The Argument from Brain Damage Vindicated

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It has long been known that brain damage has negative effects on one's mental states and alters (or even eliminates) one's ability to have certain conscious experiences. Even centuries ago, a person would much prefer to suffer trauma to one's leg, for example, than to one's head. It thus stands to reason that when all of one's brain activity ceases upon death, consciousness is no longer possible and so neither is an afterlife. It seems clear from all the empirical evidence that human consciousness is dependent upon the functioning of individual brains, which we might call the "dependence thesis." Having a functioning brain is, at minimum, *necessary* for having conscious experience, and thus conscious experience must end when the brain ceases to function.

Wishful thinking or theological rationale for brainless minds cannot outweigh the scientific evidence against the prospect of personal survival after bodily death, that is, against the idea that oneself as a *person* with one's memories, desires, beliefs, and so on, continues to exist after brain activity ceases. The dominant Western conception of immortality involves the view that not only some "mind" or "soul" continues into the afterlife, but that it is *my* consciousness, *my* memories, and so on, which continue. Moreover, what kind of horrible afterlife would it be if all mental damage, such as from a stroke, were to be carried over to the afterlife? This would certainly not be what

believers have in mind, especially if one hopes for an eternally blissful or heavenly existence. The overall purpose of this chapter is to review neuropsychological evidence vindicating the argument from brain damage against an afterlife. We also aim to supplement the overwhelming amount of recent neuroscientific evidence with a more mature philosophical rationale against an afterlife that counters several standard replies. In section 1, we present some philosophical background on the mind-body problem – the question of how the mind relates to the body. In section 2, we offer some preliminary but compelling evidence for the dependence thesis. In section 3, we present much more detailed and recent neuropsychological evidence for the dependence thesis. We respond to several replies in section 4.

1. Philosophical Background

There are two broad traditional and competing metaphysical views concerning the so-called "mind-body problem": dualism and materialism. While there are many versions of each, the former generally holds that consciousness is not physical in some sense. A *substance dualist*, for example, holds that a non-physical mind (i.e. mental substance) is associated in some way with each physical body. On the other hand, materialists typically hold that the mind is the brain, or, more accurately, that conscious mental activity is identical with certain patterns of neural activity. This view is sometimes referred to as "identity theory." As we shall see, however, the dependence thesis does not even require adherence to such strict identity.

It is important at the outset to recognize that by 'non-physical,' substance dualists do not merely mean 'not visible to the naked eye.' Many physical things fit this

description, such as the atoms which make up the air in a typical room. For something to be non-physical, it must literally be outside the realm of physics; that is, not in space at all and undetectable in principle by the instruments of physics. It is equally important to recognize that the category "physical" is broader than the category "material." Materialists are called such because there is the tendency to view the brain, a material thing, as the most likely physical candidate to identify with the mind. However, something might be physical but not material in this sense, such as an electromagnetic or energy field. As is widely held, matter is a form of energy. Thus, to say that the mind is non-physical is to say something much stronger than that it is non-material. Substance dualists, then, believe that conscious mental states or minds are radically different from anything in the physical world at all.[1]

There are a number of perhaps understandable reasons why some version of dualism, including substance dualism, has been held throughout the centuries. For one thing, from the introspective or first-person perspective, our conscious mental states do not seem like physical things or processes. That is, when we reflect on our conscious perceptions, pains, and desires, they do not seem to be physical in any sense. Consciousness seems to be a unique aspect of the world not to be understood in any physical way. To use Thomas Nagel's (1974) famous phrase, there is "something it is like to be in a conscious state" from a first-person point of view. Although materialists will urge that this way of thinking about consciousness completely ignores the more scientific third-person perspective on the nature of consciousness and mind, it continues to have force for many today. Indeed, it is arguably the crucial underlying intuition behind historically significant "conceivability arguments" against materialism and for

dualism. Such arguments typically reason from the premise that one can conceive of one's conscious states existing without one's body or, conversely, that one can imagine one's own physical duplicate without consciousness at all (what philosophers call a "zombie"). The metaphysical conclusion ultimately drawn is that consciousness cannot be identical with anything physical, partly because there is no essential conceptual connection between the mental and the physical. Arguments such as these go back to Descartes and continue to be used today in various ways (Kripke 1972, Chalmers 1996), but it is highly controversial as to whether they succeed in showing that materialism is false. Materialists have replied in various ways to such arguments, and the relevant literature has grown dramatically in recent years.[2] And few, if any, contemporary thinkers in the philosophy of mind or cognitive science use such arguments to support *substance* dualism or to reject the dependence thesis.

Historically, there is also the allegedly clear link between dualism and a belief in immortality. Indeed, belief in dualism is arguably explicitly theologically motivated by the understandable desire for immortality. If the conscious mind is not physical, it seems more plausible to believe in the possibility of life after bodily death. On the other hand, if conscious mental activity is identical with brain activity, or at least dependent upon it for its existence, then it would seem that when all brain activity ceases, so does all conscious experience, and thus there is no immortality. What do many people believe continues after bodily death? Presumably, it is one's own conscious thoughts, memories, beliefs, and so on. Materialists will reply that such traditional, perhaps even outdated or pre-scientific, beliefs simply ought to be rejected to the extent that they conflict with materialism or the dependence thesis. After all, if the weight of the empirical evidence

points toward the dependence thesis, then so much the worse for dualism, especially substance dualism, and for the possibility of immortality.

It is thus important to recognize that substance dualism is still the main form of dualism presupposed, or even explicitly endorsed, by afterlife proponents. More specifically, *interactionist dualism* or simply 'interactionism' is the most common form of substance dualism, and its name derives from the widely accepted fact that mental states and bodily states causally interact with each other. For example, my desire to drink something cold causes my body to move to the refrigerator and get something to drink and kicking me in the shin will cause me to feel pain and get angry. Due to Rene Descartes' influence, this is also sometimes referred to as 'Cartesian dualism.' Knowing little about just where such causal interaction could possibly take place, Descartes speculated that it was through the pineal gland, which of course is currently viewed as an almost humorous conjecture. But even a modern-day interactionist would certainly wish to treat various areas of the brain as locations for such interactions.

There are, however, several well-known and devastating objections to interactionism worth noting here: (1) One is simply the issue of just how such radically different substances could causally interact. How does anything non-physical interact with something physical, such as the brain? No such explanation is forthcoming or is perhaps even possible. Moreover, if causation involves a transfer of energy from cause to effect, then how is that possible if the mind is non-physical? Thus, Gilbert Ryle (1949) mockingly called the Cartesian view about the nature of mind, a belief in the "ghost in the machine."

(2) Assuming that some kind of energy transfer between the mind and the brain makes any sense at all, it is also often alleged that interactionism is inconsistent with the well-established scientific Conservation of Energy principle, which says that the total amount of energy in the universe, or any controlled part of it, remains constant. So any loss of energy in the cause must be passed along as a corresponding gain of energy in the effect, as in standard billiard ball examples. But if interactionism is true, then when mental events cause physical (brain) events, energy would literally come into the physical world. On the other hand, when bodily events cause mental events, energy would literally go out of the physical world. At the least, there is a very peculiar notion of energy involved, unless one wished, even more radically, to deny the conservation principle itself.

(3) The main focus of this chapter is on the well-known fact that brain damage to specific areas of the brain causes very specific mental defects. This by itself is strong evidence against interactionism and in support of the dependence thesis. Although the implications of this evidence have been appreciated for centuries, the level of detailed neuropsychological knowledge has increased dramatically in recent years. A dualist might respond that such phenomena do not absolutely refute her metaphysical position since it could be replied that damage to the brain simply *causes* corresponding damage to the non-physical mind. However, this raises a host of other equally difficult questions: Why not opt for the simpler explanation that brain damage causes mental damage simply because mental processes simply *are* brain processes? If a non-physical mind is damaged when brain damage occurs, how does that leave one's mind according to the dualist's conception of an afterlife? Will the severe amnesiac at the end of life on Earth retain

such a deficit in the afterlife? If proper mental functioning still *depends* on proper brain functioning, then is dualism really in any better position to offer hope for immortality? We will return to some of these questions later in this chapter.

While a detailed survey of all varieties of dualism is beyond the scope of this chapter, it is worth noting here that the most popular form of dualism today is called *property dualism*. Due to the serious objections mentioned above, substance dualism has largely fallen out of favor at least in most philosophical circles, though there are some exceptions (Swinburne 1986) and it often continues to be tied to a theological world view. Property dualism, on the other hand, is a more modest version of dualism which holds that there are mental *properties* (i.e. characteristics or aspects of things) that are neither identical with nor reducible to physical properties. There are actually several different kinds of property dualism, but what they have in common is the idea that subjective and qualitative properties of conscious experiences (or "qualia") cannot be *explained* in purely physical terms and, thus, are not themselves to be identified with any brain state or process.

Another version of dualism is called *epiphenomenalism*, according to which mental events are caused by brain events, but those mental events are mere "epiphenomena" which do not, in turn, cause anything physical at all, despite all appearances to the contrary (for a recent defense, see Robinson, 2004). But it is absolutely crucial to emphasize that neither property dualism nor epiphenomenalism reject the dependence thesis. According to these flavors of dualism, conscious mental activity still depends entirely on proper brain functioning. We wish to make it clear that

our thesis does not require the truth of a strict materialist identity theory, although we do tend to favor such a view.

2. The Dependence of Consciousness on the Brain: Some preliminary evidence

There is no doubt that some form of materialism is much more widely held today than in centuries past. Part of the reason has to do with the explosion in scientific knowledge about the workings of the brain and its intimate connection with consciousness, as revealed by the association between brain damage and disorders of consciousness, such as in amnesia and Alzheimer's disease. Brain death is now the main criterion used to establish when someone has died. Stimulation of specific areas of the brain results in modality-specific conscious experiences. And imagine saying to a neuroscientist "you are not really studying the conscious mind itself" when she is examining the workings of the brain during a brain scan using electroencephalography (EEG), magnetoencephalography (MEG), or functional magnetic resonance imaging (fMRI). Nuclear magnetic resonance imaging (MRI) measures the radio signals emitted by some atomic nuclei. The radiation emitted provides detailed information about the chemical nature of the nuclei. When used in neuroscience, MRI can give information about the anatomy of the brain. fMRI is a related method that measures changes in blood flow associated with neuronal activity within the brain while the subject is engaged in various cognitive or perceptual tasks.

The overall idea is that science is showing us that conscious mental states, such as visual perceptions, are identical with (or dependent on) certain electro-chemical processes occurring within specific regions of the brain. An identity theorist will liken

these developments to the way that the science of chemistry taught us that water really *just is* H_2O. The most obvious and natural conclusion to draw from contemporary neuroscience is that the mental activity in question just is the neural activity, or at least that the former depends on the latter for its existence.

There are also important theoretical factors favoring materialism, such as the so-called "principle of simplicity" or "law of parsimony" which says that if two theories can equally explain a given phenomenon, then we should accept the one which posits fewer types of objects or forces. Thus, we shouldn't assert the existence of additional entities unless the phenomenon to be explained requires us to do so. In this case, even if substance dualism could equally explain consciousness (which would of course be impossible according to materialists), materialism is clearly the simpler theory in so far as it does not posit any objects or processes over and above physical ones. Materialists rightly wonder why there is a *need* to believe in the existence of such mysterious non-physical entities which somehow causally interact with physical brains. At minimum, the burden of proof is surely on those who believe in the existence of such additional entities.

Moreover, in the aftermath of the Darwinian revolution and given the increased knowledge in comparative neurophysiology, it would seem that materialism, or at least the dependence thesis, is on even stronger ground. It is now relatively uncontroversial that many animals are conscious, at least in a minimal sense (*contra* Descartes). And given the similarities between the more primitive parts of the human brain and the brains of other animals, it seems most natural to conclude that, through evolution, increased volume and complexity of brain areas correspond to increased mental abilities. For example, having a well developed prefrontal cortex allows humans to reason and plan in

ways not available to dogs and cats. A similar point goes for human development from the infant brain, which allows for very few mental abilities, to the adult brain which is capable of so much more. On the other hand, as brain complexity and functionality go down, mental abilities decrease proportionally. We don't find frogs and lizards capable of doing philosophy or advanced mathematics. It also seems fairly uncontroversial that we should be materialists about the minds of other animals – few (if any) substance dualists hold a dualist view about dogs and lions, not to mention the related belief in a dog or lion afterlife. It seems odd indeed to hold that non-physical conscious minds suddenly appear on the scene with the emergence of humans. Yet if we are rightly led to believe that the conscious states of animals, such as desires, fears, emotions, visual, and olfactory sensations, depend upon their brains, then on what grounds can we deny this dependency when considering our very similar conscious states? It seems we have come a long way in distancing ourselves from the Cartesian view that animals are not conscious, yet some still irrationally cling to the Cartesian view that humans alone have non-physical minds and an afterlife. The time has come to jettison the entire set of dualist beliefs.

There are, to be sure, several much discussed objections to materialism, but most of them question the notion that materialism can currently fully *explain* conscious experience. Even if they are successful, these objections still do not really dispute the dependence thesis. For example, Joseph Levine (1983) coined the expression "the explanatory gap" to express a difficulty for any materialistic attempt to explain consciousness. Although not aiming to reject the metaphysics of materialism, Levine gives eloquent expression to the idea that there is a key gap in our ability to explain the

connection between conscious or "phenomenal" properties and brain properties (see also Levine, 2001). The basic problem is that it is, at least at present, very difficult for us to understand the relationship between brain properties and phenomenal properties in any explanatorily satisfying way, especially given the fact that it seems possible for one to be present without the other. There is an odd kind of arbitrariness involved: *Why* or *how* does some particular brain process produce that particular taste or visual sensation? It is difficult to see any real explanatory connection between specific conscious states and brain states in a way that explains just how or why the former are identical with the latter. There is therefore arguably an explanatory gap between the physical and mental.

David Chalmers (1995) has articulated a similar worry by using the catchy phrase "the hard problem of consciousness," which basically refers to the difficulty of explaining just *how* physical processes in the brain give rise to subjective conscious experiences. The "really hard problem is the problem of *experience*…How can we explain why there is something it is like to entertain a mental image, or to experience an emotion?" (1995, p. 201) Unlike Levine, however, Chalmers is much more inclined to draw anti-materialist metaphysical conclusions from these and other considerations. Chalmers usefully distinguishes the hard problem of consciousness from what he calls the (relatively) "easy problems" of consciousness, such as the ability to discriminate and categorize stimuli, the ability of a cognitive system to access its own internal states, and the difference between wakefulness and sleep. The easy problems generally have more to do with the functions of consciousness, but Chalmers urges that solving them does not touch the hard problem of phenomenal consciousness. However, Chalmers favors

property, not substance, dualism which, as we have seen, does not dispute the dependence thesis. Unlike others, he is clearly not motivated by a belief in immortality.

There are many materialist responses to the above charges,[3] but it is worth emphasizing again that Levine does not reject the metaphysics of materialism. Instead, he sees the "explanatory gap [as] primarily an epistemological problem." (2001, p. 10) That is, it is primarily a problem having to do with knowledge or understanding. This concession is important, at least to the extent that one is concerned with the larger related metaphysical issue of the possibility of immortality.[4]

In any case, let us now turn to the neuroscience.

3. Brain Damage, Lesion Studies, and the Localization of Mental Function

In this section, we will examine in more detail just how closely mental function depends on brain function. The detail is important because it makes clear that specific mental changes occur when, and only when, brain damage occurs. It is true that such correlation is not the same as identity or cause, but the *best explanation* for the neuropsychological evidence is that all conscious mental activity depends for its existence upon brain activity. The details to follow are exactly what one would expect if conscious mental activity so depended upon brain functioning.

An abundance of evidence from neuropsychological, neurophysiological, and behavioral studies in both humans and non-human animals strongly supports the dependence of the mind on the function of the brain. In humans, damage to particular brain regions, such as due to disease, trauma, or stroke, is associated with specific impairments of perception, memory, cognition, emotion, and decision-making. Drugs

that alter brain activity produce corresponding changes in perception, memory, cognition, emotion, or personality, depending upon the neurotransmitter systems involved and particular brain regions affected. While this evidence suggests a localization of mental functions in the brain, it should be noted that such localization of function is not necessary for demonstrating the dependence thesis, for mental functions could be neurally implemented in a more distributed manner throughout the brain. What *is* most relevant in the end is that destruction of the brain, regardless of localization of function, leads to destruction of the mind.[5]

In experimental animal studies, brain lesions and temporary reversible inactivation of particular brain areas, such as induced by cortical cooling (Lomber and Malhotra, 2008), reveal a modality-specific (e.g., auditory) and task-specific (e.g., sound localization) dependence of perception (or at least the behavioral manifestations of perception) upon neuronal activity within local cortical circuits. More limited, reversible inactivation (or 'virtual lesion') studies in humans using transcranial magnetic stimulation (TMS) show a similar causal relationship between brain activity and mental functions (e.g., Kanai et al., 2008; Ruff et al., 2009; Ruzzoli et al., 2010; Zaretskaya, et al., 2010; Ziemann, 2010). Together with the correlations between spatiotemporal patterns of brain activity and mental functions demonstrated in numerous neurophysiological studies using techniques such as EEG, MEG, and fMRI, these findings provide compelling evidence that our mental life is entirely dependent upon the operation of the physical brain. In short, as Richard Carrier puts it, "…nothing mental happens without something physical happening…if destroying parts of a brain destroys parts of a mind, then destroying all the parts of a brain will destroy the whole mind,

destroying *you*." (Carrier, 2005, pp.151-152). In what follows, we provide a more specific but non-exhaustive overview of neurological disorders that demonstrate the dependence of key mental abilities on brain function.[6]

Perception

Cortical Blindness: Loss of vision resulting from damage to areas of visual cortex. In the case of 'blindsight,' typically caused by damage to primary visual cortex, patients remain able to visually discriminate objects above chance, yet report a complete lack of visual awareness of them (Barton, 2010).

Cortical Deafness: Loss of hearing and/or ability to recognize sounds, including speech, which results from damage to regions of auditory cortex within the temporal lobes.

Awareness, Comprehension, and Recognition

Agnosias refer to higher-order deficits in which perception is normal, but recognition of objects, people, shapes, sounds, and odors, and their "meaning" is impaired.[7]

Hemiagnosia (also called Hemispatial neglect or hemineglect): A neuropsychological syndrome resulting from damage to one hemisphere of the brain (usually involving the parietal cortex in the right hemisphere) which is characterized by a deficit in attention to and awareness of one side of space (usually contralateral to the damaged hemisphere). Subjects with hemiagnosia not only show no conscious awareness of objects located in the space contralateral to the hemisphere of the brain lesion, but often show no awareness that they have a deficit (see Anosognosia below).

Prosopagnosia: The inability to recognize familiar faces, which is typically caused by damage to the occipitotemporal cortex (fusiform gyrus). Patients with prosopagnosia can sense that they see a face, yet they have no awareness of perceiving any information regarding whose face they may be viewing (Gazzaniga, 2000).

Akinetopsia: The inability to perceive motion in the visual field, while the ability to see stationary objects remains intact. Akinetopsia is associated with damage to higher-order visual cortical areas involved in motion processing (areas MT/V5).

Phonagnosia: The inability to recognize familiar voices, even though speech perception and understanding are normal.

Simultanagnosia: The impaired ability to perceive parts of a visual scene as a whole (often associated with Balint's syndrome), that is typically associated with bilateral lesions of the dorsolateral parietal-occipital association cortex or with damage involving the medial occipitoparietal junction, cuneus, and inferior intraparietal sulcus. Patients with simultanagnosia can perceive only one small portion of the visual field at a time and cannot integrate these parts to form a unified representation of the scene (Blumenfeld, 2010). In effect, they are able to see the individual trees, but are unable to see the forest (Barton, 2010).

Visual agnosia: The inability to comprehend the meaning of objects, which is caused by lesions to the occipital or temporal lobes of the brain. For instance, a patient with visual agnosia who is shown a stop sign might recognize and describe it, but fail to comprehend what action he must take (Kaufman, 2007).

Anosognosia: Lack of awareness or denial of the existence of neurological disability, e,g., limb paralysis following stroke. For instance, patients with anosognosia may deny that

their limb, which is obviously paralyzed, is even weak. Instead, they will offer improbable explanations, e.g., that they merely fell asleep on it, and claim that its strength will return within a few hours. Typically, such patients cannot identify the affected part of their body and might claim that their doctor's limb is really theirs. In other words, patients with anosognosia are unable to acknowledge a deficit and often employ denial, projection, and rationalization, and other defense mechanisms (Kaufman, 2007). The neurological basis of anosognosia is still under investigation; current evidence suggests that multiple brain regions are involved (Orfei et al., 2007; Vocat et al., 2010). Given that anosognosia reflects a subject's inability to adopt an objective, third-person perspective in recognizing and evaluating his/her deficit, the phenomenon is much more in line with the hypothesis that the mind is caused by and inseparable from the brain than the hypothesis that they are independent entities.

Memory

Anterograde Amnesia: The inability to remember new facts and events following damage to limbic structures, including the hippocampus, within the medial temporal lobes.
Retrograde Amnesia: The impaired memory of events that occurred for a period of time before damage to limbic structures, including the hippocampus, within the medial temporal lobes.

Damage to regions of prefrontal cortex leads to impairments in working memory, consistent with evidence from neuroimaging studies supporting the critical involvement of frontal brain structures in executive control functions underlying the joint maintenance, manipulation, and monitoring of information in working memory (e.g.,

Curtis and D'Esposito, 2003; McNab, 2008; Baier, 2010; Barbey, 2010). Similarly to anosognosia, subjects suffering from amnesia may deny their deficit and offer implausible rationalizations for their inability to remember.

Importantly, memory appears to be critical for creating and maintaining one's sense of self (self-awareness). The particular pattern of memory impairments in Alzheimer's disease, with deficits in recent memory but sparing of older information, is thought to result in an outdated sense of self. This ''petrified self" could be the source of the lack of awareness of deficits (anosognosia) in Alzheimer's disease (see Mograbi et al., 2009). Memory has long been considered essential to one's personal identity through time, especially since Locke. In the context of this chapter, it seems important to point out that the western conception of immortality takes it for granted that you, as a person, continue to exist beyond bodily death. It is supposed to be *personal* survival. After all, if it's not you, then who cares about what might continue after bodily death?

Although the capacity for memory (including self-awareness) is said to be an essential property of the soul, the evidence from brain damage indicates that this capacity cannot survive the death of the brain.

Personality

Changes in personality can be caused by frontal and temporal lobe damage. These changes are often characterized by the development of an abrupt, suspicious, or argumentative manner, or loss of social inhibitions, consistent with damage to inhibitory centers of the brain (Kaufman, 2007). A classic example of the effects of frontal lobe damage on personality is the case of Phineas Gage, a construction worker on the

American railroads who suffered an accident in 1848 wherein a large iron bar was blown through the front of his head, damaging his frontal lobes. As a result of the damage, Gage became stubborn, impulsive, and rude- personality features that were generally absent before the accident. These personality changes were so dramatic that friends and acquaintances said that "he was no longer Gage" (Beaumont, 2008).

Although an individual's personality, which is integral to his/her sense of personal identity, is said to be an essential property of the soul, the evidence from brain damage indicates that personality characteristics cannot survive the death of the brain.

Language

Aphasias: Disorders of language processing.[8]

"Fluent" or Sensory Aphasia: Impairment in the comprehension of speech, with speech production intact. Fluent aphasia is typically caused by lesions to Wernicke's area, located within the temporal lobe of the dominant (usually left) hemisphere.

"Non-fluent" or Motor Aphasia: Impairment in the production of speech with speech comprehension intact. Non-fluent aphasia is typically caused by lesions to Broca's area, located in the frontal lobe in the dominant (usually left) hemisphere adjacent to the areas of primary motor cortex involved in moving the lips, tongue, face, and larynx.

Conduction Aphasia: Inability to repeat phrases or short sentences caused by damage to the arcuate fasciculus- the neural tract connecting Broca's and Wernicke's areas.

Interestingly, lesion and neuroimaging studies indicate that the neural systems involved in processing spoken and signed language are very similar (MacSweeney et al., 2008).

Although the capacity for understanding language, independent of the modality of communication (e.g., spoken or signed), is said to be an essential property of the soul, the evidence from brain damage indicates that this capacity cannot survive the death of the brain.

Emotion

Damage to brain regions involved in emotional regulation, which include the limbic system, particularly the amygdala, commonly result in impaired processing of emotional stimuli (Berntson et al., 2007; Sergerie et al., 2008).[9] For example, subjects with damage to the amygdala often exhibit an impaired perception of danger and will fail to display typical emotional responses to stimuli that generally elicit fear in normal subjects. Damage to the orbital and cingulate cortices may result in a disorder called alexithymia, which is characterized by an inability to read emotions, including one's own (Beaumont, 2008). Damage to the insula may result in the inability to experience the emotion of disgust and impaired perception of disgust in others (Ibanez et al., 2010).

Although the capacity for emotion is said to be an essential property of the soul, the evidence from brain damage indicates that this capacity cannot survive the death of the brain.

Decision-Making

One of the presumed hallmarks of the soul is the ability to deliberate and make voluntary choices. Moreover, the choices that we make are often considered to be paramount expressions of our individual identity and perhaps even definitive of having

some form of free will. However, neurological studies indicate that planning and decision-making can be profoundly impaired by damage to specific brain structures, particularly those involved in higher cognitive functions, such as the prefrontal cortex. Lesions in different areas of the prefrontal cortex differentially affect various components of planning and decision-making (e.g. Xi et al., 2010). For instance, subjects with damage to ventromedial prefrontal cortex show deficits in their ability to judge the current relative value of stimuli: what a potential choice is "worth" to the chooser at that moment compared with other available choices (Fellows, 2007). These individuals are also impaired in their evaluation of risk and are insensitive to future consequences of their decisions (punishment and reward) (Gazzaniga, 2000; Bechara et al., 2000; Bechara et al., 2008; Clark et al., 2008; Wheeler and Fellows, 2008).

Importantly, while damage to brain regions involved in working memory processes (which include sub-regions of prefrontal cortex) can negatively affect decision-making, impaired decision-making resulting from damage to areas of prefrontal cortex can occur in the absence of working memory impairments (Gazzaniga, 2000). This observation indicates that decision-making impairments are not merely a secondary byproduct of working memory impairments, but rather reflect the involvement of brain regions that are directly implicated in our deliberative and evaluative processes (see Manes et al., 2002 and Krawczyk, 2007 for reviews of the literature concerning the effects of prefrontal cortex damage on decision-making). The amygdala, which is involved in associating a stimulus with its emotional value, is also particularly important for decision-making. Subjects with damage to the amygdala, which triggers autonomic responses to emotional stimuli, such as monetary reward and punishment, lack these

responses to reward and punishment, and consequently, cannot utilize these emotional signals to guide future decision-making (Gupta et al., 2010).

Although the capacity for rational deliberation is said to be an essential property of the soul, the evidence from brain damage indicates that this capacity cannot survive the death of the brain.[10]

Social Cognition and Theory of Mind

A fundamental component of social cognition is the ability to attribute independent mental states to others or to predict other people's behavior based on their mental states, a capacity known as "Theory of Mind" (Xi et al., 2010). Subjects with lesions of dorsolateral prefrontal cortex show impairments in Theory of Mind, in that they are unable to correctly infer the mental state of others, suggesting that this brain structure is critically involved in social cognition (Baron-Cohen et al., 1998; Stone et al., 1998; Stuss et al., 2001, Xi et al., 2010).

Although the capacities for comprehending the mental states of others and for social cognition are said to be essential properties of the soul, the evidence from brain damage indicates that these capacities cannot survive the death of the brain.

Moral Judgment and Empathy

Subjects with damage to ventromedial prefrontal cortex display impairments in moral judgment, abnormal moral conduct, and lack of concern for moral rules (Moll et al., 2005, 2008). For instance, such brain-damaged individuals are more inclined to judge moral violations, even attempted harms, including attempted murder, as morally

acceptable relative to normal subjects. These results highlight the critical role of ventromedial prefrontal cortex in processing moral and emotional information relevant for social cognition and the formation of moral judgments (Ciaramelli et al., 2007; Young et al., 2010).

Additional lesion studies indicate the crucial involvement of several brain networks in processing the emotional and cognitive components of empathy (Shamay-Tsoory, 2010). For instance, subjects with brain damage that includes the inferior frontal gyrus show deficits in emotion recognition, whereas those with lesions in the ventromedial prefrontal cortex show impairments in cognitive empathy (Shamay-Tsoory et al., 2009).

The aforementioned evidence from brain damage is consistent with findings suggesting abnormalities in several brain structures, including the prefrontal cortex and amygdala, in criminal, violent, and psychopathic individuals (Raine and Yang, 2006; Blair, 2007, 2008; Weber et al., 2008).

Although the capacities for moral judgment and empathy are said to be essential properties of the soul, the evidence from brain damage indicates that these capacities cannot survive the death of the brain.

Neurological Disorders and Disease

Neurological disorders and diseases, such as Alzheimer's and fronto-temporal dementia, bipolar disorder, Korsakoff's syndrome, depression, schizophrenia, autism, epilepsy, and mental retardation, which are all characterized by profound changes in cognitive function and awareness, are all associated with biochemical,

neurophysiological, or neuroanatomical changes in the brain. While the specific causes and nature of these changes are still unclear and the subject of vigorous ongoing scientific investigation, what is not in dispute is that these mental disorders and diseases are direct consequences of aberrant brain function.[11]

Although the mental capacities compromised by these neurological disorders and diseases are said to be essential properties of the soul, the evidence from brain damage indicates that these capacities cannot survive the death of the brain.

The Unity of Consciousness

As we have seen above, consciousness in its various manifestations is thus greatly affected by neurological damage. Virtually all of the disorders already considered affect consciousness in some form or other. Indeed, the most essential aspect of a "soul" would be the overall capacity for conscious awareness, both of the external world and of internal states. For instance, the soul should have access to information relating to its internal mental states and be able to process and use this information. In the case of dreamless sleep, general anesthesia, and coma, consciousness awareness may be minimal or absent.[12] All of these states involve corresponding changes in spatio-temporal patterns of brain activity (for instance, as reflected in the electroencephalogram, or EEG). Thus, it is not surprising that conscious awareness both of the external and internal worlds can be compromised or obliterated by brain damage (as illustrated by many of the neurological syndromes described above).

Another presumably essential feature of the conscious mind is the *unity* of its conscious experience, the sense that there is one unified stream of consciousness for each

of us. However, this apparent unity of consciousness can also be altered by brain damage. For example, in “split-brain syndrome” patients have undergone cerebral commissurotomy, the surgical cutting of the corpus callosum, a bundle of neuronal fibers linking the two hemispheres, to relieve medically intractable epilepsy. Split-brain patients subsequently display neuropsychological features that suggest a division of consciousness. The anatomical and functional dissociation between the two hemispheres results in curious cognitive psychological phenomena that reflect the failure to properly integrate information processed by the two hemispheres. For instance, when a visual stimulus (e.g., a photograph of a house) is presented to the left side of the visual field, activating the visual cortex in the right cerebral hemisphere, subjects are unable to name the object depicted, for the left hemisphere is usually the dominant hemisphere for language. However, they are able to correctly identify the object by drawing a picture of it using their left hand, which is controlled primarily by the right cerebral hemisphere. Whether the results of these split-brain studies in fact indicate a division of consciousness into two independent streams of awareness is still a matter of debate (Gazzaniga, 2000, Beaumont, 2008). However, what is not in dispute is that information represented in some parts of the brain may be made inaccessible to other parts of the brain as a result of severing neural pathways that ordinarily connect them.[13]

Discussing some of the experiments of neurosurgeon Roger Sperry, Susan Blackmore notes:

> When a dollar sign was flashed to the left [hemisphere] and a question mark to the right, the patient drew the dollar sign, but when asked what he had drawn he replied "a question mark." As Sperry (1968) put it, one

> hemisphere does not know what the other has been doing. In addition, each hemisphere could remember what it had been shown, but these memories were inaccessible to the other. So the left hand could retrieve the same object an hour later, but the person (i.e., speaking left hemisphere) would still deny having any knowledge of it (Blackmore 2004, p. 104).

These results not only support the hypothesis that memories are encoded in brains, but also suggest that awareness of the information represented by these memories may be divided in split-brain patients.

Philosopher Derek Parfit argues further that split-brain phenomena strongly suggest a division of awareness into two independent streams of consciousness:

> Here is a simplified imaginary version of the kind of evidence that such tests provide. One of these people looks fixedly at the centre of a wide screen, whose left half is red and right half is blue. On each half in a darker shade are the words, 'How many colours can you see?' With both hands the person writes, 'Only one'. The words are now changed to read, 'Which is the only colour that you can see?' With one of his hands the person writes 'Red', with the other he writes 'Blue'.
>
> If this is how such a person responds, I would conclude that he is having two visual sensations—that he does, as he claims, see both red and blue. But in seeing each colour he is not aware of seeing the other. He has two streams of consciousness, in each of which he can see only one colour. In

> one stream he sees red, and at the same time, in his other stream, he sees blue. More generally, he could be having at the same time two series of thoughts and sensations, in having each of which he is unaware of having the other.
>
> This conclusion has been questioned. It has been claimed by some that there are not *two* streams of consciousness, on the ground that the sub-dominant hemisphere is a part of the brain whose functioning involves no consciousness. If this were true, these cases would lose most of their interest. I believe that it is not true, chiefly because, if a person's dominant hemisphere is destroyed, this person is able to react in the way in which, in the split-brain cases, the sub-dominant hemisphere reacts, and we do not believe that such a person is just an automaton, without consciousness. The sub-dominant hemisphere is, of course, much less developed in certain ways, typically having the linguistic abilities of a three-year-old. But three-year-olds are conscious. This supports the view that, in split-brain cases, there *are* two streams of consciousness (Parfit 1987, pp. 19-20).

Of course, we need not go as far as Parfit and accept the two-streams view in order to make the point that commissurotomies cause rather odd changes to one's consciousness in the experimental scenarios described above, further indicating at least how normal consciousness depends upon normal brain function. However, if Parfit is right, then how might our opponent explain that two 'souls' are now associated with one

brain or body? Much the same problem arises with regard to Dissociative Identity Disorder, formerly known as Multiple Personality Disorder.

These neuropsychological phenomena, in addition to those discussed earlier, indicate that considerable information may be processed and perceived even in the absence of self-reported conscious awareness of that information. More importantly, they provide strong evidence that cognitive information processing and conscious awareness, as revealed by subjects' self-reports and neuropsychological tests, are dependent upon the integrity of particular brain areas and their functional interconnections to other brain regions, particularly those including higher associative cortices such as the prefrontal, cingulate, and parietal regions (see Naccache, 2005; Reuter et al., 2009; Dehaene and Changeux, 2011, which provide neurological and neurophysiological evidence for the 'global workspace' theory of consciousness). Given the dependence of consciousness on the functional integrity of neuronal connections in the brain, it cannot exist in a disembodied soul that survives death of the brain.[14]

To sum up this section thus far: If perception, thinking, emotion, memory, personality, moral judgment, and conscious awareness are intrinsic properties of the soul that can survive the death of the brain, then it is very puzzling why these mental capacities would be so profoundly affected or even obliterated by brain damage. On the other hand, the deleterious effects of brain damage on these mental capacities are precisely what one would expect given the hypothesis that the mind depends entirely upon the brain. In terms of Bayesian confirmation theory, the destruction of mind by the destruction of the brain is highly probable given the hypothesis that the mind depends entirely upon the function of the brain, but is highly improbable given the hypothesis that

the mind can exist and operate independently of the brain. Accordingly, the evidence from brain damage strongly supports the hypothesis that mental functions depend entirely upon the brain (see Fishman 2009 for a discussion of how hypotheses concerning 'supernatural' phenomena, such as disembodied minds, can be evaluated from a Bayesian perspective).

So what's left for a soul to do? It is important to acknowledge that none of the aforementioned neuropsychological evidence can definitively rule out the existence of *something* called a 'soul' that can survive death of the brain. The evidence does suggest, however, that if disembodied souls do exist, then they must be so bereft of properties that they are effectively indistinguishable from 'nothing.' Without a properly functioning brain, the soul cannot see, hear, recognize, understand, learn, remember, think, or decide; it has no capacity for moral judgment, empathy, experiencing pleasure, emotions, or desires; nor does it possess any distinctive personality traits. Thus, at the very least, the evidence from brain damage indicates that a soul that persists after death would have none of the features and capacities that soulophiles generally attribute to it. To the extent that these characteristics are essential to any intelligible concept of personal identity as represented by the soul, the evidence from brain damage proves, beyond a reasonable doubt, that a disembodied soul that survives the death of the brain does not exist.

It is worth emphasizing here that the soul hypothesis faces several vexing difficulties even apart from the disconfirming evidence from brain damage. For instance, if the soul can control the physical brain, which could account for the correlation between mental and brain functions (in particular between volition and behavior), then the soul can interact with a physical medium. If it can interact with a physical medium then, in

principle, it can be experimentally detected. Indeed, we might for example expect to find neurons firing in the absence of any physical cause at all. However, to date, evidence of 'soul-stuff' has not been experimentally detected, despite our relatively advanced state of scientific knowledge. Therefore, to the extent that we would have found evidence of 'soul-stuff' by now if it existed, this absence of evidence constitutes evidence of absence of the soul.[15]

Furthermore, if the soul can influence the physical brain, then why can't the soul "will" drug addiction or depression away or cause the cessation of involuntary behaviors (e.g. twitching, stuttering, tics, or uncontrollable movements symptomatic of Huntington's disease)? Some people can of course "will" a dramatic change in their behavior, such as stop smoking or drinking "cold turkey." But such "mind over matter," as it is sometimes called, does not entail that the mind is not physical in some sense. After all, if mental processes are brain processes, for example, then the fact that one's mind can affect one's body is almost trivial to explain. Part of the body (the brain) can obviously causally impact other parts of the body and one's behavior. It would simply be a special case of "matter over matter" or "matter affecting matter."

Finally, if the soul can interact with the physical brain, then why can't it bypass it altogether to act directly upon the physical world? Indeed, with a soul that can act directly upon the physical world, what is the need for a physical brain to serve as an intermediary? And, as was discussed earlier in this chapter, if the soul is non-physical, then how can it "move" (i.e., influence the function of) the physical brain, so as to account for the correlation between mental activity and brain activity? How can a non-physical soul cause bodily movement and speech? These difficulties seem to us to be

insurmountable, or at least to require extensive ad hoc reasoning to explain them away (if they can be explained away at all).

4. Objections and Replies

4a. Souls, Minds, and Energy Fields

One might object "even if the mind is (or depends on the) physical, what about the soul?" Maybe it's the soul (or "spirit"), not the mind, which is non-physical. One might be told something like this within many religious traditions.

While it is true that the term 'soul' (or 'spirit') is often used instead of 'mind' in such religious contexts, the problem is that it is very unclear just how the soul or spirit is supposed to differ from the mind. The terms are used interchangeably in many historical texts and by many philosophers because it is unclear what else the soul could be other than "the mental substance." It is difficult to describe the soul in any way that doesn't make it sound like what we mean by 'the mind.' After all, what many believe goes on after bodily death is conscious mental activity. The term 'soul' may carry a more theological connotation, but it doesn't follow from this that the words 'soul' and 'mind' refer to entirely different things. And introducing the 'soul' into the discussion just raises anew the problems and objections discussed earlier regarding substance dualism (such as the mysterious causal interaction between body and mind), except now the question is pushed back to the soul's relation to the body. And, once again, if your soul is supposed to be you, then it must contain those essential features of your personal identity, such as memories, beliefs, and other mental states which guarantee mental continuity.

Now, in light of this, one might opt for a different sort of dualism and hold that a non-material energy field of consciousness is created or caused by brain activity and it survives bodily death (perhaps even based on the conservation of energy principle).

This is, of course, a radical departure from the substance dualist view that there are non-physical minds, which, as we saw earlier, must literally be entirely outside the realm of physics, that is, not in space at all and itself undetectable in principle by the instruments of physics. Recall that the category "physical" is broader than the category "material," so something might be physical but not material, such as an electromagnetic or energy field.

The problem with this view is simply that there is no evidence for the existence of a separable "energy field" of consciousness, either during life on Earth or continuing on after bodily death. In addition, even if there were such an energy field, there would still be little reason to suppose that mental activity could continue on independently of the workings of the brain. Finally, even if there were some brain or mental energy "conserved" after bodily death, there would be little reason to suppose that you, as a continuous person, continue to exist, as opposed to, say, as the dissipation of that energy back into the universe.

The burden of proof lies with those who speculate about the existence of such energy fields or "life forces." There are, perhaps, a lot of mere possibilities, but we should not confuse that for having good positive reasons to believe in such things. There are "possibly" (in the sense of "logically possible") alien creatures who control our every conscious state through brain activity and can keep our consciousness going after our bodies die. But there is no positive scientific or philosophical reason to think there really

are such creatures engaged in that activity. Much the same is true for the "possible" continued existence of non-physical or "energy field" minds.

4b. The Instrument Theory

A common reply to the brain damage argument has been something like the following: Brain injuries and damage do not really affect the entirely independent mind at all, but simply cut off the ability of the mind to express itself through the body (e.g., causing paralysis) and/or cut off information from the body (particularly from the senses) from being sent to the mind. The mind can exist independently of the brain, just as television signals can exist independently of the television sets that receive them. Damaging the brain is like damaging a television set -- you interrupt, perhaps even destroy, the instrument which processes the signal. But the signal continues to exist because the television set does not generate the signal but simply processes it. In the analogy, the mind is to the brain as the signal is to the television set, and "behavior" is represented by the picture on the television screen (see e.g. Sheldrake 1992, pp. 116-117).

The most obvious response is that if the instrument theory were true, interfering with brain processes should not then affect mental processes at all, for brain processes and mental processes would be independent of each other. Damaging the brain would have no effect on the mind itself, just as interfering with the television's internal parts does not affect the (independent) signal. But introspection reveals that altering brain states alters mental states themselves, rather than merely disabling an independent mind from communicating with or controlling its bodily vehicle. Someone with brain damage due to, say, a stroke clearly suffers real mental problems, such as an inability to think or

understand properly. Thus, imagine saying to an Alzheimer's victim, an amnesiac, or one with a serious learning disability: "your mind *itself* is not really affected, it is merely your brain corrupting signals to and from your unaffected mind." This is patently absurd even from the first-person point of view of such people.

C.D. Broad's (1925, chapter 12) critique of 'the instrumental theory' is apt here:

> I think that, in this crude form, it cannot be maintained. Let us take the case of a man who is injured in a certain part of his brain, and for the time loses his power to remember certain events. It can hardly be maintained that, in any literal sense, he still remembers the events; and that all that has been damaged is his power of manifesting this knowledge to others by speech or writing. The latter case does sometimes arise, and it seems introspectively quite different from the former to the patient himself. Again, if the patient recovers these lost memories after a while, it seems to him that a change has taken place in the contents of his mind, and not merely a change in his ability to express to others what was going on in his mind before. We must suppose then that in such cases something more than the power to manifest one's knowledge to others has been injured. The only other alternative is to suppose that all such patients are lying and asserting that they cannot remember certain things which they actually are remembering. If we reject this very violent alternative we must hold that in some cases an injury to the brain does actually deprive the mind of the power to remember certain events which it formerly could remember.

> Could a supporter of the Instrumental Theory square the facts with his view? He might say that the general power of remembering is unchanged; and assert that all that has happened is that the injury to the body has prevented certain past events from being objects of memory, as blindfolding a man would prevent certain present objects from being perceived. But in that case the mind is reduced to something which has merely certain very general capacities, and any particular exercise of these powers seems to depend on the body…Let us now take another example. We will suppose that a man is injured in the head; that before the injury he was of a cheerful and benevolent disposition; and that after the injury he is morose and liable to attacks of homicidal mania. Are we to say that the injury has made no difference to his mind; that this remains cheerful and benevolent; but that the change in his brain compels him to express his cheerfulness by scowling and his benevolence by attacking other people with carving-knives? This is scarcely plausible. And, if we accept it, we shall not be able to stop at this point. We shall have to conclude that it is impossible to tell what the character of anyone's mind really is. It seems to me that what is left of the mind when we try to square the Instrumental Theory with the known facts is so abstract and indefinite that it does not deserve to be called a "mind."

The instrument theory reply is also extremely puzzling for the following reason: It runs directly counter to the emphasis placed on the first-person or introspective point of

view on consciousness from Descartes to today. Recall from section one just how much emphasis is placed on consciousness from the first-person point of view in order to justify a belief in dualism. For the dualist, first-person subjective experience is what counts most with respect to consciousness. The mind at least *seems* to be non-physical from the first-person point of view. To be told now by a dualist that we must adopt such a radically third-person perspective on the "real" mind in order to avoid the argument from brain damage is incredible. Even those dualists who no longer believe, with Descartes, in the infallibility of introspection will find it difficult, if not impossible, to explain how one's own mind can merely appear to be badly damaged and dramatically affect one's everyday activities without being "really" damaged at all. Drugs and alcohol, for example, also affect the mind in a way that can be easily appreciated, both introspectively and from a third person perspective, as indicated by aberrant behavior.

Additionally, we have already seen how brain activity underlies mental activity, and that mental capacities are damaged in very specific ways depending on the brain damage. Why else would the brain be most active when one is engaged in a complex task or question? The signal/television analogy breaks down. Why is the human brain so complex if it is merely a "receiver" of consciousness? Wouldn't essentially the same receiver be sufficient for each animal? The complexity of animal hearts does not increase nearly as much as the complexity of animal brains – why should this be so on the dualist view? Indeed, we might again wonder why we need a brain at all on this view. Why can't the independent mind directly perceive information about the environment and act directly upon the body and the world in the absence of a brain altogether?

Finally, according to the instrument theory, wouldn't the mind or soul have to be as complex as the brain in order to "mirror" the brain's activity with corresponding mental activity? If so, then the signal/television analogy again breaks down, this time because of the much simpler signal as compared to the complexity of parts one finds in a television. And why then have two separate and distinct entities doing the job that one could do? This seems contrary to the law of parsimony. Even more puzzling: if the "mind" or "soul" is now understood to have parts due to such complexity, how can there be non-physical parts? This idea again runs directly counter to the historically dualist belief that the mind is "simple" or "indivisible" in the sense of not having any parts. The rationale here has been precisely to allow for immortality, with the reasoning being that something without parts is indestructible and so must be eternal, unlike material objects. Philosophers from Plato to Descartes to Leibniz relied heavily on this line of reasoning. It now appears that the instrument theory contradicts this influential argument.

4c. The embodied soul alone is affected

Another reply states that when the brain is damaged, a separate nonphysical "soul" or mind is indeed correspondingly damaged while a person is still alive (when the separable soul is temporarily embodied), but in death that correspondence disappears, and hence the soul is able to survive death fully intact. The most popular version of this sort of position was called the "transmissive hypothesis" by William James, better known as the "filter theory" by contemporary authors (Kelly et al. 2007), but finds its most sophisticated expression in J. M. E. McTaggart. McTaggart (1906, pp. 105-106) succinctly states this view as follows:

> Even if the brain is essential to thought while we have bodies, it would not follow that when we ceased to have brains we could not think without them. The same argument applies here as with the organs of sense. It might be that the present inability of the self to think except in connexion with the body was a limitation which was imposed by the presence of the body, and which vanished with it.

Given the 'filter' theory, then, we should predict *enhanced* mental capacities following brain damage, as this would remove the supposed limitations imposed by the physical brain. However, instead we find that brain damage results in the opposite effects: deficits in mental capacities. Thus, the neuropsychological evidence counts strongly against the 'filter' hypothesis. But Stephen Braude (2003, pp. 290-291) expands on McTaggart's position with the use of an analogy. He writes:

> Consider the case of portable electronic devices that can operate either on battery power or through a connection to AC lines, docking stations, or some other component to which they can be joined and through which they can draw power. Typically, the latter connections allow a portable device to perform functions better than it can perform on its own. For example, docking stations enhance the functionality of laptop computers, and AC connections often permit them to display brighter screen images. Moreover (and perhaps more important), the connections bypassing the

> unit's battery power also impose constraints on the portable device's function, constraints which it lacked as a stand-alone device. Of course, they make the device less portable. But they also render the portable device vulnerable to processes (e.g., power surges or fluctuations) which can alter or impair its performance and even disable it. For example, some audio equipment sounds better on its battery power than when connected to AC lines....[T]he connection between the portable device and an AC source seems to mirror the familiar dependence of thought processes on brain functioning, and the analogy captures an important feature of McTaggart's survivalist position. Like connection to a wall outlet or docking station (which can both expand and constrain the device's functions), physical embodiment would simply be one possible medium for cognitive expression. And like running on battery power, disembodied existence or possession of an astral body might be others.

Though there are a number of problems with Braude's response and analogy, we'll focus on four:

First, this response would seem to make survival impossible to falsify, or even render unreasonable to believe, by any imaginable neurophysiological evidence. Surely, extrapolation from all observed dependencies implies exactly the opposite of the view that consciousness survives brain death. Thus, there is an element of very bad induction along with the ad hoc claim in Braude's reply. What positive reason is there in the first place for believing in the survival of the conscious mind? Braude and McTaggart seem

to be saying something like "since survival is possible, then it is reasonable to believe." This is absurd and tantamount to the claim that if something is possible, then it is probable. Surely we cannot allow this line of reasoning without committing ourselves to believing in an endless number of logically possible, though highly implausible, hypotheses or objects. One wonders just what conceivable evidence, if any, would ever sway our opponents into believing that consciousness dies with the brain.

Second, Braude's analogy once again runs afoul of the typical and historical dualist belief in the "simple" or "indivisible" nature of the mind. Computers and docking stations are physical things with parts that we can perfectly well understand. This would presumably not be the case for any alleged nonphysical soul or mind. Like most arguments based on analogy, there are too many major dissimilarities between the compared objects in order for the argument to be strong.

Third, and perhaps most importantly, what exactly is the analogy anyway? What is the conscious "mind"? Presumably it is the "portable electronic device." What is the brain, or brain function? Presumably it is the AC source. But of course in the computer analogy, we do know and understand how there can be more than one energy "source" which the device can be run through (e.g. either via an AC connection or battery power). But there is no such evidence for, or reason to believe that there are, multiple energy sources for the mind. Moreover, in the mind-brain case, the claim seems really to be that the conscious mind doesn't need any "physical energy source" at all. The claim is that the body is no longer needed at all in order for the mind to survive and neither is anything else physical needed. But even Braude is not claiming that the electronic device can operate without any "power source." Computers, like minds, won't work or function at

all if there isn't the proper energy input. So the analogy breaks down in several ways. The analogy does not really "mirror" the "dependence of thought processes on brain functioning."

Fourth, we have no account of just how one "recovers" or "restores," say, one's memories. Do we need to invoke God at this point? Does God fix one's mind at death or make sure that a "complete" soul continues on? This also seems very ad hoc.

5. Conclusion

We believe that the argument from brain damage has only been vindicated in recent years based on the neuropsychological evidence. It seems clear from all the empirical evidence that the very existence of human consciousness is dependent upon the functioning of individual brains, which we have called the "dependence thesis." Having a functioning brain is, at minimum, necessary for having human conscious experience, and thus conscious experience must end when the brain ceases to function. As much as we might all wish for there to be an afterlife, it is not rational to believe in one given the available evidence.[16]

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[1] For much more on various theories of the mind-body relation, see Gennaro 1996, Gennaro 2005, Chalmers 2002, and Campbell 2005.

[2] See Yablo 1999, Perry 2001, and Kirk 2005, 2009, for a sample of materialist replies to such conceivabilty and zombie arguments.

[3] See Loar 1990, 1997, Shear 1997, Van Gulick 1985, 1993, Ludlow et al. 2004, and Stoljar 2009 for a sample of materialist replies concerning the explanatory gap and hard problem.

[4] Perhaps most important for the materialist, however, is recognition of the fact that different concepts can pick out the same property or object in the world (Loar 1990,

1997). Out in the world there is only the one "stuff," which we can conceptualize either as 'water' or as 'H2O.' The traditional distinction, made most notably by Gottlob Frege in the late 19th century, between "meaning" (or "sense") and "reference" is also relevant here. Two or more concepts, which can have different meanings, can refer to the same property or object, much like 'Venus' and 'The Morning Star.' Materialists, then, explain that it is essential to distinguish between mental properties and our concepts of those properties. By analogy, there are so-called "phenomenal concepts" which use a phenomenal or "first-person" property to refer to some conscious mental state, such as a sensation of red. In contrast, we can also use various concepts couched in physical or neurophysiological terms to refer to that same mental state from the third-person point of view. There is thus but one conscious mental state which can be conceptualized in two different ways: either by employing first-person experiential phenomenal concepts or by employing third-person neurophysiological concepts. It may then just be a "brute fact" about the world that there are such identities and the appearance of arbitrariness between brain properties and mental properties is just that – an apparent problem leading many to wonder about the alleged explanatory gap.

[5] See Gualtiero Piccinini and Sonya Bahar's "The Neural Localization of Mental Functions," in this volume.

[6] When not otherwise explicitly noted, the material presented in this section is mainly derived from the following well-regarded neurology textbooks commonly used in medical schools: *Neuroanatomy Through Clinical Cases* (Blumenfeld 2010), *Clinical Neurology for Psychiatrists* (Kaufman 2007), *The New Cognitive Neurosciences* (Gazzaniga 2000), *Introduction to Neuropsychology* (Beaumont 2008). An extensive

index of neuropsychological disorders and their neurological causes can also be found at the National Institute of Neurological Disorders and Stroke (NIH) website: http://www.ninds.nih.gov/disorders/disorder_index.htm. See also Sacks 1987, Ramachandran and Blakeslee 1998, Metzinger 2000, Blackmore 2004, Ramachandran 2004, Laureys 2005, and Baars and Gage 2010.

[7] Jamie Horder's "The Brain That Doesn't Know Itself: Persons Oblivious to their Neurological Deficits," in this volume, argues that agnosias are particularly problematic for the survival hypothesis.

[8] See Terence Hines' "Can There be Language without a Brain?," in this volume.

[9] See Carlos J. Álvarez's "The Neural Substrate of Emotions and Emotional Processing," in this volume.

[10] We earlier briefly mentioned "free will" in this context mainly to point out that, regardless of one's view on this perennial problem in philosophy, decision making seems to be necessary for it. Of course, there is the traditional debate between those who believe in "libertarian" free will and those who are determinists, as well as the question of whether or not free will and moral responsibility can be compatible with determinism in some way (see Kane 2011 for a very nice collection of recent essays on free will, including several readings on how neurophysiology might be brought to bear on the issue). Although this is an immensely interesting and important area, there is little reason for us to delve into it for our purposes in this chapter.

[11] For a more extensive argument from degenerative diseases in particular, see David Weisman's "Dissolution into Death: The Mind's Last Symptoms Indicate Annihilation," in this volume.

[12] For a more extensive argument from this point, see Vanessa V. Charland and Steven Laurey's "You are Your Brain: The Argument from Coma and Disorders of Consciousness," in this volume.

[13] For a more extensive discussion of the implication of this point for survival after death, see David C. Noelle's "Distributed Learning Systems in the Brain and the Unity of Mind," in this volume.

[14] It is also worth noting the importance of the role of neurochemistry in having various kinds of conscious states. Indeed, an entire anthology on the neurochemistry of consciousness has examined this often ignored area of research among philosophers (Perry, Ashton, & Young 2002). Over fifty neurotransmitters have been discovered thus far. For example, acetylcholine seems to play a major role in the difference between sleep (and dreaming) and waking forms of consciousness. Dopamine seems to contribute importantly to attention and working memory. It is also widely acknowledged that some mental disorders, such as depression, dementia, and schizophrenia, result from abnormalities in the levels of neurotransmitters. Thus, it is not merely that damage to specific brain *structures* greatly affects consciousness.

[15] For a detailed defense of this point, see David Papineau's "There is No Trace of Any Soul Tied to the Body," in this volume. The notion that absence of evidence can be evidence of absence is easily captured within a Bayesian framework (e.g, see Fishman, 2009).

[16] We are grateful to Keith Augustine for the invitation to contribute to this anthology and for numerous helpful comments on previous drafts.