

Parsimony and the Mind

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Some philosophers claim that the mind is fundamentally different from physical objects (Descartes; Addis, 1989; Searle, 1992), while some others maintain that physical matter is all that really exists (Hobbes; Ryle, 1949; Feigl, 1967; Dennett, 1991). These two positions are known as dualism and materialism, respectively. The debate between dualism and materialism has an extensive history, during which both sides have evoked many theories in their defense. One concept that may be applied to this debate is the principle of parsimony. This paper explores the consequences of using the principle of parsimony to solve the mind-body problem.

Parsimony is first defined and shown to be a valid criterion for choosing between theories. The argument that materialism is preferable to dualism because it is more parsimonious is then presented. This argument can be first critiqued on the grounds that materialism is not really more parsimonious. However, a reductionist form of materialism is more parsimonious than dualism. The reductionist argument can then be critiqued on the grounds that the principle of parsimony is not applicable to the mind-body problem. This is because certain characteristics of the mind present insurmountable problems to the materialist.

§ Parsimony Defined

There are several ways of criticizing of the use of parsimony as a guiding principle in the search for knowledge. It could be argued that there is no clear and agreed-upon definition of 'parsimony' or 'simplicity.' The justification of parsimony's worth as a guiding principle can also be questioned. We must therefore first define the various forms of parsimony and show why it is needed as a scientific and philosophical guideline. To reduce confusion, parsimony and simplicity will be treated as synonyms.

The principle of parsimony is sometimes called Ockham's Razor, named after a medieval philosopher who advanced the theory with such phrases as "plurality is not to be posited without necessity" and "what can be explained by the assumption of fewer things is vainly explained by the assumption of more things" (Boehner, 1957, p. xxi). It remains unclear from these passages just what these "things" really are. To alleviate some of this confusion, I will distinguish three types of parsimony.

The first type of parsimony is epistemological parsimony. Epistemological parsimony deals with the number of things that a theory posits. These things can be either specific objects or more abstract processes. Consider, for example, Newton's law of gravitation in comparison to Kepler's three laws of planetary motion. Because Newton's law of gravity can explain Kepler's three laws in one formula, it is more epistemologically parsimonious. Because in this case Newton's law represents

the theory with the fewer number of nomonological assumptions, epistemological parsimony could also be called nomonological parsimony.

Epistemological parsimony is a concern among scientific theories. Science is the search for synthetic a posteriori truth. Absolute certainty, when dealing with synthetic facts, is certainty of the wrong kind. Science must always work from some assumed starting points and aim for practical certainty. Some foundations of scientific beliefs are the principle of induction, the criterion of falsifiability, and the law of non-contradiction. Another one of these assumed starting points is the principle of parsimony. Without this rule, scientific theories would become needlessly complicated: "It will be recognized at once that a methodological rule requiring that, in any given situation, we choose the least simple of the admissible hypotheses would render us completely paralyzed" (Schlesinger, 1975, p. 333). Epistemological parsimony allows for the fewest number of nomonological assumptions (see "The Principle of Minimum Assumption" in Kapp, 1958). Parsimony is needed because, given observed data, more than one theory is possible: "it is easy to demonstrate that, given *any* amount of observational evidence, there always exist an infinite number of mutually incompatible theories that explain (entail, or, in cases of statistical explanation, imply statistically) the evidence at hand" (Maxwell, 1976, p. 567).

An example of the use of the principle of epistemological parsimony is the revision of the geocentric model of the solar system:

The success of seventeenth- and eighteenth-century astronomers at determining orbits and constructing predictive models of the heavens was not much greater than that of the third-century astronomer Ptolemy, who believed the Earth to be at the center of the universe. Ptolemy could get very good predictions with his geocentric model if he assumed the sun and the planets to be moving along several different circular orbits simultaneously. To understand this, think of a path of a speck on a wheel of a car driving in circles on a merry-go-round. This involved three circular orbits. Some seventy-five rotational motions in all were involved in explaining the trajectories of the planets, the speed of each one being estimated from direct observations combined with a set of formulae. By putting the sun at the center, Copernicus could reduce the number of rotational motions needed to around thirty-five; he was very conscious that this simplification was the main strength of his theory, and the reason it was preferable to Ptolemy's. (Slobodkin, 1992, p. 148)

Although Ptolemy and Copernicus could explain the planetary orbits equally as well, the Copernican model was accepted because it was more parsimonious. Newton and then Einstein further revised the laws governing planetary motion in the same manner.

The second type of parsimony is ontological parsimony. A theory is more ontologically parsimonious than another if it posits fewer types of things. Like epistemological parsimony, the

principle of ontological parsimony attempts to conserve the number of assumptions that we must make. However, instead of dealing with nomonological concerns, ontological parsimony deals with metaphysical assumptions. Physicalism, the theory that only matter exists, is more ontologically parsimonious than dualism, the theory that matter and mind are fundamentally different entities. However, it remains to be seen if this is a compelling reason for accepting physicalism over dualism.

The extension of the principle of parsimony from scientific to philosophical discourse is shown in the difference between epistemological and ontological parsimony. Because both disciplines deal with the search for truth, the philosophical use of ontological parsimony has the same justification as the scientific use of epistemological parsimony: "our acceptance of an ontology is, I think, similar to our acceptance of a scientific theory, say a system of physics: we adopt, at least insofar as we are reasonable, the simplest conceptual scheme into which the disordered fragments of raw experience can be fitted and arranged" (Quine, 1961, p. 16).

It could be argued that the principle of ontological parsimony has no justification. The problems that could arise from choosing a multi-entity ontology, such as deciding how to tell the types of entities apart, could outweigh any advantages of doing so. Also, the extension of the principle of parsimony into philosophical discourse can be argued against in principal. As one translator of Ockham states:

What Ockham demands in his maxim is that everyone who makes a statement must have sufficient reason for its truth, 'sufficient reason' being defined as either the observation of a fact, or an immediate logical insight, or divine revelation, or a deduction from these. This principle of 'sufficient reason' is epistemological or methodological, certainly not an ontological axiom. (Boehner, 1957, p. xxi)

The argument here is that the principle of parsimony should be limited to scientific discourse only. Only the number, and not the type, of entities should be conserved. Yet it seems reasonable that we should attempt to avoid needless complication and conserve assumptions not only in science, but in philosophy as well. For this reason, we should conclude that ontological parsimony has as much justification as epistemological parsimony.

The third and last type of parsimony is linguistic parsimony, which allows statements to be made in shorter sentences. Pragmatically speaking, this is computationally less cumbersome. Imagine a language that is identical to English except that the word 'seventeen' is replaced by 'the number that is one more than sixteen and one less than eighteen.' This language would not be as linguistically parsimonious as English.

This type of parsimony differs from the two other forms of parsimony. While epistemological and ontological parsimony attempt to conserve nomonological and metaphysical assumptions, linguistic parsimony only is concerned with how these assumptions are phrased. Despite this

limitation, linguistic parsimony is a very serious concern, as we would not want to have to speak in a language in which it took all day to greet one another.

Although this paper will use the terms ontological, epistemological, and linguistic when speaking of parsimony, it should be noted that simplicity and parsimony have been previously defined similarly. The three types of parsimony are similar to Herbert Feigl's three meanings of simplicity (Feigl, 1981, pp. 132-133). According to Feigl, material simplicity (similar to epistemological parsimony) is testable by empirical evidence. Occam-simplicity (which resemblances to ontological parsimony) deals with the metaphysical components that a theory posits. Formal simplicity deals with theories that "only differ from one another linguistically," much like linguistic parsimony.

Parsimony is a relative characteristic; parsimony can only be used to describe one theory in comparison to another. Different types of parsimony can be in conflict with each other. A theory that is more ontologically parsimonious than its rivals may not be the most linguistically parsimonious. Which type of parsimony is preferred or should be maximized will be discussed later.

Now that parsimony has been described and justified, let us turn to its limitations. Some limitations of the principle of parsimony are pointed out in Hilary Putnam's "Explanation and Reference" (Putnam, 1991, p. 182). For example, two simplest theories about different things may be in conflict. Because a contradiction would not be acceptable, the theory with the lesser relevant support should be abandoned. Also, the simplest theory may not fit with previous knowledge. Knowing only the fact that three points on a highway are in a straight line should yield the more parsimonious conclusion that the highway is a straight line. However, our previous knowledge of the existence of curves in roads makes this an improbable conclusion.

It seems that some criteria must take precedence over parsimony, such as logical consistency, plausibility, and past evidence. In order to meet these criteria, only when two theories have equal support should the principle of parsimony be used to designate a preference. Putnam's examples point to an important required condition for the use of principle of parsimony: all other things must be equal. Otherwise, we would be forced to accept the more parsimonious claims that there are only four elements and five planets. Considering that we would have to explain away so much data to the contrary, it is simply not worth the effort. Parsimony should only be a concern between two theories with equal support: "The explicatum should be as simple as [similarity to the explicandum, exactness, fruitfulness] permit" (Salmon, 1989, p. 5, from Carnap 1950/1962, Chapter 1). When the simplest theory does not fit the facts, it should be abandoned:

What science does, in fact, is to select the *simplest* formula that will fit the facts. But this, quite obviously, is merely a methodological precept, not a law of nature. If the simplest formula ceases, after a time, to be applicable, the simplest formula that remains applicable is selected. (Russell, 1953, p. 401)

The concept of parsimony is not only definable, but worthy of use as a guiding principle. This does not mean that the simplest theory is always true, but rather that it should be accepted over its rivals if all other things are equal: "Of the two competing explanations, both of which are consistent with the observed facts, we regard it as right and obligatory to prefer the simpler" (Barker, 1961, p. 273). Theories must of course be modified to fit the data that they describe: "Ockham's razor cannot overrule observed differences" (Polten, 1973, p. 127). Some confusion remains concerning the three defined types of parsimony: ontological, epistemological, and linguistic. As we shall see in the debate between the materialists and the dualists, it remains unclear which type of parsimony is of paramount importance.

§ Parsimony and Materialism

We now turn to the argument that materialism is preferable over dualism because it is more parsimonious. Physicalism is the materialist theory that physical matter is all that exists, and there are no such things as mental states. A physicalist can use the concept of ontological parsimony in a claim against the use of mental terms in the following manner:

It is argued that there are no entities of some suspect sort, on the grounds that the true things that are said using sentences which appear to refer to or quantify over entities of the suspect sort can be rendered in a language which avoids such reference and quantification. Careful practitioners of this method take pains to assure us that the kinds of patterns which allow us to infer recognized entailments from these statements are preserved in the recommended alternative language. Moving in for the ontological kill, it is said that the new language better reflects the logical form of the statements in question and that the truth of the statements does not require the existence of entities of kinds not quantified over in sentences in the new language. And so it is concluded that there *are* no things of the type thus excised from the language - or more accurately, that the apparent kind term in our original language does not indicate a kind of entity at all. (Stern, 1989, p. 34)

The physicalist's first claim is that a dualist language and a physicalist language explain the workings of the world equally as well. The second claim is that a physicalist language is ontologically more parsimonious than a dualist language. Therefore, according to the principle of ontological parsimony, physicalism should be preferred over dualism: "we can vastly simplify our cosmological outlook if we can defend a materialistic philosophy of mind" (Smart, 1963, p. 661).

In "On What There Is," Quine supports the principle of ontological parsimony. He claims that either our sensations *or* physical matter is the only type of entity that can be said to exist. He thus presents the choice between a phenomenalistic and a physicalistic ontology. It is suggested that this is a forced choice: we must adopt either one or the other as our ontology. This means that ontological

parsimony is to be taken as paramount. If this were the case, then we would be stuck with either idealism, the theory that only minds exist, or materialism, the theory that only matter exists.

Dualism claims that instead of being forced to adopt a single-entity ontology, we should be allowed to posit the existence of two distinct types of entities, namely, mind and matter. Instead of having to choose between either phenomenalism or physicalism, we should instead acknowledge the existence of both mental states and physical matter. As earlier stated, ontological parsimony has the same amount of support as other forms of parsimony, suggesting that there is no reason to place the criterion of ontological parsimony ahead of other forms of parsimony.

We can think of clear-cut cases where a seemingly more parsimonious claim is not reasonable. For example, the belief in two dimensions would have to be explained by so many other theories that the simplicity of having one less dimension would not be worth it. Likewise, as with the case of ontological parsimony, it seems prudent to realize that: "ontological economy is just one kind of simplicity. What one saves here may well have to be spent on complications elsewhere" (Stern, 1989, p. 35). The earlier mentioned problems that go with adopting a dualist ontology may outweigh possible complications of a physicalist ontology. There is also no justification for valuing ontological parsimony ahead of other forms of parsimony. For these reasons, the dualist's argument at present must be kept open.

Physicalism must present a more detailed argument than claiming that dualism is faulty due to problems with ontological parsimony. The physicalist must argue that other forms of parsimony are on the side of physicalism as well. Failing this, at the very least, it must be shown that the ontological simplicity of physicalism outweighs any other possible epistemological or linguistic complications.

Epistemological parsimony deals with the number of nomonological assumptions that a theory makes. Because dualism posits the existence of all of the physicalist's entities and then some, it may seem at first that physicalism is more epistemologically parsimonious. However, in order for the principle of parsimony to be evoked, both theories in question must explain the data equally as well. The physicalist must therefore explain data concerning what the dualist calls mental events. This means that the physicalist must translate all statements made in a dualist language into a physicalist language. As a result of these translations, both theories, although using different vocabularies, describe the same number of entities.

It could even be argued that the principle of epistemological parsimony counts against physicalism because of the translation principles and rules that it must define. Dualism has no such translation rules because for it both matter and mind exist as irreducible entities. However, in order for dualism to have a role in science, it must also present a language with rules that correlate talk of mental events with a physical vocabulary. This means that dualism and physicalism must have the same number of nomonological assumptions. We can conclude, therefore, that the principle of epistemological parsimony sheds no light upon the current debate.

It must now be argued that physicalism is either more linguistically parsimonious than dualism, or that any linguistic complications arising from choosing physicalism are worth conserving ontological parsimony. To refute any such argument, the dualist could bring up the use of mental terms in the science of psychology. The dualist argument proceeds as follows.

By interpreting behavioral cues, we can make a list of probable signs that a person has certain mental states. For example, if a person gets up and gets a drink of water, we can guess that he or she was thirsty. Placing the physical description [drinks water when available] on the mental state [thirsty] creates what is called an operational definition (Hempel, 1965; Kimble, 1989). This method does not make psychology unscientific or inaccurate: even though mental states are irreducible, we can not only measure the brain states from which they emerge, but we can also observe the more external behaviors that they are correlated with. Also, just because we must study behavior instead of mental states does not mean that mental states do not exist:

Scientific empiricism does not hold to the view, rightly or wrongly associated with Watson's name, that so-called mentalistic or introspectionistic terms, such as 'sensation,' 'consciousness,' 'image,' etc., are *necessarily* meaningless or that their referents do not exist. But scientific empiricism does hold that it is the methodological idea of the sciences of behavior to use such mentalistic terms only after they have been introduced by (*operational*) definitions from a physical meaning basis. (Bergmann & Spence, 1944, p. 2)

A physical basis for the verification of mental states is needed because we cannot directly observe other people's mental states.

One objection to this argument claims that there will always be some uncertainty due to the use of operational definitions. Suppose for example that a person does not drink water when offered, yet maintains that he is thirsty. Based on the definition of [thirst] as [drinks water when offered], then this person is not thirsty. However, if we were to define [thirst] as [answers yes to the question "Are you thirsty?"]], then the person would be classified as thirsty. Due to this contradiction, it may seem that the method of using arbitrary definitions of mental states is unreliable. Defining and examining variables in terms of their observed effects is all that science can accomplish. Considering all possible outcomes, what can be observed and defined is all that exists. The physicalist concludes, therefore, that mental states do not exist.

The dualist could counter that consciousness can still exist even though it cannot be directly measured objectively. A perfect account of physical reality and physical laws is all that is needed to predict future conditions. However, using mental variables to describe, explain, and predict behavior is much easier than relying on purely physiological explanations. Suppose that examining behavior using mental variables is not necessary because psychology is really just physics. In terms of physical reduction, this statement is true: psychology, the analysis of behavior, can be reduced to physics, just

as can geology, biology, and chemistry. Yet for some reason we ask people if they are thirsty in order to predict if they will drink water when offered rather than scanning their body for hydration levels. This is because it is easier (more linguistically parsimonious) to examine behavior using mental variables, which do have a place in science:

The history of the sciences suggests that progress depends on postulating unobserved phenomena, and theories should not be restricted to only observable phenomena ... Psychology should formulate theories, and these theories are permitted to have elements that refer to unobservable phenomena ... scientific progress appears to depend on the postulational nature of the enterprise, and psychology should not be restricted in this regard, so long as the theoretical concepts can be "operationally defined." (Moore, 1998, p. 217)

Mental variables are not so much inferred from behavior as they are a way of talking about behavior.

Psychology relies upon the same method as any other science. Defining [acidity] as [turns litmus paper red] is not methodologically different from creating the definition for thirst. A physicalist would maintain that using mental terms brings in excess baggage when describing physical states because physicalism is ontologically more parsimonious. However, this point is lost when we consider the extremely complicated vocabulary that we would have to use to avoid talk of mental states.

For example, even though we realize that the elements are all made up of only protons, neutrons, and electrons, we still talk of the elements without referring to the simpler designation of combinations of smaller parts of matter. We say 'carbon' instead of 'the element with six protons, six electrons, and six neutrons.' This manner of speaking is more linguistically parsimonious than the alternative. Similarly, we talk of 'thirst' rather than 'a physiological level of dehydration that causes fluid seeking behavior' because of concerns with linguistic parsimony. Indeed, "a high-level explanation is often more comprehensible and enlightening." (Chalmers, 1996, p. 43).

These cases reinforce the position that there is no one type of parsimony that is most important. Instead of trying to maximize one kind of parsimony, we seem to aim for a practical balance between ontological, epistemological, and linguistic parsimony. A physicalist argument that we can do away with mental terms altogether is therefore faulty due to the enormous problems that would develop with linguistic parsimony. Adopting the physicalist's simpler ontology is not worth being forced to talk in a language devoid of mental terms. Because it is less cumbersome to use mental terms in our vocabulary, although dualism is more ontologically complicated than physicalism, it is more parsimonious overall. We can conclude that, at the very least, talk of mental states is in fact more parsimonious.

However, the battle over the mind has yet to be won. The dualist position is still open to attack, this time in the form of reductionism. It is possible to accept all of the above conclusions and still adopt the materialist theory of reductionism. In contrast to physicalism, which claims that mental events do not exist, reductionism admits the existence of mental events, but only as a physical processes. We have concluded that the talk of mental states is necessary, but the reductionist can agree with this, adding that mental states are nothing more than physical processes themselves.

The reductionist argument proceeds as follows. We can talk of mental states without granting them a separate category of existence. The arguments against physicalism show that certain linguistic simplifications of phenomena are in the end more parsimonious than adopting a more limited ontology. Yet making linguistic simplifications of processes does not mean that we are forced to make ontological distinctions between the two terminologies: "a physiological translation of mentalistic terms may reassure those who want to avoid dualism" (Skinner, 1957, p. 957). We use the word 'lightning' as a linguistic simplification of 'the electrical discharge between the sky and the ground,' but we would not want to conclude that there are two types of entities: the lightning and the electrical discharge. Similarly, the color red can be shown to be nothing more than a certain frequency of light. But just because we still say 'red' does not mean that it exists as a separate type of entity than a frequency of light. As with the case of the phenomenon of lightning and the color red, the mind does not need to be placed in a separate category of existence. We can treat the mind as a hypothetical construct without saying that it exists in a category separate from physical matter.

This is sound argument. It was earlier assumed that a physicalist language and a dualist language could explain the working of the world equally as well, and that a physicalist vocabulary was preferred because it was more parsimonious. Physicalism ran into problems with linguistic parsimony, so it was concluded that dualism was preferred because it was more parsimonious in general. However, the reductionist has solved the physicalist's problems with linguistic parsimony without adopting dualism. We can therefore conclude that the materialist theory of reductionism is more parsimonious than dualism.

But the dualist is not dead yet. Even though reductionism has been shown to be more parsimonious than dualism in general and overall, this is not reason enough for adopting materialism over dualism. The dualist still has one argument left. This argument is stated by Laird Addis in *Natural Signs: A Theory of Intentionality*:

As for *kinds* or categories and subcategories and entities, indeed, one should not multiply them beyond necessity. But "necessity" also requires, if one is a serious ontologist of mind, that the realm of the mental be fully accounted for in its uniqueness (or its *apparent* uniqueness, if you like) as well as in its continuity with the rest of nature. In any case, ontological economy can never be an argument in itself for or against some particular ontology of mind (or anything else) but only, at most, a principle for choosing between alternative accounts when all other means for choosing have been exhausted

without resolution. This book may be regarded as an argument that, at least in the case of mind, that point of exhaustion is never reached, and there is excellent reason for preferring an account of mind, and especially of intentionality, that embraces a somewhat enriched ontology. (Addis, 1989, p. 18)

As earlier mentioned, when comparing any two theories, they must be shown to have the same amount of relevant support in order for parsimony to be a concern. For this reason, we must now address the claim that a materialist and a dualist can explain the working of the world equally as well. If not, the dualist can conclude that: "Just as Maxwell sacrificed a simple mechanistic worldview by postulating electromagnetic fields in order to explain certain natural phenomena, we need to sacrifice a simple physicalistic worldview in order to explain consciousness." (Chalmers, 1996, p. 169). The dualist must contend that all things are not equal between reductionism and dualism.

Let us take stock. Our application of the principle of parsimony to the mind-body problem has resulted in the conclusion that the materialist theory of reductionism is more parsimonious than dualism. However, in order to fully resolve the issue, the claim that the principle of parsimony is not applicable to the mind-body problem needs to be addressed. To this aim, I will put aside concerns with parsimony and carry out a discussion on whether or not mental states can be reduced to physical descriptions.

§ Dualism

It will aid our discussion if describe what dualism means. When most materialists argue against dualism, they are arguing against the Cartesian theory of substance dualism. René Descartes theorized that the mind was a separate entity that existed in a realm of mental substances. Descartes' notion of the mind was like what today is termed the soul. It is faulty to assume that adopting a theory of dualism must imply a belief in the Cartesian notion of substance dualism. There are more choices available than materialism and substance dualism. Property dualism, for example, states that the mind has certain properties that are not physical. This does not mean that the mind exists in a realm independent from the body, but rather that mental events have properties that cannot be described in physical terms.

Materialists argue against dualism by pointing out that since the time of Descartes we have discovered that the brain is the source of consciousness. This fact is generally not in dispute:

If it is materialism to believe that the mind is lawfully grounded in matter such that states of consciousness can exist only as the products or concomitants of certain highly organized states of matter, then any rational person is a materialist. This is but the *primacy* of matter (as contrasted with its *exclusivity*) and is denied only by idealists, supernatural religionists, so-called psychics and their followers, and other irrationalists. (Addis, 1989, p. 10)

Although substance dualism has been shown by scientific discoveries to be a rather dubious position, this constitutes no proof against property dualism. The fact that brain processes give rise to mental events is accepted by the property dualist.

To clarify this point, Addis presents us with three types of materialism. Philosophical materialism is the theory that matter is primary because it can exist without mind, and not vice versa. Contrary to Cartesian dualism, this theory states that the mind cannot exist without the body. This theory of the primacy of matter has been shown to be consistent with property dualism. Scientific materialism is the theory that all physical events have maximally possible physical explanations. This means that all physical events can be explained in a physicalist vocabulary. Perfect knowledge of physical reality and physical laws is all that is needed to predict and explain physical events. Also, even any so-called science of the mind must eventually become the science of behavior. However, as Addis points out, the acceptance of these two forms of materialism does not entail the belief of absolute materialism, the theory that everything is physical. Even though physical events can be explained in terms of physical processes, this does not mean that everything is physical. There may be other non-physical events that exist alongside the physical events as well. The statement 'We can wholly account for her behavior in terms of physical processes' does not entail that 'she is nothing but a physical device.'

To show that property dualism is valid, the dualist must refute the absolute materialist theory of reductionism. Mental states must be shown to be irreducible to brain states. Once we accept the statement 'We can wholly account for her behavior in terms of physical processes,' the only argument against making the conclusion that 'she is nothing but a physical device' is to claim that each person experiences events in a way that outside observers cannot. The subjectivity of mental states can then be used to illustrate their irreducibility to brain states.

Because we can only know our own sensations, emotions, and feelings, and must infer those of others, consciousness is subjective. Perhaps an advanced computer could list all of our feelings objectively by scanning our brains, but it still would not experience them: "mental occurrences exemplify at least some properties that could not be observed no matter how far knowledge and technology developed" (Natsoulas, 1984, p. 61, see also the "physically-omniscient neurologist" in Meehl & Feigl, 1991, pp. 126-129). The brain and the mind are different because the mind can only be known from a first person standpoint, while the brain can be studied objectively: "What seems impossible is to include in a physical conception of the world the facts about what mental states are like for the creature having them" (Nagel, 1985, p. 35). Therefore, even though consciousness emerges from the brain's workings, it can only be understood from a subjective standpoint, making it irreducible to brain states.

Another fact that demonstrates a difference between the mind and the brain is the distinction between primary and secondary qualities. As defined by John Locke, Galileo, and others, primary qualities exist as they are perceived in objects, and secondary qualities are perceptions that do not

resemble objects. Size and shape are primary qualities, while sound and color are secondary qualities. We accurately perceive the shape of an apple, a primary quality, but instead of perceiving the frequency of light that it reflects, we see the color red, a secondary quality.

Our eyes sense frequencies of light in the same manner that scientific instruments do. However, our result is not a numerical frequency, it is a color. The transformation of physical sensations into secondary qualities cannot be explained by materialism. Secondary qualities have no place in a purely physical world, which exists of only primary qualities: "A dualist can hold that there is no place for redness-as-experienced in material bodies, and nevertheless allow for its existence, by locating it in the non-material realm he takes the mind to me. A materialist obviously cannot do this, since according to him there is no non-material realm" (Shoemaker, 1990, p. 110). Because the materialist only supposes the existence of primary qualities, the existence of secondary qualities cannot be explained by materialism.

By definition, all physical objects can be fully described by primary qualities. Because secondary qualities can be perceived differently by different people, as with the case of color blindness, they are subjective. The subjectivity of secondary qualities cannot be fully accounted for on purely physical terms: "instances of secondary quality occur under conditions which are not definable in exclusively physicalistic terms, for such terms stand in relations which generate from potential nature only primary qualities" (Beck, 1946, p. 606). This is because physical reality can be fully described by primary qualities, yet secondary qualities cannot; since primary qualities can explain physical reality but cannot explain secondary qualities, secondary ideas are not physical.

Reducing the color red to a frequency of light removes the subjective perception of it, the very thing that makes it a secondary quality. This subjective perception is a function of the mind. The non-primary, and therefore non-physical, existence of secondary ideas thus requires a differentiation between the brain and the mind: "Secondary qualities are a plague for reductive theories in the philosophy of mind" (Campbell, 1972, p. 232). Because by definition the materialist supposes the existence of only physical and primary qualities, the existence of secondary qualities cannot be explained by materialism.

In response, the reductionist can argue against property dualism as really being dualism at all. A reductionist could agree that entities can have properties different from the matter from which they emerge, but contend that this does not entail an ontological distinction. Consider the following passage from John Searle's *The Rediscovery of the Mind*:

If we think of the make-up of the world, then of course everything in the world is made of particles, and particles are among our paradigms of the physical. And if we are going to call anything that is made up of physical particles physical; then, trivially, everything in the world is physical. But to say that is not to deny that the world contains points

scored in football games, interest rates, governments, and pains. All of these have their own way of existing - athletic, economic, political, mental, etc.. (Searle, 1992, p. 26)

Searle says that even though the mind is grounded in the brain, it exists as an entity that is fundamentally different from the brain or any other physical object. This is because, as we have shown, the mind has certain properties that the brain does not.

However, the reductionist argues, if this point were taken seriously, it would be a disaster. We would quickly find ourselves having to agree not only to the separate existence of mental states, but of interest rates and governments as well. A football has different properties than the individual atoms that it is made of, such as size, weight, color, and throwability. However, as with the earlier mentioned case of lightning, we would not want to conclude that footballs exist in a different ontological class than atoms. Likewise, even though the mind may have some different properties from the atoms of the brain that cause it, because it is still logically grounded by physical states, it is not fundamentally different from other physical entities.

In order to sidestep this disaster, the dualist must explain how footballs, lightning, and colors can be reduced to their physical qualities, while the mind cannot. Because footballs have no qualities that are fundamentally different from physical matter, they can be said to be physical entities. Using the example of the reduction of water to its elements, Chalmers (1996) explains: "The microphysical features do not *cause* liquidity; they *constitute* it. This is entirely different than what is going on in the case of consciousness, so the analogy fails." (p. 130). The properties of the mind, unlike the properties of water and footballs, can in no way be reduced to anything physical.

The weight of a football corresponds to the combined weight of the atoms that it is composed of, and its shape is a function of the shape of the atoms. Even the color and throwability of the football can be fully described by the nature of its physical composition. But when we look to translate something such as pain into neural firings, *we see no such correspondence*: "the explanatory categories we use in describing human action and experience seem to be irreducible to the categories employed by the physical sciences" (Madell, 1988, p. 6). The raw experience of pain itself exists as a primitive, atomic mental state, and it can only be known from a first-person standpoint: "I can know that another person is in pain on the basis of his behavior only if (1) I know from my own experience what pain is, and (2) I know from my own experience what behavior typically accompanies pain." (Addis, 1984, p. 337, see also Wilson, 1974).

Another example will illustrate that property dualism is limited to mental states. The colors that we see can be said to be really "nothing but" frequencies of light. However, the same relation does not hold between mental states and brain states. Secondary qualities can be reduced to primary qualities because primary qualities can exist independently of their parallel secondary qualities. If a tree falls in a forest, it makes sonic reverberations. However, if nobody is around to perceive these vibrations as sounds, there are no secondary qualities. Therefore, all that truly exists "out there" are

primary qualities. Yet it is a different case when we consider the brain and the mind. This is because any active brain will also produce an active mind; along with brain states, there will also be mental states that exist in their own right. The reductionist's worry of an ontological disaster is thus averted without rejecting dualism:

It is impossible to exclude the phenomenological features of experience from a reduction in the same way that one excludes the phenomenal features of an ordinary substance from a physical or chemical reduction of it - namely, by explaining them as effects on the minds of human observers. If physicalism is to be defended, the phenomenological features must themselves be given a physical account. But when we examine their subjective character it seems that such a result is impossible. The reason is that every subjective phenomenon is essentially connected with a single point of view and it seems inevitable that an objective, physical theory will abandon that point of view. (Nagel, 1979, p. 167, see also Chalmers, 1996)

Although the brain is all that exists to an outside observer, a great deal more than neural activity exists "in there," namely mental events, that cannot be observed from an outside perspective: "So, from the outside, we cannot reduce the experience of 'red' to the neural state because *we have no place to begin the reduction*. There is no materiality to the experience 'red' from this point of view, because the experience of 'red' is illusory from the outside standpoint" (Feinberg, 1997, p. 90). The inaccessibility of mental states thus makes them irreducible (Wilson, 1974). Reductionism fails to adequately explain subjective experiences because it must eliminate the notion of consciousness:

The point of having the concept of consciousness is to have a word to name the subjective experiences. The other reductions were based on carving off the subjective experience of heat and color and redefining the notion in terms of the causes of the experiences. Because the phenomenon that we are discussing *is* the subjective experience itself, one cannot carve off the subjective experience and redefine the notion in terms of its causes without losing the point of the concept. (Searle, 1998, p. 27)

We can conclude our mental states, and only our mental states, cannot be reduced to physical entities. Laird Addis summarizes why this is the case:

what makes the properties of states of consciousness mental and *not physical* derives from two facts (1) that those properties are known only in their intrinsic natures, to those being to whom they are known, only by introspection and never by the outer senses; and (2) that none of those properties of genuine states of consciousness is in fact identical to any property that is discovered or discoverable through the outer senses. So they do constitute a realm of properties distinct from any that physics, even broadly conceived, would ever mention. (Addis, 1989, p. 23, see also Grossmann, 1973, pp. 188-189)

So although reductionism is the most parsimonious solution to the mind-body problem, reducing minds to matter fails to adequately explain the nature of subjective states.

§ Concluding Remarks

We began with the physicalist's objection to the use of mental terms on the grounds of ontological parsimony. Concerns with linguistic parsimony showed the need for mental terms to be included in our vocabulary. A reductionist can agree to the use of these terms by saying that they could be reduced to physical states. However, because the mind has fundamentally different properties than any physical object, it exists as a fundamentally different type of entity.

Why, then, is dualism in such disrepute? One problem is that there exists a great confusion over the language that the mind-body debate uses. While seemingly all of us would agree that the brain causes the mind and the mind has properties that are not physical, when it comes to taking an ontological stance, many philosophers are confused about how to interpret these facts. As John Searle bemoans:

In the philosophy of language, for example, it is not at all common to deny the existence of sentences and speech acts; but in philosophy of mind, obvious facts about the mental, such as that we really do have subjective conscious mental states and that these are not eliminable in favor of anything else, are routinely denied by many, perhaps most, of the advanced thinkers in the subject. (Searle, 1992, p. 3)

One reason for this phenomenon may be the confusion of the fact that a psychological science must be behavioristic to mean that mental states do not exist. This category mistake is known as psychologism, the mistaking of a philosophical question, in this case the mind-body problem, for a psychological question. Despite the need for an empirical science, there is no reason to be so materialistically minded (Grossmann, 1965, pp. 138-143).

Another reason for the popularity of materialism may lie in the fact that the brain causes the mind. Any two identical brain states will produce the same mental states. This is often taken to mean that reductionism is valid. Yet identity does not necessarily confirm reductionism: "there is always a very tight connection between psychology and physiology in the analysis of any behavioral event. However, such a statement does not imply that psychology is identical with, or reducible to, physiology" (Moore, 1980, p. 469). Just because mental states can be *identified* with their brain states does not mean that they are the *same* as brain states (Brodbeck, 1966). In the end, however, the point of view one takes seems to pre-determine one's stance on reductionism:

In the last few years, there has again been an extended discussion of this explanatory gap argument in the literature. Unfortunately, there is always a point in the argument where a basic intuition of some sort is inevitably invoked - either a version of the intuition that

whatever the physical story is, it still leaves out the 'essentially subjective' phenomenal features, or, on the other hand, a version of the contrary intuition that provided we reach an adequate physical story, 'in fact' there won't be anything left out although it may 'seem' to us as if it were so. There seems to be no way rationally to decide the issue once the level of these conflicting intuitions has been reached. (Kurthen, Grunwald, & Elger, 1998, p. 231)

Despite agreeing on the basic nature of reality (although it has been jested by Jaron Lanier that "the logical possibility exists that there are some people without internal experience, and that would certainly explain our diverging philosophies"), when it comes to forming an ontological position, both materialists and dualists alike regard the opposing theory as invalid as the theory of phlogiston.

There are further problems with the language of the mind-body debate. Addis, a self-proclaimed dualist, freely endorses what he calls philosophical materialism and scientific materialism. Searle rejects the terminology of "materialism" and "dualism" as being inadequate to handle discussion of the so-called mind-body problem:

The weird feature about this entire discussion is that materialism inherits the worst assumptions of dualism. In denying the dualist's claim that there are two kinds of substances in the world or denying the property dualist's claim that there are two kinds of properties in the world, materialism inadvertently accepts the categories and the vocabulary of dualism. It accepts the terms in which Descartes set the debate. It accepts, in short, the idea that the vocabulary of the mental and the physical, of material and immaterial, of mind and body, is perfectly adequate as it stands. It accepts the idea that if we think consciousness exists we are accepting dualism. What I believe - as is obvious from this entire discussion - is that the vocabulary, and the accompanying categories, are the source of our deepest philosophical difficulties. As long as we use words like "materialism," we are most invariably forced to suppose that they imply something inconsistent with naive mentalism. I have been urging that in this case, one can have one's cake and eat it too. One can be a "thoroughgoing materialist" and not in any way deny the existence of (subjective, internal, intrinsic, often conscious) mental phenomena. However, since my use of these terms runs dead counter to over three hundred years of philosophical tradition, it would probably be better to abandon this vocabulary altogether. (Searle, 1992, pp. 54-55)

Current talk about the mind-body problem uses more technical phrases such as "supervenience," "epiphenomenalism," and "weak externalism." More bizarre terms such as "non-reductive physicalism" and calling Searle a "materialist dualist" are also appearing. It remains to be seen if redefining the mind-body problem with such terms will produce any less confusion. I have made the effort to present a solution to the mind-body problem, not only with consideration to the principle of parsimony, but also using the vocabulary in which it has been traditionally posed.

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If you are interested in further readings on the philosophy of mind, I suggest starting with the bibliography in Herbert Feigl's *The "mental" and the "physical", the essay and a postscript*. (Q175 .F383 1967). A more contemporary and comprehensive bibliography is maintained online by David Chalmers: <http://consc.net/biblio.html>; another good set of publications are available from the [Center for Consciousness Studies](#).

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