This idea relies upon the conception of mind as a configuration or orchestration of brain states. If a mind depends on the configuration of the brain, then the connectivity of individual regions and cross talk between regions all contribute to the number of states possible. Consciousness, then, arises out of the orchestration of all the many configurations made available by integrating information with the brain.

This view is still not complete, however, as a medium by itself produces nothing. A block of stone stays a block of stone without the aid of someone to carve out the masterpiece.

There has to be that other half of the creative aspect, that force of creation. But then there is also a third piece missing, the final product, Michelangelo's David. In what follows I will discuss what shapes the mind and then what the final result might be.

5.3 The Creative Aspect

To talk about creating phenomenal experience, I will borrow some ideas from Douglas Hofstadter's 2007 book, *I am a Strange Loop*. Hofstadter suggests that we are "strange loops" which he describes using an analogy with video camera and television (Hofstadter, 2007). Consider a situation where a video camera is both taking input and displaying its visuals to a television screen. The lens of the camera is, strangely enough, pointed at the television screen so that the pattern therein becomes a part of the input. The new input is incorporated into the pattern on the screen, and the camera is now self-referential, forever creating because it turns in upon itself. It is in this way that Hofstadter believes a mind works, turning in on itself, creating as it is perceiving. This seems a bit difficult to understand as it is, so I'll talk about a few concepts from this and explain.

The first concept is more obvious than the second. The mind is influenced by two main sources, new input from perceived events or objects and various effects from old experiences (the self-referential part[3]). The various feedback loops and feedforward (signals that move forward into affected areas of the brain) inputs would represent effects from old experiences affecting current brain processes, and, of course, the new inputs from our senses would reflect

[3] Although I don't speak on his work, Uriah Kriegal wrote that consciousness might actually be self-reference in his book, *Subjective Consciousness: A Self-Representational Theory*. He says that, "a mental state has phenomenal character at all when, and only when, it represents itself in the right way" (Kriegal, 2009)

new perceived events or objects. The creation aspect here is captured by the way new inputs and old experiences influence the current processes. Based upon the physiology I've talked about thus far, these influences are reflected through physiological feedback loops seen in the SCP phenomenon, through attention feedback loops in the gamma oscillation associated with processes like awareness, and through feedforward inputs. *These are physical aspects of the brain!*

The second thing I take from this analogy is that these loops act as a *driving force*. As long as these processes are operating, the brain states (the medium being acted on or within) will continue to change and form new experiences. The various internal and external inputs keep stirring the pot and orchestrating new configuration of brain states. Using Hofstadter's analogy, as long as the camera is on, working correctly, and with the camera pointing at its own output, we will have a strange loop.

Some may suggest that these operations stop during unconsciousness, so how might the experiences renew themselves after the cogs which create experience stop themselves? Biyu He and Raichle suggest that the Slow Cortical Potential may act as a way of keeping homeostasis during unconscious brain activities (He and Raichle, 2009). So if that is the case, the "medium" that is the SCP maintains the brain's workings long enough to come out of unconsciousness in the usual way, ready for new inputs that start the creation of experiences all over again.

The last question of, "How is phenomenal experience formed, and what is it?" remains to be answered in this particular view of a physical mind.

5.4 Phenomenal Experience

Phenomenal experience is the combination of the medium, brain configurations and orchestrations, and that which gives it motion: the feedback loops, neuronal connections, and raw sensory inputs. That is a strange idea, but I am certainly not the first. Again, Douglas Hofstadter (2007) suggested this very thing with his book on strange loops. Hofstadter and I have gone about explaining this idea in different ways, but he has influenced my thinking so greatly on this and the idea is essentially his.

Consider my example from the introduction, the one about you waking in the morning, walking in on someone preparing breakfast. There are sights, sounds, smells, that all trigger phenomenal experience. This included remembering past experiences and your lover, and the sensations also caused you to make connections about the meanings behind those sensations. You recognized those noises for what they were, the sounds of someone making breakfast. Your mood, too, is affected and most likely affected the way in which you perceived the sensations within my example. These are all ways in which your mind works to bring about phenomenal experience.

Psychological consciousness is a result of two types of events, internal and external events. Many events stem directly from stimuli; a stimulus might makes you remember a particular memory, you may see the reflection in the water, or may hear a sound. These are brought about by mental churnings, or what I called psychological consciousness. Other psychological forms of consciousness occur by mulling over some memory or thought; the mental churning which accompanies contemplation brings about new mental churning just as an external stimulation might.

There is a parallel between how I've described phenomenal and psychological experiences in the way mentally internal and external events influence how the brain or mind operates. In the very least, I've suggests that the physical processes associated with psychological consciousness correspond with phenomenological consciousness. I want to do more than that, however.

Douglas Hofstadter describes consciousness in terms of billiard balls (Hofstadter, 2007). When inspected closely, the billiard balls appear to be moving with their normal impacts and rolling. They are just moving billiard balls. When we "zoom out", we get a bigger picture and a different entity appears - the chaos of all the billiard balls. Of course, this is just a metaphor. It seems plausible to say that out of the mechanisms of the brain, including feedback, an entity might be born.

This is plausible because a sense of self is essential for consciousness. The brain structure and methods of communication within the brain work together with feedback to yield a sense of self. Subjectivity is born out of the chaos of the brain and the necessity of feedback.

5.5 An Example about Color

Raw sensations like color, sound, touch, taste, etc, are very difficult to explain, but for this section I will focus on the color red. Let's consider how light happens to cause vision to work within the brain. The mode of transmission for vision is light. Physiologically, light passes through the sclera, cornea, and lens and finally impinges upon the retina. The purpose of the lens appears to be focusing the light on the retina in order to form an image. The retina has 10 layers with the rods and cones toward the image being received; the rods and cones respond to

the light and send signals to the back of the brain.

Color corresponds with the wavelength of light that hits your retina. Color is a particular wavelength or set of wavelengths along a very large spectrum of wavelengths, and for an object, this set of wavelengths represents what is *not* absorbed by the object but what is reflected. When an electromagnetic wave like light interacts with the rods and cones in our eyes, they become absorbed and eventually cause activity in the brain and we see color and shape (Barret, Barman, Boitano, Brooks, 2010). It seems like a color such as red may be a good candidate for phenomenal experience.

A large portion of the information received by our eyes ends up in two lateral geniculate nuclei (LGN) within the dorsal thalamus (Bear, Connors, Paradiso, 2007). The LGN acts as a kind of gateway for information from the retina to the visual cortex (Bear, Connors, Paradiso, 2007), but strangely the majority of input into the LGN comes from the visual cortex itself (Bear, Connors, Paradiso, 2007). This fact in combination with the fact that the LGN also receives input from the brain stem suggests that our visual experience may be altered by our brain (Bear, Connors, Paradiso, 2007). Thus enters phenomenal experience.

Let's say that a ray of light with a wavelength associated with the color red impinges on a person's retina, and its signals make their way down to the LGN and combine their effects with the effects of inputs from the visual cortex and brainstem producing a specific combination of neuronal firings that affect a person's LGN. The LGN then takes on another specific configuration of neuronal firing within the visual cortex.

Now for what is more speculation on my part. I suggest that the entire result is the

experience of seeing the color red. The entire result is not simply the final configuration of neuronal firing within the visual cortex, but the process that necessarily repeats itself. There is a physical loop here that, as long as there is life within the brain, the physical loop continues. The configuration of neuronal firings within the visual cortex is incorporated within the whole brain itself through the connections of SCP, gamma oscillations, and small world brain structure I mentioned earlier. Afterward, the affected brain has its own effect on the LGN through the visual cortex and brainstem. The process begins anew. This cycle is the way in which red is perceived and then incorporated into experience.

5.6 The Plausibility Argument

I have set forth a view of physically reducible consciousness. My intent is not to create an iron clad view of consciousness derived from the physical, but to merely show that it is something plausible. David Chalmers is an opponent to such a reduction of consciousness, and as I mentioned in the introduction, uses the Conceivability Argument (CA) to argue for dualism. In what follows I aim to render the CA completely ineffective by relying on the plausibility of my view of physically reducible consciousness.

6. David Chalmers' Conceivability

Roughly speaking, the conceivability argument goes like this: beings exactly like us physically but without conscious experience (zombies) are conceivable. Zombies are metaphysically possible because zombies are conceivable. Materialism cannot be metaphysically coextensive with zombies. Therefore materialism is false. In what follows I give an explanation

of the conceivability argument in its most general form, and then go into Chalmers' more nuanced aspects within his argument. Afterward, I discuss how my construction of a physically reducible consciousness weakens Chalmers' conceivability argument.

6.1 The Conceivability Argument

For a generalized form of the Conceivability Argument, let P be the conjunction of all microphysical truths, and let Q be an arbitrary phenomenal truth. Here is Chalmers' most straightforward version of the CA (Chalmers, 2009):

1. P&~Q is conceivable.
2. If P&~Q is conceivable, then P&~Q is metaphysically possible.
3. If P&~Q is metaphysically possible, then materialism is false.
4. Therefore, materialism is false.

Since P contains all of the microphysical truths, Chalmers maintains that it must specify all the "fundamental features of every fundamental microphysical entity in the language of microphysics". If Q is understood to be the idea of phenomenal consciousness, premise 1 introduces the concept of a zombie. (Chalmers 2009) A zombie walks like us, talks like us, lives like us, but is empty inside and is without consciousness.

What I wish to focus on in this paper is the first premise, that P&~Q is conceivable, but before I can tackle that premise, I have to consider David Chalmers's conception of conceivability.

6.2 Prima Facie and Ideal Conceivability

David Chalmers speaks of four kinds of conceivability. There are two categories each

with two possible outcomes. The first category involves the amount of reflection involved, and is split into prima facie and ideal conceivability. Prima facie conceivability includes concepts that are conceivable upon the face of it. Prima facie conceivability does not involve much, if any, reflection (Chalmers, 2009). Ideal conceivability is something that is already prima facie conceivability, but has been ideally rationally reflected upon (Chalmers, 2009).

Chalmers gives three examples in his 2009 paper, which are: A) 2+2=5, B) a complicated mathematical proof, and C) the phrase 'There is a flying pig'. 2+2=5 is neither prima facie nor ideally conceivable because it is impossible. A complicated mathematical proof is usually prima facie conceivable, but if the proof happens to be unsound, then it is not ideally conceivable. Chalmers claims that the phrase 'There is a flying pig' is prima facie conceivable and ideally conceivable. These examples illustrate a connection between prima facie and ideal conceivability, namely, that prima facie conceivability is necessary but *not* sufficient for ideal conceivability.

The first two examples also show us how Chalmers believes how conceivability works. The two examples are very similar. 2+2=5 is clearly logically impossible given mathematical knowledge, which implies that conceivability entails some kind of logical aspect. The complicated mathematical proof's ideal conceivability relies solely on its actual truth value after rational deliberation, so example B suggests that ideal conceivability relies at least in part on logical proof, or a lack of logical contradiction. From these examples, it seems that prima facie conceivability relies on something being logically possible and ideal conceivability relies on arguments being logically valid.

6.3 Positive and Negative Conceivability

The second aspect of conceivability Chalmers considers is called either positive or negative conceivability. Positive conceivability is an extension of logical possibility as mentioned in section 6.2. In fact, Chalmers uses the following definition for positive conceivability: "We can say that *S* is positively conceivable when one can coherently imagine a situation in which *S* is the case" (Chalmers, 2009). Logical possibility has a great deal to do with ensuring that an argument is coherent. Positive conceivability is the successful *construction* of an idea through filling in details.

Negative conceivability is the inability to rule out an idea through either a priori or ideal reasoning. Considering the first example from section 3.2, 2+2=5 is *not* negatively conceivable because it can be ruled out. From the second example, the complicated mathematical proof cannot be ruled out through a priori means, but may or may not be ruled out through ideal reasoning.

Chalmers purports that premise 1 is either about positive or negative ideal conceivability. (Chalmers 2009) I will treat each positive and negative conceivability separately in their own section, but because prima facie conceivability is built into the definition of ideal conceivability, I wish to talk about that first.

6.4 A Zombie's Prima Facie Conceivability

Before delving into ideal conceivability, there should be a discussion of a zombie's prima facie conceivability as it is the foundation of ideal conceivability. This will be a slight detour which does not involve any concrete understanding of how the mind works, but it's an

important point to make, nonetheless. To make things more complicated, but more precise, I should also consider primary and secondary conceivability.

Primary conceivability is about a concept's meaning in a possible world. If one can imagine a possible world that, if we were centered upon that possible world the concept would be accurate, then the statement would be primary conceivable. For example, 'water is not H_2O' is false when the utterance is said on a centered world where water is XYZ, but true on any world where water *is* H_2O. Therefore, 'water is not H_2O' is primary conceivable because we can think of possible worlds in which it might be true (Chalmers, 2009). Secondary conceivability and possibility is about a concept's meaning in the actual world. We can use empirical knowledge. 'Water is not H_2O' is not secondary conceivable because the word 'water' must be evaluated in *this* world, the actual world, and so it is always referring to H_2O. The utterance is always taken to be said in counterfactual worlds with respect to facts of our own (Chalmers, 2002).

In what follows, I hope to show that relying on any prima facie conceivability requires that we first *beg the question* against the physicalist. Let's assume a non-philosopher, Allen, attempts to conceive of a zombie in the secondary sense. We know nothing about Allen except that he has a physicalist reductionist belief. To conceive of a positively prima facie zombie Allen must construct a scenario in which there is an entity who is exactly physically the same as Allen (or someone else he knows) except without phenomenal consciousness. We already see a problem in the secondary conceivability. Allen's a priori leanings, his intuition, tells him that consciousness is based entirely on the physical. How can Allen conceive of a being just like

himself physically, but without the inner light of consciousness if his intuition already tells him that is not possible? It seems to me that it would require some a posteriori prodding to get him to conceive of zombies.

Now for Allen's *primary* positive conceivability. Chalmers says that "it will suffice for the truth of *P&~Q* that the world is a zombie world, or simply that the individual in question is a zombie in a physically identical world." (Chalmers, 2009) Chalmers seems to be saying that in order for P&~Q to be true, only one individual in the possible world must be considered a zombie. Let's Consider a physical clone of Allen in a possible world where everyone but him has phenomenal consciousness. Allen must have a consciousness based upon his intuition, so we have a contradiction.

Let's assume that he can't conceive of a world where he has no phenomenal consciousness and everyone else does. Allen must conceive of a world where everyone is a zombie. Again, we run into the same contradiction because his intuition tells him that, since everyone is a physical duplicate of everyone in the actual world, they must have consciousness. If this is unconvincing, consider the anti-zombie world, a world that would have been a world of zombies if not for the addition of phenomenal consciousness. Allen's intuition tells him that phenomenal consciousness comes from the physical body, and only the physical body. So, all the creatures in this anti-zombie world with their addition of phenomenal consciousness results in a kind of multiple phenomenal consciousness. Each individual would have two phenomenal consciousness. Even though it might be possible for the two phenomenal consciousnesses to have the exact same experiences, that seems to be arbitrarily the case. There is only one way in

which the two phenomenal consciousness sharing the same body might have exactly the same experiences; any deviation changes them into separate entities. On this account, it seems like the only way Allen might positively conceive of dualism is if he conceives of a highly constricted view of dualism - the phenomenal consciousness bestowed by dualism must be exactly the same as the consciousness provided by the physical.

Let's say that Allen is now attempting to do the same thing, but negatively so. Allen runs into the same problem. A possible world in which an exact physical copy of everyone in the actual world exists, but that world without that addition of consciousness would seem to Allen to be exactly the same as the actual world, a contradiction. And any world with that addition of consciousness to the exact physical replicas would be full of people with multiple personalities. This seems to rule out zombies.

One may wish to argue that I've put too much thought into Allen's prima facie reasons and that the amount of reasoning involved now excludes Allen's conception from being prima facie conceived. This seems to be a misunderstanding of what it means to be prima facie conceived. In the example A) where 2+2=5, we know immediately what each term and operand *means*, and may rule that out almost instantly. In example B), with the complicated mathematical proof, I take it to be true that we also know what each and every aspect of the proof means, we just may not be able to tell if it's conceivably true or false simply based on that. I have done nothing more than explore what 'Zombies are possible' might mean to Allen in the same way that 2+2=5 means to Allen. I reasoned just enough to give Allen and the reader just enough understanding to know what it means to conceive of a zombie in another possible

world through Allen's *initial intuition*.

A second conceiver Boris, someone with the intuition that dualism is correct, will have none of the problems that Allen has. Boris can both positively and negatively conceive of zombies with no difficulty. This seems to imply that conceivability of zombies depends on the individual doing the conceiving. Prima facie conceivability is *begging the question.* This poses a problem for Chalmers since ideal conceivability relies so heavily on having prima facie conceivability. If prima facie conceivability depends on the person doing the conceiving as I suspect, then it is certainly begging the question to say that we can conceive of zombies at all. Prima facie conceivability is so flimsy, it really isn't a useful way to see if something is actually conceivable.

For the sake of argument, I wish to assume the opposite: that we *can* prima facie conceive of zombies. Now let's can consider ideal forms of conceivability.

6.5 Ideal Primary Positive Conceivability

An updated version of the Conceivability Argument invokes either positive or negative ideal primary conceivability (Chalmers, 2009). I wish to consider just ideal primary positive conceivability. Primary negative conceivability seems nearly impossible to rule out, so I will assume that if an individual has prima facie conceivability (which they do not), then they can have ideal primary negative conceivability. What does it mean to form an ideal, primary, positive conception of a zombie? 'Ideal' means that something that is already prima facie conceivable must be conceivable after being ideally rationally reflected upon. 'Primary' means that the concept in question is being evaluated with respect to a centered possible world (Chalmers,

2009), which is not necessarily this one. 'Positive' implies that we must construct a scenario that is both coherent and non-contradictory.

This should be very similar to the description I gave for Allen in the previous section, with the exception that we are assuming that zombies are prima facie conceivable. We can conceive of a world full of zombies or just a world with at least one zombie. For my purposes, let's conceive of a world with at least one zombie, a person that is an exact physical copy of someone with consciousness, but without some phenomenal experience. The zombie could be missing an entire consciousness, or just part of it. Upon reflection, how does that work? Where was the consciousness located before we 'took' it away from the pre-zombie? What kind of substance or property is the mental? Does a phenomenal consciousness's location coincide with the physical form's location? In this possible world, how might one verify that an individual is not a zombie? These are the type of questions that one should come up against if we are trying to conceive of ideal and positive zombies. I will attempt to answer some of these questions and others.

First, how might we verify that an individual is not a zombie in the world we are imagining? Zombies entail dualism of a sort. Dualism claims that the mental and physical are ontologically separate. If the physical and the mental are significantly different enough, then the mental would not follow the same sort of physics that the physical does. Then how might one interact with the mental if phenomenal consciousness does not react in a 'physical' way to our normal probing methods? Normally, we use our knowledge of physical reactions to understand how mechanisms work: we bombard things with energy, create chemical reactions, manipulate

machinery, etc. Experiments will always have one thing in common, they all create a measurable change. In section 2.4 we talked about a change in the brain that corresponded with the ability of an individual to sense a stimulus. But the mental will not react in any predictable way to physical stimulus because in this case the two are significantly different; the rules of the physical don't necessarily apply to the mental when talking about dualism! As with black holes, we might come to understand through an extrapolation of the physical data that's affected by the mental. Extrapolating about the phenomenal mind, however, will not work because the definition of a zombie involves complete mimicry of consciousness. Ultimately, we are left trying to figure out how the mental acts on the physical and vice versa using traditional experimental methods. Since physical rules don't necessarily apply to the mental, traditional experimental methods will ultimately fail us. This is Chalmers's point.

Unfortunately, it seems to me that this point works against, not for, Chalmers's Conceivability Argument. Let's assume that the physical and mental are just similar enough to interact. Consider the divisions that make up the mind. Part of the mind is very different from the physical, while the other part is similar enough to interact with the physical. How do the divisions of the mind interact? It seems as thought we'd have to divide the part of the mind that's roughly physical into aspects that are, again, roughly physical and purely mind. One can make these divisions indefinitely, never finding a meeting place where the mental actually interacts with the physical. Some may argue that the mental just *is* similar enough to the physical to interact, but this seems to misrepresent the nature of how the physical interacts. There are set rules by which the physical interact involving two things, energy and mass. Without one or the other, no

interactions take place. Therefore, unless we have a better understanding of how the mental interacts with the physical in some other way, it seems as though the mental cannot interact with the physical.

However, this is a somewhat unfair assessment of positive conceivability. We don't yet know how the mental is acted on by the physical. That is precisely the point. If we don't know how the physical and mental interact, then we might as well be conceiving of the intangible, silent, scentless rhinoceros who lives in my fridge. We can say whatever we want about the mind and make it fit to our situation. That is simply an unrealistic way to come to truth, and is another instance of begging the question. One's ability to conceive of zombies or dualism depends upon the individual's personal preferences.

7. Conceiving of a Physical Consciousness

it would be absurd to argue for a prima facie conceivable view of a material consciousness because I have already argued that such conceptions of consciousness are inherently biased and rely almost solely on begging the question. For the sake of argument, I will afford materialism the same assumption I have allowed dualism, that it is prima facie conceivable. The question becomes "is it ideally conceivable?".

7.1 Ideal Primary Positive Physicalist Conceivability

For materialism to be ideally primary and positively conceivable, it must be 1) conceivable after being ideally rationally reflected upon, it must be 2) conceivable while centered upon a possible world that is not necessarily this one, and it must be 3) constructed in such a way that is coherent, non-contradictory, and *is plausible.* For this exercise, please refer

to the first half of this paper. Even if the neuroscience proves to be incorrect, off, or simply inaccurate, I have still provided a general sense of how the physical systems in the actual world might bring about both psychological and phenomenal consciousness. The Slow Cortical Potential, gamma oscillation, and structure of the brain all contribute to coordinating different brain processes. Feedback signals of the SCP and gamma oscillation acts to force a continuous change within the brain and are agents for self-reference. Hopefully, I have been convincing enough to make these accounts sound plausible.

If you doubt the neurophysiological aspect of my account, we can still talk about possible worlds as having physicalist minds. First, don't talk about possible worlds in which not all microphysical truths are shared with ours. We cannot guarantee that the neurophysiology I discussed will work, so we might as well ignore them for possible worlds. We can still positively conceive of a physical consciousness. We need information integration for there to be consciousness; the physical systems that we might call a "brain" in a possible world must have a way of effectively and efficiently integrate information so we get a whole experience. The "brain" in a possible world must have a way of producing internal change from feedback and feedforward signals. These signals also provide for that subjective or self-referential aspect of experience.

If my abstracted account truly generates consciousness then we can say that we can positively ideally conceive of consciousness.

6.2 Ideal Primary Negative Physicalist Conceivability

For primary negative conceivability, we must be logically unable to rule out a materialist

conception of consciousness in other possible worlds using perfect rationality. The materialism postulated in this paper can be summed up in the following two sentences: Consciousness can be represented by the physical through an orchestration of brain states over time. Internal feedback and feedforward loops coupled with external stimuli create a kind of strange loop that allows the creation of phenomenal experience.

It's a fairly simple set of ideas, and it seems rather difficult to find whether or not this is ideally primary negatively conceivable. The best that I can say is that I'm not sure. This can be a toss up, which is very similar to negatively conceiving zombies.

6.3 Begging the Question

On the one hand, I argue that physicalism is plausible, and give an account. On the other hand, Chalmers argues that his Conceivability Argument rules out physicalism. When we apply the Conceivability Argument to both ideas, we obtain similar results. For the Zombie Argument I found that ideal positive primary conceivability is difficult to provide, but under certain strict conditions it is something achievable. Similarly, the physicalist account I gave has a shaky but possible ideal positive primary conceivable account of physical consciousness in possible worlds. The negative versions of each conceivability is also roughly the same. In essence, we have come to very similar, if not the same conclusions for each *opposing* argument.

If one is able to find opposing conclusions equally plausible, then there is probably something wrong with the method, or with the argument. I propose that the argument itself is flawed, and for the same reason that I do not believe prima facie conceptions to be legitimate conceptions. The conceivability argument relies heavily on begging the question. A person's

willingness to believe one argument over the opposing argument will ultimately tip the scale to favor one argument over another. The strengths of the arguments are roughly equal. Ultimately, we should remove all use of the conceivability argument since it relies so heavily on bias.

7. Conclusion

There is something mysterious about the nature of phenomenal experience. We can describe the way we sense what's right in front of us, but when it comes to describing *why* it looks the way it does based on simple physical processes, qualia becomes a bit more difficult to nail down. This paper has been a modest attempt at understanding how a physical process, or multiple physical processes, can give rise to what it feels to be a certain way or see something in a certain light. In attempting to do this I have given both concrete and abstract versions of what a physicalist description of consciousness might be. I have suggested that consciousness requires something of a medium, something of a continual force to produce an experiential type response within the brain, and feedback to produce a subjective self.

I have also made an attempt to cripple the Conceivability Argument by attacking its first premise. Although I may not have been successful in the first half of my paper, I believe I have been able to at least give physical reductionism enough credence that the prima facie conceivability of zombies seems significantly less plausible. I also believe I have given what are very strong arguments against ideal positive conceivability, which forms the real foundation of the first premise. By the end of this paper, I hope the reader find the Conceivability Argument significantly less palatable, if it was even palatable to begin with.

Bibliography

- David Chalmers, "Consciousness and Its Place in Nature," Blackwell, *Blackwell Guide to Philosphy of Mind,* 2003, http://consc.net/papers/nature.pdf
- David Chalmers, *The Conscious Mind: In Search of a Fundamental Theory* (Oxford University Press, 1996)
- Marcus E. Raichle and Mark Mintun, "Brain Work and Brain Imaging," *Annual Review of Neuroscience*, 449–476, 2006
- Alberto Mazzoni, Nikos K. Logothetis, Stefano Panzeri, "The information content of Local Field Potentials: experiments and models," http://arxiv.org/ftp/arxiv/papers/1206/1206.0560.pdf
- Biyu J He and Marcus E. Raichle, "The fMRI signal, slow cortical potential and consciousness," *Trends in Cognitive Neuroscience*, 302–309, 2009
- Per E. Roland, Akitoshi Hanazawa, Calle Undeman, David Eriksson, Tamas Tompa, Hiroyuki Nakamura, Sonata Valentiniene, and Bashir Ahmed. *Cortical feedback depolarization waves: a mechanism of top-down influence on early visual areas*. (Proceedings of the National Academy of Sciences, U. S. A 2006)
- Anthony Hudetz. Suppressing the Mind. "Cortical Disintegration Mechanism of Anesthetic-Induced Unconsciousness". Humana Press 2010.
- Steven Laureys. "The Neural Correlate of (un)awareness Lessons from the Vegetative State". *Trends in Cognitive Neuroscience*, 2005
- G. Bryan Young and Susan E. Pigott. "Neurobiological Basis of Consciousness".

Archives of Neurobiology, 1999

- Mark F. Bear, Barry W. Connors, and Michael A. Paradiso. Neuroscience Exploring the Brain. Lippincott Williams & Wilkins, 2007
- Giulio Tononi. "An Information Integration Theory of Consciousness". *BMC Neuroscience*, 2004
- Lucia Melloni, Carlos Molina, Marcela Pena, David Torres, Wolf Singer, and Eugenio Rodriguez. "Synchronization of Neural Activity across Cortical Areas Correlates with Conscious Perception". *The Journal of Neuroscience*, 2007
- Olga A. Imas, Kristina M. Ropella, B. Douglas Ward, James D. Wood, and Anthony G. Hudetz. "Volatile anesthetics disrupt frontal-posterior recurrent information transfer at gamma frequencies in rat". *Neuroscience Letters*, 2005.
- Douglas R. Hofstadter, *I Am a Strange Loop* (Basic Books, 2007)
- Uriah Kriegal, *Subjective Consciousness: A Self-Representational Theory* (Oxford: Oxford University Press, 2009)
- Kim E. Barrett, Susan M. Barman, Scott Boitano, Heddwen L. Brooks. *Ganong's Review of Medical Physiology 23rd Edition*(McGraw Hill, 2010)
- Eugene Hecht. *Optics 4th Edition* (Pearson Education, 2002)
- Mark F. Bear, Barry W. Connors, Michael A. Paradiso. *Neuroscience Exploring the Brain 3rd Edition* (Lippincott Williams and Wilkins, 2007)
- David Chalmers, "The Two-Dimensional Argument Against Materialism," Oxford University Press, 2009, http://consc.net/papers/2dargument.html

- David Chalmers, “Does Conceivability Entail Possibility,” Oxford University Press, 2002, http://consc.net/papers/conceivability.html