

Belief According to Reasons: Can the Brain Detect Truth?

Thomas M. DePietro

University of Delaware

ABSTRACT

Reductive physicalism holds that mental states are identical to brain states. In this paper I argue that if reductive physicalism is true, it follows that our beliefs can never be justified. Since we do in fact form justified beliefs, it follows that physicalism is false. In order to defend my claim that reductive physicalism entails that we never form justified beliefs, I first point out that if reductionism is true, belief states are brain states. This entails that they are caused by previous neurological factors and other brain states which bring about beliefs in virtue of their physical and chemical properties such as the size or charge of the neurotransmitters involved in neuronal signaling. This positively excludes the possibility that evidence in favor of a proposition is causally responsible for the belief in question, consequently beliefs are not justified by evidence. After I give my argument, I offer a potential way out on the reductionist's behalf. The reductionist perhaps can identify a mental state recognizing the evidence for a proposition with a brain state that causes the belief in that proposition thus linking the cause of a belief with the evidence for the belief. However, this will not suffice for the reductionist. The connection between the evidence and the belief is too loose for it to count as justification. The mental state which causes the belief still brings about the belief in virtue of its physical properties and not its properties as embodying reasons for the belief in question. Consequently, justification is not secured. In the final section of this paper I consider some implications of rejecting reductionism for neuroscience and philosophy of mind.

KEYWORDS

Reductionism, Functionalism, Physicalism, Materialism, Neuroscience, Cognitive Science, Belief, Cognition, Neurophysiology, Epistemology

As humans, we take ourselves to be capable of forming true beliefs. The contrary position is self-refuting, as it is impossible to believe the statement "I cannot form a true belief" to be true. Moreover, we take ourselves to be capable of forming true beliefs based on reasons, that is, we think some of our beliefs are justified. The contrary would be similarly self-refuting in that if someone held the statement "I cannot form a justified true belief" to be true, she would likewise have to admit that there is no defense she can give in favor of it. The entire enterprise of thought, of any sort, ranging from typical interpersonal interactions to complex theories in particle physics, presupposes that we are capable of forming true beliefs based on various kinds of justification. It is correct to conclude therefore, that humans (all things considered) at least some times have the cognitive capacity to form justified, true beliefs (JB from now on).¹

It is uncontroversial that the primary organ of cognitive function in the body is the brain. Of course, the brain depends on the other organs (e.g. heart for blood) to survive, but the brain itself is what carries out human cognitive tasks such as thinking, planning, choosing, and evaluating. Therefore, if forming JB's is a cognitive task, we should expect that it is a function of the brain. However, what I will argue in this paper is that the brain *alone* cannot carry out the task of forming JB's. I will not argue that the brain doesn't play any role whatsoever as this would overstate the case. Without the proper function of the brain, humans could not form coherent thoughts at all! But simply because the brain is necessary for the formation of JB's, it does not follow that the brain is alone *sufficient*. Since minds do carry out this function and brains do not (by themselves) it follows that the mind and brain are not identical and there is something in addition to the brain which constitutes the mind. In section I I will give introduce reductive physicalism. In section II, I will argue that reductive physicalism fails to account for JB's. In section III, I will consider a potential retort from a reductionist. Finally, In section IV, I will look at how this applies to various positions in philosophy of mind as well as how it relates to neuroscience and psychology.

I. Reductionism

The view that the brain alone is sufficient to produce the mind is a thesis associated with physicalism about the mind. Physicalists hold that the mind is a

1. By "justified" I simply mean there is evidence supporting the belief in question. I do not care for the purposes of this paper whether or not the justification is sufficient for knowledge.

material thing which in contemporary thinking, this equates to holding that the only component of the mind is the physical brain, nothing more. The opposite position is typically a kind of dualism² in which the brain is one component of the mind, very important, however, it is not sufficient to produce a mind. Therefore, in making a mind, there is another component as well. Physicalism denies this claim, however, physicalists are not agreed on exactly how the brain gives rise to the mind. The specific type of physicalism I will address in this paper is reductive physicalism which *identifies* the brain with the mind. So the mind is nothing in addition to the brain because the mind *is* the brain considered under a different description (Lewis 1966, 17). Mental states (conscious states such as desires, beliefs, qualia, etc.) and brain states (i.e. the physical configuration of the brain at a certain point in time) are to be identified with one another. Now, there are different ways in which they are to be identified. For example, the most popular reductionist view is called functionalism because it identifies a mental state with a certain functional state of the brain. So the reason one brain state is to be identified with a mental state is because of the functional (role in a causal system) characteristics of that brain state (Levin 2013). However, the specific types of reductionism need not concern us here. I may now proceed with my argument.

II. Against Reductionism

Reductionists hold that mental states and brain states are identical with one another in virtue of some property of the brain state, perhaps its type of brain state or its functional characteristics. It follows therefore that reductionists hold belief states (specific kind of mental state in which a person takes some proposition to be true) are to be identified with brain states. Under ordinary circumstances, the typical cause of a brain state is some prior brain state or more simply, a series of neural interactions. For instance, while the brain state associated with seeing a cat is not caused by a prior brain state (at least not entirely), it is caused by input from sensory neurons in the eyes. The only exception to this rule could be a case of direct manipulation, as for instance, if a neurosurgeon were to stimulate a neuron or brain region. But, in general, brain states are caused by interactions among neurons (cells in the brain and periphery which communicate to the brain via electrical and chemical signals). Of course, the causal story in question is quite

2. There are forms of neutral monism which I would not classify as forms of physicalism but we can leave them aside at this point in the discussion.

complex. There are billions of neurons and trillions of connections between said neurons in the brain. The point is that *neurons* do the causing in the brain. The interactions among *neurons* bring about brain states.

The reductionist therefore, in being consistent, must admit that belief states are caused by the interactions among neurons. It is prior brain states coupled with sensory input which ultimately give rise to a brain state to be identified with some belief state. So far so good. The reductionist will not find this problematic as it is more or less a restatement of her position applied to the specific question at hand, viz. belief states. But, there is a subtle problem here. Let B stand for a belief state (brain state) and N be its various neurological causes. In virtue of what does N cause B? Surely, it is in virtue of N's physical properties. For example, perhaps part of N is the firing of a particular neuron leading to part of B which is the firing of another neuron. If neuron 1 causes neuron 2 to fire, this happens because of the various properties of the key components of neural transmission.

Neuron 1 releases a chemical called a neurotransmitter. The neurotransmitter diffuses across a synapse and binds to a protein channel on neuron 2.³ Afterwards, this allows the influx of sodium ions into the cell via rapid diffusion causing a change in the electrical potential of neuron 2. This results in neuron 2 releasing its own neurotransmitter. As we can see from this process, it is because of the chemical properties of the neurotransmitter that the protein channel on neuron 2 opens up. For example, the size, shape, and electrical charges of the various regions of the neurotransmitter dictate how it will interact with the protein channel on neuron 2. The fact that sodium ions move in to neuron 2 upon the opening of the protein channel is a result of the concentrations of these ions in solution. The fact that sodium has an effect on neuron 2 is because of its charge which is a result of how many electrons the sodium has (1 less electron than proton). The electric current which runs through neuron 2 only has an effect on neuron 2 because of other protein channels across the membrane which eventually allow for the influx

3. For those unfamiliar with the technical language: Neurons are cells of the nervous system. They are especially noteworthy for their ability to send and receive information via electrical and chemical signals. A synapse is where two neurons join together (the space between the two neurons is quite small) and this allows for communication between the two neurons usually via chemical signals called neurotransmitters. Protein channels are proteins which are part of the plasma membrane (outer covering) of a cell. When a chemical binds (attaches) to a protein channel, the channel changes shape and opens up, allowing for the passage of various molecules into the cell.

of calcium ions into the cell which in turn interact with vesicles within the cell to allow them to release neurotransmitter to a new neuron. The physical properties of calcium as well as the vesicles are relevant to this interaction. Through and Through this process is dictated by the physical and chemical properties of neurons, their components, and their surrounding ion-filled environment. This process is a snippet but a representative one of the entire causal process whereby N brings about B (see Breedlove 2007 for a textbook introduction to such material).

Typically however, we take it that B is caused by known facts about the world in virtue of their evidential weight in support of the belief in question. For example, perhaps Smith believes Jones to be an alcoholic. Smith believes this because Jones often comes to work late, he has been known to get very drunk at social functions, and he has appeared drunk at work on a number of occasions. Smith's belief is reasonable and justified, and presumably caused by said reasons. The reductionist however must deny this, she must say that Smith's belief is caused by neurological factors in virtue of their physical and chemical properties. This is a rather radical entailment. On reductionism, Smith *does not* believe Jones to be an alcoholic because of the evidence. Moreover, Smith's case is not unique. *No one* believes anything *because of the evidence* in favor of the belief. For example, No one ever believes that Barack Obama is president of the U.S. because of reliable news sources, accurate video footage, or the testimony of any other informed American. In fact, no one believes *reductionism* on account of the arguments in favor of it! (Haldane 1929, 209).⁴ Rather, every person's beliefs are explicable in terms of the neurological causes and their physical or chemical properties but not because of the value of the evidence. Now, if no one believes anything because of evidence or arguments supporting a position, then no one is ever justified in believing anything. To believe something justifiably is to have some reason or warrant for believing what one believes. It may be the case that justification is *available* for certain beliefs, for instance, perhaps there is ample evidence that Jones is an alcoholic. However, no one ever *believes* this fact *because of the evidence*. Thus, even when one has a belief that is *justifiable* it is never *justified* (Lewis 1947).⁵

4. Haldane makes this exact point when he argues that if thoughts are a result of chemistry and not logic, then the belief in materialism is itself unjustified (Barr 2009).

5. I should point out that while C.S. Lewis provides a major influence in the formulation of my argument, his version was developed in a different context. Lewis is specifically concerned with

III. Reductionist Objection

A reductionist may attempt to save her position by attempting to argue that the two are not mutually exclusive. In other words, she may argue that B is produced both by the reasons in favor of holding the belief as well as the neurological factors in virtue of their physical properties. This is not to say that B is overdetermined (as this would be un parsimonious) or partially produced by two distinct causes (as this would go against the entire goal of physicalism). Rather, the reductionist has to somehow identify N with the evidence supporting the belief in question. In making this identification, obviously N is distinct from the evidence as such but N could in theory be identical with the mind's perception of the evidence in question. For instance, one piece of evidence supporting the claim that Jones is an alcoholic is that Jones has been drunk to work. Now, this fact is not in any way identical to a series of neurological factors (N). However, perhaps N is identical to the *mental state* whereby Smith recognizes that Jones has been to work drunk. In other words, we may say that N (or part of N⁶) is identical to the mental state Smith is in where he thinks "Jones has been to work drunk." Consequently, the reductionist can have her cake and eat it too, she can be a consistent physicalist but also hold that beliefs are caused by reasons.

This reductionist response certainly has some *prima facie* appeal. Nonetheless, it misses a crucial point. The problem, as I argued in section II, is not that reductionism must posit a neurological cause for a belief state *per se*. The problem is that neurological causes are causes *in virtue of* their physical or chemical properties. This is not unique to reductionism. *Of course*, neurological causes derive their efficacy from their various physical and chemical properties. No one would deny this. The problem facing reductionists is that the only cause they can admit is a neurological cause and therefore beliefs are produced in virtue of physical and chemical properties of this cause. This *positively excludes* the possibility that beliefs are produced in virtue of the fact that the belief has a justification.

naturalism as a whole as opposed to the specific question of reductionism that I am concerned with. Moreover, Lewis is using the argument in part as evidence for theism, I am not.

6. I add this qualification because perhaps N represents a whole host of factors including sensory inputs, other beliefs, memories etc. Neurological causation is complex and I do not wish to create the impression that it is any simpler than it actually is. However, this consideration is not relevant to the argument at hand.

This holds true even if I grant the reductionist's response above. For example, suppose that N (or part of N) is the brain state identical to the mental state or series of mental states in which Smith recognizes the various pieces of evidence which make Jones appear to have an alcohol problem. Suppose further that N produces B, the brain state identical to the mental state whereby Smith believes Jones does in fact struggle with alcoholism. Now, why is it that N causes B? The reductionist still must admit that it is in virtue of N's physical and chemical properties. What matters is for instance that N includes certain neurons firing containing certain amounts of particular neurotransmitters of various sizes and shapes. What most definitely does not matter is that N is identical to the mental state in which Smith recognizes the evidence in favor of the proposition in question.

The reductionist may retort however: "No, of course N causes B in virtue of its physical properties. That said, it matters that N is identical to the mental state in which Smith recognizes the evidence for the belief that he has because N has the physical properties that it does in virtue of its mental content." This response allows the reductionist to hold the following claims: (1) N causes B, (2) N causes B in virtue of its physical properties, (3) N has the physical properties it does in virtue of its mental content and therefore (4) N causes B in virtue of the mental content, that is, N causes B because N is the mental state in which Smith recognizes the evidence in favor of the belief. As we have already seen, (1) and (2) are entailments of reductionism. However, (3) is what the reductionist needs in order to preserve her position from absurdity and get to (4).

But the retort as stated will not work. Claim (3) is necessarily false. N has its physical properties essentially. If any of N's physical properties were different, it would not exist, some different series of neurological factors or a different brain state would exist.⁷ But since (3) is false, the reductionist cannot arrive at (4) and is stuck at the conundrum she started with.

7. I have to be quite careful here. N only has its physical properties essentially on a *de re* understanding of what N refers to. Initially, I stated that N represents "the cause" of B. However, on a *de dicto* reading, N would represent whatsoever causes B. Either way, in relying on a *de re* reading, my argument is not altered in substance, however readers should be clear on this point moving forward so as to avoid confusion. (On an aside note, my claim that N has its physical characteristics essentially is true on a *de dicto* reading if one holds that B can only be caused by one set of neurological factors, a view which I see as plausible albeit too controversial to rely on for this paper).

A clever reductionist however can satisfy her desideratum for something akin to (4) if she alters claim (3). Suppose instead she posits that the sheer presence of N derives from the fact that Smith recognizes the reasons for thinking Jones is an alcoholic. If this is the case, N's causation of B depends on it having the mental content that it does because N only causes B on the supposition that N is present. Moreover, it is a sufficient condition for the production of B that N have the mental content that it does. Since it has its physical properties essentially, as long as N is present, B will follow.⁸

This move, while clever, does not address the reductionist's problem. For still, N causes B in virtue of its physical and chemical properties. The explanation for the occurrence of B *given* N is still the physical and chemical properties of B. In other words, given Smith grasps the evidence, it still only follows that he has the belief about Jones because of the properties of N, *not* because he grasps the evidence. Sure, Smith has the belief that he does in one sense because he has evidence for the belief. But the connection between the evidence and the belief involves an intermediary which undermines the justification (c.f. Barr 2009).

To see this, let us use a new example. Smith has the belief that Jones is trustworthy. A reductionist may analyze this as follows: Let B' be the belief state, N' be the cause. But suppose now that N' is identical to the mental state which holds that Jones owns a funny Christmas tie. N' may be present precisely because Jones owns a funny Christmas tie, that much is correct. Moreover, the mental content of N' does in some sense cause B' (i.e. the fact that Smith recognizes what tie Jones owns does contribute to Smith's belief). But, since the link between the mental content and the belief is sufficiently loose, it is possible to have this kind of situation. The tie that Jones owns has nothing to do with whether or not he is trustworthy. The mental content causally responsible for Smith's belief is wholly irrelevant to that belief. So *even though* the reductionist is correct (to an extent) in claiming the mental content of N' is causally relevant to the production of B', the connection is not tight enough to secure justification. Justification requires that the mental content that produces the belief is causally connected to the belief in such a way that it only (or at least, under normal conditions) produces the

8. All things being equal. Perhaps N causing B is indeterministic or there are other factors which control whether or not N causes B such as some kind of "free will." These issues however are equally relevant regardless of whether or not one is a reductionist or how one believes N produces B. So technically, it is not correct to say N is sufficient for B *full stop*, but for the reductionist's purposes, it is good enough.

belief if it actually embodies evidence for the belief. As this example shows, if the mental content is causally responsible for belief in the wrong kind of way, it may be right to say that the mental content of brain states produces certain beliefs but it is wrong to say that it does so in virtue of the fact that it contains evidence for the proposition believed. Consequently, it is not appropriate to consider this kind of causal role justification, otherwise, we would have to admit that in the hypothetical situation given, Smith is justified in believing Jones trustworthy on account of his spirited ties.

The only final move a reductionist can make is to claim that such a hypothetical scenario is *impossible*. The reductionist may reason as follows:

1. Situations like the second Jones case in which the mental state causing the belief doesn't contain evidence for the belief are impossible or very unlikely
2. If stories like the second Jones case are impossible or very unlikely, under ordinary circumstances, the cause of a belief state is a previous mental state embodying evidence for the proposition believed
3. If ordinarily, the cause of a belief state is a previous mental state embodying evidence for the proposition believed, then beliefs can be justified
4. Therefore, beliefs can be justified

The reductionist's line of thinking here seems to focus on the impossibility of the second Jones story. If such a story cannot happen, then we need not worry. If our beliefs are consistently produced by mental states embodying evidence for the proposition believed, then we are justified in our beliefs. However, the reductionist is incorrect to think that (1) is the controversial premise. Of course, if the scenario delineated above is possible or highly likely, this certainly undermines the possibility of justification for reasons enumerated. But the point of the example was to *illustrate why even when* the cause of a belief is a mental state containing evidence for that belief it is still not justification.

It may be the case that given our laws of physics plus evolutionary history, mental content is usually correctly paired up with belief states. But this wouldn't matter. What is doing the work in my argument is *not* the possibility of such a strange scenario. Rather, the work is done by the fact that the way in which N' and B' are associated is not one in which the fact that the mental content associated with N' evidentially supports the belief associated with B.' So even though the mental content is in some sense causal, it does not justify the belief. The possibility of such a strange scenario like the one with Jones's tie follows from the problem with reductionism, not the problem following from the possibility. To go back to the original example which is surely possible, Smith is still not justified in believing that Jones is an alcoholic even though N produces B and N is associated with the right kind of mental content. In that scenario, even though Jones coming to work drunk consistently causally produces Smith's belief that Jones is an alcoholic, it does not do so in such a way so as to be considered justification. This is because the evidence of Jones coming to work drunk has no effect on Smith's belief *qua* evidence for the claim. Therefore, I take it that the problem in the reductionist's argument is not premise (1) necessarily but premise (3). It is not sufficient for justification that beliefs are reliably produced by mental states containing evidence for the beliefs. It is also necessary that they be produced *because* the evidence is *evidence for the proposition believed*.

Notice an additional problem with the reductionist's line of thinking here. In order to believe (4), the reductionist must believe (1). Now, I granted that perhaps the reductionist is correct in her thinking that premise (1) is true. Maybe strange scenarios like the one with Jones and his Christmas tie are impossible given the way in which brain states derive their mental content. Or maybe they are simply very unlikely given evolutionary history and the way in which certain brain states got associated with certain behaviors and therefore beliefs.⁹ Whatever the basis for the truth of (1) is, it need not concern us, I am sure reductionists can offer many interesting accounts. What is important here however is this: can the reductionist be *justified* in believing (1)?

To be justified in believing (1), a reductionist must be justified in believing that we can form justified beliefs. For the ability to believe (1) justifiably presupposes

9. On the other hand however, an influential argument against physicalism and more broadly naturalism has been provided by Alvin Plantinga to the effect that natural selection alone is not sufficient to equip the human brain with truth-detecting abilities (Plantinga 2011).

that it is possible to form justified beliefs. Therefore, in order to believe (1), the reductionist must believe (4). But in that case, (1) cannot be used as a premise in support of (4), otherwise, this would be question begging. Consequently, the reductionist cannot offer a non-question begging argument for the conclusion that we may be justified in our beliefs on the basis that the Christmas tie scenario is impossible.

Now, does this problem face non-reductionists? For don't we simply assume we can be justified in forming beliefs regardless of which theory of mind we espouse? For example, I assume that my senses are generally reliable and I am not a brain in a vat. But, I do not have a good argument for this conclusion that is not question begging. However, I don't take the skeptical scenario seriously, I dismiss it and it is axiomatic for me that I can form justified beliefs. I think that there however is a difference between what the reductionist is doing and what an ordinary person is doing when rejecting skepticism. The ordinary non-skeptic is assuming that things are the way they appear unless greater evidence is presented otherwise. I am assuming my senses are reliable because they seem to be and barring evidence to the contrary, this assumption is practically useful and a good starting point for any epistemic stance. The reductionist however is assuming her position can account for the fact that we can be justified. The ordinary non-skeptic reasons according to the following steps:

5. I can form justified beliefs (axiom)
6. If my senses are not at all reliable, I cannot form justified beliefs
7. Therefore, my senses are (sometimes, typically, ordinarily) reliable.

The reductionist however is reasoning with these steps:

8. I can form justified beliefs (axiom)
9. If the Jones tie scenario is possible and reductionism is true, I cannot form justified beliefs

10. Therefore, either the Jones tie scenario is impossible or reductionism is false (from 1-2)

11. Reductionism is true (premise)

12. Therefore, the Jones tie scenario is impossible.

But notice, for the reductionist, the premise (11), cannot be justified unless we assume that (12) is true. But if a defense of (11) is predicated on the acceptance of the conclusion, then the argument is question begging. The reductionist's only argument then is to take (11) as an axiomatic starting point, much like the non-skeptic and the reductionist take (5). But now, the difference between the ordinary non-skeptic and the reductionist is quite apparent: the ordinary non-skeptic starts with the assumption we can form beliefs and treats this as a starting point not in need of a defense. However, the reductionist starts off with this *and* reductionism and assumes that it needs no defense! But reductionism is controversial, by no means the only theory of mind, and something which can either be defended or objected to by arguments. It is not a candidate for an axiom. Therefore, the reductionist is doing something quite different than the ordinary non-skeptic. She is simply begging the question.

Let us recap. First, the reductionist may respond to my initial argument by claiming that N's causing B is in some way dependent on the mental content of N. In order to do this, the reductionist must claim that the presence of N depends on it having the mental content that it does. If this is the correct analysis, then reductionists are right in saying that the content of the mental state which causes a belief is causally responsible for the belief. However, the mental state is still not a cause of the belief *in virtue* of it containing evidence which supports the proposition believed. This is problematic because it entails we cannot truly be justified in believing anything. This opens up the possibility of mental states causing belief states which are completely irrelevant to the evidence considered. Even if such an alleged possibility is in fact very unlikely due to the way in which mental states derive their intentional content, the reductionist cannot defend this position in a non-question begging manner. To conclude, reductionism entails we are never justified in believing anything. However, since we *are* justified in some

of our beliefs, it follows that reductive physicalism is false and mental states are not identical to brain states.

IV. Implications

In section I I introduced reductive physicalism. Physicalism claims that the brain is wholly responsible for human cognition, there is nothing more to the mind than the brain. Reductionism is a kind of physicalism which attempts to explain the relationship of the brain to the mind by arguing the two are in fact the same thing considered under different descriptions, that is, they are identical. However, in section II, I argued that if this were true, then our beliefs would be causally produced on account of the physical or chemical properties of preceding neurological factors rather than on account of the evidence in favor of the propositions believed. Since this would undermine the idea that humans are ever *justified* in believing anything, which we are, I argued that reductionism is false. In section III, I considered a potential move the reductionist could make by attempting to identify the neurological causes of belief with mental states associated with grasping the evidence in favor of that belief. I pointed out that while this is a clever move, it ultimately fails for the same reason that any reductionist account will fail. That is, the *cause* of a belief if reductionism is true is a cause *in virtue* of its physical properties *rather than* its association with the evidence in favor of the belief. Consequently, if reductionism is true, no belief is ever had by a person because evidence favors the proposition believed. This entails that no one is ever justified in believing anything, an absurd and self-refuting position. Hence, reductionism is a false theory of mind. In the words of Biologist J.B.S. Haldane, "If my mental processes are determined wholly by the motions of atoms in my brain, I have no reason to suppose that my beliefs are true ... and hence I have no reason for supposing my brain to be composed of atoms" (Haldane 1929, 209).

If I am correct, then in philosophy of mind, we are left with two main positions. The first would be a kind of dualism. On dualism, the mind is said to be composed of both physical parts, i.e. the brain, and non-physical parts or properties. On the other hand, one may opt for a non-reductive physicalism. Non-reductive physicalists attempt to explain how the brain *produces* the mind but is distinct from it. What this paper hopefully shows however is that beliefs cannot be justified if their cause is not intimately linked to the evidence in favor of the proposition believed in the right kind of way. In order to construct a theory which has this

feature, philosophers will do well to recall why reductive physicalism fails. It fails not merely because beliefs have physical causes, but because the causes are causes because of their physical properties rather than evidential properties.

Finally, to conclude this paper, it is necessary to connect what I have said to contemporary neuroscientific thinking. In many ways, the philosophy of mind helps serve cognitive and biological based neuroscientific approaches by constructing a framework within which the discipline can proceed. Neuroscience must assume at the outset that the brain and mind are interconnected in a very unique and profound manner. To reject this would be to reject the entire foundation of neuroscience. Adopting a crude version of Cartesian dualism by which our beliefs are caused by reasons in our mind and the brain ultimately plays no role, or only the role of a sensory machine, is bound to be problematic. It cannot account for the complex interaction of our thoughts and behaviors as well as the evolutionary side to our cognitive abilities. On the other hand, as I have argued in this paper, if we accept a dominant paradigm which identifies neural states with cognitive states, the entire enterprise will be undermined as well albeit in a different way. If mental states and brain states are identical, we are never justified in believing anything, including any claim delivered to us by contemporary neuroscience. Therefore, this extreme as well could undermine the discipline.

In conclusion, I hope to have advanced the discussion in philosophy of mind in my paper. Additionally however, I hope to add a positive insight into the field of cognitive neuroscience. In developing a theory of mind, it is first important to reject at the outset any position that undermines or eliminates the very mind in need of an explanation. This is what reductive physicalism does. It defeats the possibility of justified belief and consequently, cannot be positively assumed in doing any research in theory of mind. Another implication of my paper on cognitive neuroscience is this: it should help direct how those who study the mind and brain ask certain questions. The approach cannot be one which assumes when we understand the brain and the functional relationships of brain states we understand the mind. Rather, cognitive neuroscience must ask *how is it* that the brain produces the mind? Or alternatively, if the mind is not produced by the brain, what does produce the mind? And how would an external mind not produced by the brain come to be or continue to be so intimately causally linked to the brain? These are questions which are beyond the competence of modern neuroscience, however, the approach is necessary if consciousness and thought

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are to be fully understood. What this illustrates is that philosophy and science must be in communication to form a coherent and complete picture of what the world is like. If this paper does nothing else, I hope to do that.

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