



Eliminativism Redux: Are Quotidian Pains Hurting Science?

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Abstract

Scientific inquiry has revealed that pain is a complex and heterogenous phenomenon that is neither localized to a circumscribed region in the brain nor realized by a unique neurological mechanism. This discovery has inspired the application of a new version of eliminativism—scientific eliminativism—to pain. Based on this view, pain is not a natural kind and should be eliminated from scientific theorizing. Scientific eliminativism applied to pain is purportedly distinct from eliminative materialism because the former does not require elimination of the term ‘pain’ from its quotidian uses in folk psychology. In this paper, I challenge the distinction between scientific eliminativism and eliminative materialism and argue that the two versions of eliminativism make the same claims. I argue further that endorsement of scientific eliminativism for pain leads to elimination of the category of pain from folk psychology. To avoid this outcome, I formulate a proposal that obviates the need for eliminativism in any domain.

1 Introduction

Melzack and Wall (1965) developed a gate-control theory of pain. The primary conceptual development of this theory is the recasting of pain as being composed of sensory, affective, and cognitive features. According to this view, a typical instance of pain, such as the one that might be experienced when stubbing a toe, has three aspects: One aspect of pain is sensory and discriminative, which includes the pain’s location, its intensity, and its character, e.g., sharp, dull, or lancinating. The other aspect of pain is its affective and motivational character, i.e., pain is unpleasant and it motivates the individual to withdraw from the offending stimulus. The third aspect of pain is cognitive and includes the role of attention, expectation, and learning in the categorization of certain sensory experiences as pain as well as its categorization as a particular type of pain, e.g., an intense, lancinating pain in the foot. To account

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for the complexity of pain, Melzack and Wall (1965) and Melzack and Casey (1968) propose that pain is realized by a neurological system which includes a pathway for the sensory and discriminative aspects of pain, another for the affective and motivational element of pain, and a third for the cognitive features of pain.

The neurological complexity of pain prompts Hardcastle (2001) to argue that pain is not one, but two distinct systems: The first system is for the sensory processing of painful stimuli and is comprised of the sensory and discriminative pathway for pain processing as well as its affective and motivational pathway. The second system is inhibitory and enables the cognitive modulation of pain through attention, expectation, or learning. Hardcastle further proposes that the commonsense concept of pain, or the concept of pain utilized in everyday life, should reflect the biological complexity of pain and she proposes that the unitary concept of pain should be eliminated and replaced by two concepts: ‘pain’ and ‘pain inhibition.’ Hardcastle’s proposal is an instance of eliminative materialism (EM), a position originally described by Churchland (1990). EM is the view that when a category of quotidian psychology, e.g., pain, cannot be identified with a neurological process, that category should be eliminated from everyday parlance and it should be replaced by a concept that accurately designates a neurological category.

In addition to being complex, pain is also heterogenous. For example, there are pains that result from noxious stimulation, e.g., exposure to heat or to cold, from exposure to toxins, e.g., capsaicin, but there are pains that can occur without such stimulation, e.g., chronic pain or phantom limb pains. The complexity and heterogeneity of pain has led Coninx (2023) and Corns (2020) to conclude that pain is not realized by a unique neurological mechanism. Coninx (2023) argues that despite the lack of a unique mechanism for pain, distinct pains are realized by neural systems that bear a family resemblance to each other and therefore she maintains that pain, as a category of experience, can remain useful in the scientific study of pain. Corns (2016, 2020) argues instead that the category ‘pain’ is not a natural kind and is not useful in scientific theorizing. Corns’s argument is an instance of scientific eliminativism, a view proposed by Machery (2009). Based on this view, a scientific term, e.g., ‘pain’ or ‘concept,’ is useless, and even a hurdle to scientific progress, when it fails to pick out a natural kind (Machery, 2009, 241), and that when this is the case such a term should be eliminated from scientific theorizing. Corns’s scientific eliminativism for pain is contained only to the scientific domain because Corns maintains that ‘pain’ remains useful in quotidian parlance.

In what follows, I show that the proposal for the circumscribed elimination of pain only from scientific theorizing is not successful; instead, the scientific elimination of pain would lead to the elimination of pain from everyday parlance. I begin my argument, in Sect. 2, by describing the empirical evidence for the founding premise of scientific eliminativism for pain, which is that pain cannot be identified with a specific biological mechanism. In Sects. 3 and 4, I characterize eliminative materialism and scientific eliminativism, respectively. In Sect. 5, I demonstrate that arguments for the circumscribed elimination of pain only from scientific theorizing are not successful because our quotidian parlance about pain is best described as an empirically evaluable theory of pain. In Sect. 6, I demonstrate that scientific eliminativism is not motivated unless pain is a shared term between neuroscience and

quotidian psychology. I then demonstrate that if pain is a shared term, its scientific elimination leads to its elimination from everyday parlance. I conclude by arguing that the category of pain utilized in quotidian parlance is shaped by neuroscience and therefore does not impede the progress of the science of pain. This, in turn, obviates the need for eliminativism in either neuroscience or quotidian parlance.

2 Pain and Neurological Mechanisms

Before tackling scientific and classic eliminativism, I will describe the arguments proposed by Corns (2020) and Coninx (2023) to support the premise that pain is not realized by a unique neurological mechanism to demonstrate the motivation for the call to eliminate pain as a scientific category. The focus of this section, however, is not the assessment of the truth of the claim about the existence of a neurological mechanism for pain. I will assume, for the sake of argument, that the call for elimination is well grounded in the empirical evidence.

Much of the current empirical research in pain utilizes the paradigm established by the gate-control theory of pain. Melzack and Wall (1965) and Melzack and Casey (1968) propose gate-control theory of pain through their rejection of specificity theory. Specificity theory postulated a one-to-one correspondence between stimulation of dedicated pain receptors and activation of a specialized pain center in the brain. As it turns out, each element of that view was refuted—there are neither dedicated pain receptors nor a specific pain center in the brain. The postulation of the gate-control mechanism can account for why the stimulation of certain receptors at the periphery of the nervous system in the skin or the viscera is not sufficient to evoke pain. The gate-control mechanism located in the dorsal horn of the spinal cord modulates the input transmitted from nociceptors. Nociceptors are afferent nerve fibers that carry information from the sensory organs to the central nervous system (CNS), and the dorsal horn is where afferent nerves merge into the CNS. The output from dorsal horn is based on the intensity of the signal from the afferent nerves. The intensity of the output is the ratio of activation between small and large afferent fibers, the latter of which have an inhibitory effect. The large and small fibers are referred to in most of the literature respectively as C fibers and A-delta fibers (Bishop, 1946). The output of the large afferent fibers can also be modulated by the neocortical areas of the brain or by what Melzack and Casey (1968) refer to as the central control system (p. 426). Based on this view, stimulation of nociceptors is not sufficient to elicit pain because of the potential cognitive modulation of the gate-control mechanism in the spinal cord. Thus, there are no dedicated pain receptors because stimulation of afferent nerve fibers is not sufficient for the experience of pain.¹

¹ Based on gate-control theory, there are at least two distinct nociceptive fibers A-delta and C fibers, each of which are activated by different stimuli. Additional evidence points to the existence of multitude of additional nociceptive fibers, each sensitive to variety of thermal stimuli as well as capsaicin. Furthermore, there are nociceptive fibers which are activated only as a consequence of the inflammatory process that might result from injury (Dubin and Patapoutian 2010). Considering this evidence, it is better to say that A fibers and C fibers designate categories of fibers, which are preferentially sensitive to certain kinds of stimuli usually implicated in pain.

Melzack and Casey (1968) argue that pain as a category is the product of interacting, but separate, neural mechanisms, each of which realizes one of the three aspects of pain. For example, there are pathways: “(a) via neospinothalamic fibers into the ventrobasal and posterolateral thalamus and somatosensory cortex; and (b) via medially coursing fibers, which comprise a paramedial ascending system, into the reticular formation and medial intralaminar thalamus and the limbic system” (Melzack & Casey, 1968, 427). The pathway that projects into the thalamus and the somatosensory cortex underlies the sensory and discriminative aspects of pain, while the activation of the reticular formation and the limbic system contributes to the unpleasantness of pain and motivates the person to perform actions required to avoid noxious stimuli. Finally, the cognitive aspects of pain are subserved by the prefrontal cortex (Melzack & Casey, 1968). Melzack and Casey (1968) conclude:

“The word "pain" is a label, a category, signifying a multitude of different, unique experiences. Pain varies along both sensory-discriminative and motivational affective dimensions. The magnitude or intensity along these dimensions, moreover, is influenced by cognitive activities...Pain must be defined in terms of its sensory, motivational, and central control determinants. Pain, we believe, is a function of the interactions of all three determinants, and cannot be ascribed to any one of them” (Melzack & Casey, 1968, 434).

At this point, it is important to note that there are a couple of distinct ways of identifying a unique neurological mechanism, each of which might lead to a different verdict regarding the existence of one for pain. Mouraux and Iannetti (2018) distinguish between a pain selective and a pain specific neural response. They argue that “...(A) neuron selective for pain would exhibit a response preference for pain, i.e., it would fire more strongly when pain is present as compared to when pain is absent. It follows that selectivity is not an all-or-nothing property and, instead, can be graded or quantified” (Mouraux & Iannetti, 2018, 3293). They argue further that: “...(A) ‘pain specific’ neuron would be a neuron that increases its firing rate when pain is present, and never does when pain is absent, i.e. it would exhibit the highest degree of selectivity” (Mouraux & Iannetti, 2018, 3293). But they caution that neural specificity would be difficult to demonstrate as it would require exposure to an exhaustive array of stimuli to determine that a neural response is specific only to noxious stimuli.

Mouraux and Iannetti (2018) maintain that there is paucity of evidence in support of either a selective or a specific neurological mechanism for pain. First, Mouraux and Iannetti (2018) argue that the evidence is still out on the existence of pain specific or pain selective neurons in the sensory and discriminative areas of the pain pathway. In addition, although there is some evidence in animal models for pain selective neurons in the affective and motivational pain pathway, the evidence is characterized by Mouraux and Iannetti (2018) as sparse. This undermines the claim that there are neurons that are either specific or selective for nociceptive stimulation. Second, there is some evidence against a pain selective or specific neurological system. A study by Salomons et al. (2016) demonstrates that other types of sensory experiences trigger to a similar extent the same sensory and affective pathways

activated by nociceptive stimulation even in individuals who lack nociceptive receptors (Salomons et al. 2016).

Melzack (2001) proposes a neuromatrix theory of pain, which abandons the requirement of a specific or selective neural system for pain. Melzack maintains that pain is a multidimensional phenomenon, which is normally the result of sensory inputs, but can happen even in absence of such stimulation, as in instances of chronic pain. Based on this view, pain is the result of a typical pattern of neural impulses, i.e., a neurosignature for pain. This neurosignature is realized by a neuromatrix, which Melzack (2001) defines as a widely distributed network of neurons that represent the body and the self as a unit. Melzack (2001) further argues that this widespread neural network is initially genetically determined but continues to be modified by sensory inputs, emotional stressors, as well as cognitive influences. Therefore, the characteristic neural signature for pain is the result of a developmental process, which includes repeated exposure and activation of the neuromatrix.

Although there have been attempts to identify such a neural signature for pain (Tracey & Mantyh, 2007), the jury is still out on whether it exists. According to Coninx (2023) current efforts fall short of identifying a universal neuromatrix for pain because patterns of activity in the brain that result in painful experiences vary across distinct categories of pain, e.g., visceral or thermal. In addition, there are individual differences in patterns of activity that correlate with painful experiences. This is not surprising, if Melzack (2001) is correct in the estimation that both emotional stressors and cognitive influences can affect the activation patterns through a neuromatrix. In sum, although there seems to be some consensus that painful experiences are the result of sensory, emotional, and cognitive processing, there is no agreement that such processing is realized by a characteristic neural mechanism in the brain.

3 What is Eliminative Materialism?

Given that scientific eliminativism is a repudiation of the eliminativist thesis originally proposed by Churchland (1990), I will begin by presenting the basic structure of Churchland's eliminative materialism (EM) to assess criticisms of it in Sects. 5 and 6 of this paper. EM is one of the proposed solutions to the mind and body problem and it was introduced as an alternative to reductive materialism.² Churchland's eliminativism has two premises: (1) the quotidian invocations of psychological states, e.g., beliefs, thoughts, and sensations, constitute a folk psychology (FP), which is an empirically evaluable theory; (2) FP is a false theory because empirical evidence undermines it. Thus, FP should be eliminated in favor of a more explanatorily successful theory.

² The kind of reductive materialism that Churchland disputes is type-type materialism, which is the view that the mind and body problem can be resolved by identifying types of mental states with types of brain states. An example of such an identification can be found in Rorty (1970), where he proposes, but does not endorse, the identification of pain with C-fibers firing.

The particularities of EM's first premise are important for the remainder of my argument, so I will present it in some more detail. Churchland (1990) argues that folk psychology has all the characteristics of an empirically evaluable theory. Folk psychology aims to explain and predict human behavior by positing unseen entities, i.e., mental states. For example, when one sees an individual fleeing a scene of a crime, one explains that by appealing to a variety of mental states, e.g., beliefs, thoughts, or sensations, that usually cause an individual to run in fear, e.g., they believe that a shooter is pursuing them. Similarly, one can predict the likelihood that an individual might run in fear by positing beliefs about personal risk, i.e., one will run to safety if one is pursued by a mal-intended shooter. Hence, just like physics or chemistry, where particles or molecules are posited to explain and predict observable physical or biological phenomena, FP explains and predicts human behavior by specifying law-like relations between psychological states, external stimuli, and overt behavior (Churchland, 1990). According to Churchland everyday psychological explanations contain law-like generalizations that mirror the structure of scientific generalizations. For example:

- (1) $(x)(p)[(x \text{ hopes that } p) \ \& \ (x \text{ discovers that } p) > (x \text{ is pleased that } p)]$;
 is like the statement
 (2) $(x)(f)(m)[((x \text{ has a mass of } m) \ \& \ (x \text{ suffers a net force of } f)) > (x \text{ accelerates at } f/m)]$.

The relationship between “x hopes that p” and “x discovers that p,” which yields the conclusion “x is pleased that p,” is the same as the one contained in the expression “x has mass of m” and “X suffers a net force of f,” which results in the conclusion “x accelerates at f/m” (Churchland, 1990). In sum, the first premise of EM is that FP is a scientific theory.

Recasting FP as an empirically evaluable theory allows Churchland to argue that FP is false: “Since folk psychology is an empirical theory, it is at least an abstract possibility that its principles are radically false and that its ontology is an illusion” (Churchland, 1990, p.6). This argument for the principled revisability of FP allows Churchland to introduce the second premise of eliminativism, which is that FP is *de facto* a radically false theory. According to Churchland FP has internal failures, i.e., it fails to successfully explain phenomena within its domain, such as some of the most basic psychological phenomena, e.g., perception, imagination, mental illness, or sleep (Churchland, 1990). FP also has external failures because it fails to cohere with other scientific theories such as neuroscience. If FP is as Churchland says it is, one can then assess the quality of FP based on the standards used for scientific theories. One can gauge the explanatory strengths of FP in relation to those of neuroscience and the comparison is less than flattering. Churchland argues that neuroscience is a more powerful approach because it is making more headway in explaining crucial phenomena like perception or memory. In sum, FP and its tenets and categories should be eliminated in favor of a theory of better quality, i.e., neuroscience.

This is a good place to point out that there is yet another type of eliminativism that precedes Churchland's formulation. Both Quine (1969) and Feyerabend (1962) endorse the view that successful reduction is elimination. Based on this view, when an entity, such as a table, is successfully characterized as a collection of atoms, then

one could argue that the only entities that are real are those of the reducing theory, in this case the entities posited by physics. Churchland's proposed eliminativism is not the outcome of successful reduction of FP to neuroscience. Churchland argues that radically false theories, such as folk psychology, should be eliminated because they cannot be reduced since they posit entities that do not exist. If reduction entails, as Nagel (1961) proposes, that the entities of the reduced theory are identified with the entities of the reducing theory, then the falsehood of the reduced theory travel down to the reducing theory via bridge laws established to identify the entities of the theories involved in the intertheoretic reduction. Thus, reduction of a false theory, e.g., folk psychology, would render the reducing theory, e.g., neuroscience, false. Hence, EM is an argument for elimination without reduction, i.e., a preemptive elimination.

The conclusion of EM is that the posited entities of FP, including thoughts and beliefs, which cannot be successfully reduced to neuroscience should be eliminated.³ Proponents of EM argue that this elimination should occur not only in scientific circles, but that FP should be replaced as the primary psychological framework utilized in everyday life. FP should also be eliminated from our quotidian attributions of mental states because neuroscience, as a more suitable theory, would improve the ability to explain and predict human behavior in science and in quotidian parlance.

An application of EM to pain is proposed by Hardcastle (2001), who argues that the commonsense concept of pain is not representative of the different dimensions of the pain system and therefore that it should be eliminated and replaced by two different concepts that reflect the different elements of the pain system. Hardcastle (2001) proposes a theory of pain, which is a modification of the Melzack and Casey (1968) proposal with more emphasis given to the inhibitory aspects of pain. Hardcastle's theory distinguishes between the pain sensory system (PSS) and the pain inhibitory system (PIS) (Hardcastle, 2001, 130). "PSS and PIS ... serve two different goals: the PSS keeps us informed regarding the status of our bodies. It monitors our tissues to maintain their intactness whenever possible. In contrast, the PIS shuts down the PSS when flight or fleeing is imminent, and then enhances the PSS response in moments of calm" (Hardcastle, 2001, p. 134). Based on this approach, the PSS is bottom-driven because it is activated by nociceptive stimulation, while the PIS is a top-driven, cognitively controlled system that serves the purpose of modulating the effects of PSS. In this way, Hardcastle proposes an elimination of the category of pain, rejecting even the reconceptualization of pain proposed by Melzack and Casey (1968), in favor of two distinct phenomena—the system for the sensory processing of pain and the system for inhibiting pain.

Furthermore, Hardcastle argues that the way we speak about pain in our everyday life needs to be reformed:

"I hold that adopting a biological perspective on pain entails an eliminativism regarding pain talk... Though I do not wish to eliminate most folk expressions concerning our mental life, I do believe that our ways of discussing pain are

³ The good news is that Churchland argues that color sensations can be successfully reduced to patterns of activation in the visual cortex (see Churchland, 2005).

broken beyond repair. They do not reflect what we know to be true about pain processing; they do not reflect the complexity of our experience. Moreover, they assume a tacit dualism. Our best strategy is simply to scrap them and start over” (Hardcastle, 2001, 152).

With this Hardcastle presents an application of EM to pain because she calls for the elimination of the folk-psychological conception of pain. She argues that the biological characterization of pain as being two distinct systems should be adopted into our everyday parlance. This is because, as Hardcastle argues, the folk-psychological category of pain does not serve us well outside of the scientific realm as it fails to be useful in capturing our quotidian experiences of pain.

4 What is Scientific Eliminativism?

Machery (2009) proposes scientific eliminativism (SE) as an alternative to EM. The need for an alternative eliminativism, according to Machery (2009) and Mallon et al. (2009), is because EM rests on a descriptivist theory of reference. Machery argues that: “(E)liminativist arguments are fundamentally vitiated...These arguments rely on assumptions about how words like ‘concept’ or ‘belief’ refer” (Machery, 2009, 225).

In what follows, I will describe Machery’s argument that EM is dependent on a theory of reference and the argument that this blocks Churchland’s proposal for the elimination of folk psychology. A descriptivist theory of reference is the following view: a set of competent speakers associate a particular term with a particular description. For example, pain is an unpleasant sensation that results from tissue damage. This description specifies a set of properties that set the referent of ‘pain.’ Thus, something is a pain only if it is an unpleasant sensation resulting from tissue damage. If it turns out to be the case that there is no state that uniquely or partially satisfies the description of pain, then ‘pain’ does not refer. Hence, the conclusion that if the folk-psychological description of pain is proved wrong by neuroscience, then folk-psychological ‘pain’ does not refer and should be eliminated.

Mallon et al. (2009) point out that the descriptivist theory of reference has been challenged by a causal-historical theory of reference proposed by Kripke (1980) and Putnam (1975). Based on this view, the referent for a term is set based on a historically established description. For example, imagine that the term ‘pain’ is introduced into a community for the purpose of referring to an unpleasant sensation that results from tissue damage. Now, imagine further that neuroscience discovers that none of the elements of the original description obtain, i.e., pain is not an unpleasant sensation that results from tissue damage. On the causal-historical theory of reference, the term ‘pain’ may continue to refer so long as the causal chain from the original association between ‘pain’ and its description is maintained. This happens when each user of the term ‘pain’ learned the meaning of the term from another user of that same term, reaching back all the way to the original Jones who introduced the association between ‘pain’ and an unpleasant sensation. Based on this theory

of reference, ‘pain’ continues to refer even if the referent fails to satisfy the original description.

Machery (2009) argues further that we do not have good ground to prefer one of these two theories of reference because empirical work demonstrates that competent users of a language differ in their intuitions regarding different theories of reference. For example, Machery et al. (2004) showed that American subjects were much more likely to endorse a causal-historical view of reference than Chinese subjects. Thus, the move to eliminate ordinary terms is unwarranted because different people have different intuitions about how their folk terms refer, i.e., there are inter- and intra-cultural differences among folk theories of reference.

Scientific eliminativism, as characterized by Machery (2009), is a view that does not rest on assumptions about theories of reference because the call for elimination is based on claims about the status of specific psychological categories as natural kinds. Based on SE, the call for elimination is grounded in the argument that a particular category is not a natural kind: “a scientific term is likely to be useless, if not a hurdle, because it fails to pick out a natural kind” (Machery, 2009, 241). The advantage of scientific eliminativism is both that it does not rely on a theory of reference to support calls for elimination and that because elimination of ordinary terms, according to Machery (2009), erroneously relies on the descriptivist theory of reference, elimination can be contained only to scientific theories. SE, unlike EM, allows for circumscribed elimination.

Corns’s (2020) argument is an instance of scientific eliminativism because she argues that ‘pain’ as a category of experience is not a natural kind and that it should be eliminated from scientific theorizing. Corn characterizes natural kinds thusly: ... (W)e are liberally taking natural kinds to be any kinds which are usefully referenced for explanation and prediction in scientific generalizations,...” (Corns, 2020, 141). She further argues that the utility of scientific generalizations will increase as reference to categories of pain are eliminated because evidence for the complexity and heterogeneity of pain indicates that there is not a single mechanism that realizes all pains (Corns, 2020, 156). Nonetheless, she argues that references to single instances of pain for which mechanistic explanations are discovered need not be eliminated from scientific prediction. Corns maintains that although instances of pain might be usefully referenced in scientific generalizations, categories of pain, i.e., thermal pains, punctate pains, etc., are not usefully referenced in scientific generalizations as they are not natural kinds.

Corns (2020), however, argues that there are categories that have quotidian uses, despite their not being useful for scientific theorizing. She argues that one such category is ‘Sunday mornings.’ Such a category might be useful in everyday life as it captures features of how the week is organized; it designates a time of rest; a time of happiness or melancholy; and it identifies a suitable time to meet for brunch. Sunday mornings, however, are not a natural kind, or so Corns argues, and would be unlikely to produce fruitful scientific theories. Corns argues that ‘pain’ is like ‘Sunday mornings:’ both are categories useful in everyday life as they capture a domain of our experiences and enable us to communicate about those to our friends and family, but neither is a useful scientific category. Corns maintains that a class is not a natural kind when it is characterized by properties that do not matter for scientific

theorizing. The reason to think that pain is not useful in scientific theorizing is the lack of empirical evidence for a unique neurological mechanism for pain. And when that is the case, then it makes sense for that class to be eliminated from scientific theorizing. In sum, I take Corns to be arguing that the use of a category that is not a natural kind stalls scientific progress, but that a similar problem does not arise in folk psychology as even categories that are not natural kinds have utility in quotidian parlance.

A full discussion of the aptness of this definition of natural kinds is not necessary for my argument because I can make it by assuming Corns's definition of natural kinds. My primary aim is not to argue that our current folk-psychological conception of pain identifies a natural kind. That type of argument would require the assessment of Corns's characterization of natural kinds and distinct characterizations might lead to a different verdict. Instead, in Sect. 5, I defend the view that the folk psychology of pain is a scientific theory; thus, what constitutes a natural kind for the folk psychology of pain will trail whatever definition of natural kinds is most suitable to explain scientific categories in general. Corns (2020) might be right that scientific categories are useful for theorizing only when they pick out natural kinds. But even if the correct definition of natural kinds were different from what Corns has proposed (or even if one makes an argument that natural kinds are not required for scientific theorizing), my argument would not be affected because I maintain that whatever is true for science is true for folk psychology.

5 Circumscribing Eliminativism

In what follows, I will dispute the claim that there is a version of eliminativism that can be circumscribed only to the scientific domain. To do that, I will address two ways in which the categories of FP could be isolated from elimination. Both these arguments are meant to establish reasons for why quotidian parlance or quotidian psychological frameworks cannot be revised. The first is the argument proposed by Machery (2009) that the elimination of folk-psychological terms assumes a descriptivist theory of reference. The second is the denial of the first premise of EM, which is the FP is a scientific theory. I will address each argument in turn.

As was described in the previous section, Machery (2009) argues that EM has a fatal flaw because of its reliance on a descriptivist theory of reference. This fatal flaw is what leaves room for the proposal of a new version of eliminativism, which is an eliminativism that only applies to scientific psychology or neuroscience. In what follows, I argue that EM is not an argument about how mental terms refer, but an argument about how we individuate our inner states.

First, Churchland proposes eliminative materialism as a solution to the mind and body problem. His proposal there depends on claims about the ontological status of folk-psychological categories and not on how such terms refer. Churchland argues that FP is *de facto* a scientific theory, which can be evaluated through empirical means. This is why he can claim that empirical evidence sourced in neuroscience can be used to undermine folk psychology. Given evidence for the explanatory inadequacy of FP and the lack of neuroscientific evidence for its categories, Churchland

concludes that the categories of FP are non-existent and that attempts to reduce them to neuroscience will fail. This is akin to the claim that because there is no evidence for a unique physical instantiation of pain, pain should be eliminated in favor of another category that better accommodates the empirical evidence for the neurological complexity and heterogeneity of pain. Churchland argues for the elimination of folk-psychological categories in quotidian parlance. But one could in principle isolate the argument for elimination of mental categories in neuroscience from the call to revise FP. If one does that, then EM's call for the elimination of mental categories becomes a view qualitatively similar to SE.

An additional reason to doubt that EM relies on theories of reference is that the argument about how FP could be eliminated and replaced does not rely on a view about how terms refer; instead, it is an argument about how we individuate our inner states. Churchland argues the FP is the basis of a conceptual framework utilized in everyday life to individuate mental states. To put it differently, one introspects mental states, such as beliefs, emotions, and sensations because of the tacit endorsement of a folk-psychological theory that introduces these categories. To make this relevant to the discussion of pain, laypeople individuate and introspect pain because they endorse a conceptual framework that features 'pain' as a category of mental states. Churchland proposes that the way we individuate mental states and therefore the way we introspect them can change if we adopt a framework that does not feature those states. Thus, if FP is replaced by neuroscience and neuroscience does not feature pain as category of experience, we will begin to introspect whatever the alternative category of experience is posited by neuroscience.

Churchland argues that the way to replace FP with neuroscience is through the reconceptualization of the relevant psychological domain. Instead of introspecting pains, Churchland would argue, we could be introspecting the neurological instantiation of the relevant experience. To understand how such a reconceptualization could happen, Churchland argues, we can look to the reconceptualization that happens when an individual becomes an expert in a field. For example, to a musically untrained individual, chords sound like undivided wholes, but a musician can discriminate the individual notes of which the chords are composed. The perceptual change is the result of musical training. Once novices learn that chords are composed of distinct notes, they become able to perceive each note in the chord, i.e., they reconceptualize the perceptual experience as being of one sound to being of three or four sounds (Churchland, 1990, p. 65). To apply this to pain, if it turns out that there are separate neurological instantiations for pain that results from a stubbed toe and the pain that results from venipuncture, perceivers would reconceptualize those two sensory experiences as distinct and be able to introspect them as distinct phenomena. Based on EM, the scientific facts about neurological states and their causes would become incorporated into the relevant background concepts that are used to individuate our experience.

Even if one is not persuaded that reconceptualization can affect introspection in the way proposed by Churchland, one can nonetheless accept that the proposed reconceptualization is not dependent on the possibility of changing the meaning of folk-psychological terms and their referents; instead, it is an argument for the possibility of the reconceptualization of our inner states. Hence, if one wishes to find a

fatal flaw in EM, then one might find it in the estimated likelihood of the proposed reconceptualization. In Sect. 6, I will argue in favor of the reconceptualization of FP. Specifically, I will argue that quotidian conceptions of pain are shaped by the neuroscience of pain.

The second way in which one could argue for the possibility of SE without EM, is by challenging the claim that folk psychology is an empirically evaluable theory, which can in principle be replaced by a better, empirically evaluable theory such as neuroscience. If FP is not a scientific theory, or not even a theory, then one could argue that eliminativism does not apply to FP. Furthermore, one could then argue in line with Corns (2020) that there are some folk-psychological categories, e.g., pain, which can be useful in everyday life without being natural kinds. If one takes FP to be an empirically evaluable theory, i.e., a scientific theory, then the usefulness of its categories would depend on the same features as the usefulness of the categories of neuroscience.

To identify the potential usefulness of FP, let us review proposed views regarding the nature of folk psychology. As was described in Sect. 3, Churchland argues that FP is an empirically evaluable theory because it has all the characteristics of a scientific theory: it posits unseen entities to explain and predict overt behavior and it introduces generalizations that have the structure of natural laws. This is unlike Corns's characterization of ordinary terms, such as 'Sunday mornings,' as having usefulness unrelated to scientific theorizing. Churchland characterizes the primary role of FP as being just that of scientific theorizing within the psychological domain, i.e., its the primary purpose is to predict and explain human behavior by employing psychological generalizations. And, in what follows, I argue that when it comes to the folk psychology of pain, Churchland's characterization of our quotidian psychology is correct.

Since the original characterization of FP, there have been a few alternative accounts of folk psychology. For example, Godfrey-Smith (2005) characterizes folk psychology as a model akin to those utilized in scientific inquiry to support prediction and explanation of certain phenomena. Based on this view, an individual can explain and predict the behavior of another person by running a simulation of how they would behave in each situation, i.e., they would model what another individual would do in each situation based on what they would do in that same circumstance. Godfrey-Smith (2005) proposes this view as a better characterization as it does not presuppose the endorsement of a theory. But this view maintains the parallel between scientific psychology and folk psychology as it attributes the paradigm of simulation to quotidian psychological predictions and explanations. Furthermore, this alternative leaves untouched the claims that the results of the simulation would be empirically evaluable or that they would support prediction and explanation by positing mental states, i.e., by endorsing a particular theory of inner states.

Andrews (2008, 2012) argues for an approach to folk psychology that takes into account additional purposes and aims of folk psychology. Andrews proposes a pluralistic approach to folk psychology that includes the role of FP in prediction and explanation of behavior but emphasizes the role of FP in communication and interaction. To explain how the latter are achieved by folk psychologists, Andrews argues that folk psychology includes multiples strategies, such as attribution of

personality trait, stereotyping, egocentric biases, etc. Andrews is not directly challenging the claim that some aspects of FP include attribution of psychological states for the prediction and explanation of behavior; in fact, she argues that explanation and prediction is one of the aims of FP. Furthermore, Andrews argues that folk psychology might have an even more active role of helping folk psychologists shape their environment and make it easier to navigate.

An additional contemporary approach to FP is proposed by Spaulding (2018) who aims to defend the traditional view of folk psychology as attributing mental states for the prediction and explanation of overt behavior, but expands the methods by which attribution of mental states is achieved. Spaulding argues that for folk psychologists to predict and explain behavior they utilize social categorizations, stereotypes, and biases. Although pluralistic folk psychology aims to point out the narrow conceit of the original characterization of folk psychology as endorsed by Churchland, a recent characterization of the pluralistic approach seems to suggest an inclusive project rather than a complete rebuke of the original rendition of FP. Andrews et al. (2021) argue thusly: “Pluralistic folk psychology is a research program that, at its core, is committed to the idea that social understanding and interaction is a complex phenomenon that involves a diverse array of psychological processes. However, there is no particular model of social cognition, or indeed any particular kind of model that all pluralists are committed to” (Andrews et al., 2021, 1691). In sum, although pluralism about folk psychology rejects the view that Churchland’s characterization of FP is the one correct explanation of the role of psychology in our quotidian interactions, none of these views are a direct rebuke of the claim that parts of FP have the features originally described by Churchland and some in fact defend it. It is reasonable, then, to propose that at least aspects of folk psychology establish empirically evaluable generalizations for the prediction and explanation of human behavior.

Corns does not propose a general view of folk psychology, but she does characterize our quotidian invocations of pain as being part of an everyday theory that includes references to pain. She further rejects the claim that the same standards of utility apply to the scientific inquiry to pain as they apply to the everyday theory of pain, and she potentiates the role of this quotidian theory in communication thereby endorsing a pluralistic view of folk psychology. She argues for the utility of the everyday theory of pain thusly:

This everyday notion of pain is useful for communicating with each other in our everyday lives. When I say I am in pain, I tell you something. Indeed, I can lie to you and say that I am in pain when I am not. Our everyday posit of pain facilitates self-identification, self-ascription, and communication to others about the bad things happening to us presently—both to our bodies, as in “physical pain”, and to our minds, as in the so-called “mental pain”. It is instrumental in our search for medical attention, compassion, and sympathy. It facilitates our ability to protect injured limbs, to limit how far we push our bodies, and to identify potentially toxic chemicals and stimulation. We usefully refer to pain with lamentable frequency (Corns, 2020, 192).

Although I agree with Corns that the folk psychology of pain can play a role in communication this way of characterizing FP does not undermine the claim folk psychology can also be characterized as a containing generalization, prediction, and explanation. In fact, when Corns is describing the utility of quotidian invocations of pain, she reasserts that characterization of FP as containing generalizations about the causes of pain, i.e., exposure to toxins or bodily damage, and explanation of overt behavior, i.e., protection of an injured limb. In addition, the motivation to seek medical attention when in pain seems to indicate that the individual in pain characterizes pain as a biological phenomenon for which there is biomedical treatment, i.e., analgesics.

This is in line with my argument that the quotidian theory of pain contains generalizations about causes of pain. One anticipates pain in certain situations, e.g., when touching hot surfaces, when being stabbed, or when stubbing one's toe. In addition, one anticipates certain types of pain behaviors in circumstances that are associated with the experience of pain, such as accidentally walking into a glass door. For example, one expects a person to vocalize discomfort, avoid the noxious stimulus, or display appropriate avoidance behaviors. The expectation of this type of pain-related behavior is what allows us to both predict what one would do when in pain and to reliably infer that the individual is experiencing pain. Finally, in many situations there are reliable ways in which one aims to relieve pain. For example, by rubbing the painful area, by protecting it from other additional stimulation, or by taking medicine. In sum, the characterization of pain in quotidian parlance seems to serve a role that is defined by pain's causes, effects, and its relievers, i.e., it is the part of folk psychology that proposes empirically evaluable generalizations.

The argument that quotidian invocations of pain might have the role of garnering attention or sympathy does not preclude the argument that folk psychology of pain is also an empirically evaluable account of pain, i.e., a scientific theory of pain. Using Corns's liberal account of natural kinds, which is that natural kinds are any kinds that are useful in prediction and explanation in scientific generalizations (Corns, 2020, 141), we can now argue that this same account of utility can be applied to the folk psychology of pain. To do that, it is important to note that for Churchland, folk psychology is a scientific theory because it has the characteristics of a scientific theory. Thus, an everyday theory, as Corns calls it, is scientific because it contains generalizations for prediction and explanation. Thus, the quotidian character of folk psychology, i.e., that it is used in everyday life, is not a reason to think that a theory is not scientific. Thus, if the argument for scientific eliminativism is that the usefulness of a category in an empirically evaluable theory is derived from its status as a natural kind, then the usefulness of FP depends on its containing natural kinds. Hence, if pain is not a natural kind, it is not useful, or at least not as useful as a category that is a natural kind, whether it is a category featured in neuroscience or in folk psychology.

6 One Elimination Leads to Another

At this point, it is possible to assess the need for elimination of pain as a category in any domain. To do this, I will evaluate two standard motives for eliminativism: The first such motive is the claim that pain is inseparable from its folk-psychological

baggage. The second reason to argue for elimination is that FP is static. I will dispute each of these claims in turn. The first argument is that when utilizing the category of pain, one is invoking the folk-psychological characterization of that term. And then, if one wishes to propose an alternative explanation of pain and allied phenomena, one needs to choose a different category free of folk-psychological connotations. This is especially true if this argument is coupled with the view that FP introduces categories that are not natural kinds.

To dispute the claim that the category of pain must come with folk-psychological baggage, I will invoke Lewis's (1972) argument that the theoretical terms of FP are implicitly defined by the collection of platitudes that currently comprise folk psychology. Lewis argues that the theoretical terms of a theory are implicitly defined by their functional role in that theory. All theories, including FP, feature two types of terms: theoretical terms (T-terms) and observational terms (O-terms). T-terms do not have meaning pretheoretically; their meaning is set by the causal roles specified by the O-terms of the theory. The meanings of O-terms of one theory are fixed by other theories as the O-terms of one theory are the T-terms of another. Folk psychology introduces mental terms, e.g., 'beliefs,' 'thoughts,' 'desires,' or 'pains,' as T-terms. In turn, the meanings of mental terms are set by the causal role specified by the O-terms contained within folk psychology.

According to Lewis (1972), a theory like FP is true if it is wholly or partially realized by a certain state of affairs, i.e., if it is wholly or partially true of the world. So, if the observational terms are wholly or partially realized by a certain state of affairs, then the theoretical term refers, and if they are not, then the term does not refer. Lewis's argument is that theoretical terms are eliminable when the theory is fully realized. (This is not a preemptive elimination, but the type of elimination that follows from successful definition as Quine had in mind and as was discussed in Sect. 3 of this paper.) In other words, whether you call an unpleasant sensation caused by tissue damage 'pain' or 'shmain' is irrelevant because T-terms do not have meanings prior to their introduction by a theory and their referents are determined by the O-terms. In situations where pain does not refer, those are situations in which the observational terms that implicitly define pain are not realized by any state of the world. The issue in such cases cannot be resolved by eliminating the theoretical term; instead, the problem would have to be resolved by adjusting the description specified by the O-terms. Hence, this type of eliminativism does not motivate the preemptive elimination proposed by Churchland, or even those proposed by Machery and Corns, because eliminating T-terms on its own does not affect the descriptor that picks out the referent of the term. In turn, given that theoretical terms are implicitly defined by the observational terms, changes in the observational terms alter both the referent and the meaning of the term, rendering the elimination of the theoretical term innocuous. It is entirely irrelevant whether we keep using the term 'pain' if the observational terms fixing the referent are either wholly or partially in accord, or in fact sourced, in neuroscience.

I will illustrate this further. Let us assume, for example, that pain is defined thusly:

- (1) 'Pain' is an *unpleasant sensation* that *results* from *tissue damage*.

In (1) ‘pain’ is a T-term and all the italicized terms are O-terms. An elimination of pain as a T-term in favor of an alternative T-term, ‘Shmain’ in this case would result in the following change:

(2) ‘Shmain’ is an *unpleasant sensation that results from tissue damage*.

In (2) ‘shmain’ is a T-term and all the italicized terms are O-terms.

The utility of such a change does not seem obvious as the causal role or the implicit definition of the T-term would not be altered through its elimination. To modify the implicit definition of the T-term, there would need to be a change in the O-terms. In other words, T-terms are revised when the theory that introduces them is revised. Based on Lewis’s view, pain, as a T-term, does not have pretheoretical meaning and if a neuroscientific theory of perceptual or sensational phenomena featured ‘pain’ as a T-term, the meaning of this term or its causal role would then be defined by the neuroscientific theory that features it. Furthermore, keeping ‘pain’ as a T-term would not have any effect on scientific or theoretical progress as the meaning of that term would not be limited by a folk-psychological definition of pain. It could then, awkwardly, be the case that ‘pain’ is a T-term both in folk psychology and in neuroscience with entirely distinct definitions or causal roles because of their being embedded in different theories.

To motivate scientific elimination then one would need to argue that pain is a shared T-term, a term that is both defined folk-psychologically and the object of scientific inquiry. If we then couple this with the claim both SE and EM have in common, which is that a theory, e.g., neuroscience, which posits natural kinds cannot reduce a theory that does not, e.g., folk psychology, then the theory that does not posit natural kinds should be eliminated. This is a different way of saying that pain as characterized by folk psychology should not be the object of scientific inquiry. I take Corns’s argument for the scientific elimination of pain to be resting on this view. Here it might be useful to point out that if this is the motivation for elimination, then one needs to draw a disanalogy between ‘pain,’ as a category of folk psychology, and ‘Sunday mornings,’ or any other folk psychological category that is not currently a scientific category. The argument for the elimination of pain is motivated by the fact that pain is already treated as a scientific category, hence the need for the argument that it should not be.

It is time now to evaluate whether scientific eliminativism can be achieved without revision of folk psychology. To argue that this is not probable, I will invoke the second motivation for eliminativism, which is the claim that FP is static. Churchland argues that because of its status as an empirically evaluable theory FP is in principle revisable, but he couples this argument with the claim that current FP is the same as the FP of the ancient Greeks. I will dispute the claim that folk psychology for pain does not change to show that SE for pain would result in EM for pain. To do this, I will reprise the argument for the boundaries of FP of which there are different versions all with a similar upshot. For example, Stich (1996) argues that FP is composed of “generalizations that are ‘common knowledge’ among ordinary folk. Almost everyone assents to them, and almost everyone knows that almost everyone else assents to them”. Lewis (1972) similarly argues that a psychological theory is implicit in our everyday parlance and that we could identify the boundaries of it by

collecting quotidian platitudes that contain mental terms, such as ‘belief,’ ‘emotion,’ and ‘sensation.’ Churchland (1990) does not provide specific guidance for how to identify the boundaries of FP, but he argues that it is an empirically evaluable theory that utilizes mental states to explain and predict behavior in everyday life. These ways of circumscribing quotidian psychological generalization would lead to the identification of the most current folk psychology.

As was described earlier, Lewis holds the view that the O-terms of one theory are the T-terms of another. So, for example, if the observational terms that characterize ‘pain’ in our current FP are derived from a neuroscientific theory, then the causal role of ‘pain’ as a T-term in FP, is partially set by the neuroscience of pain. This establishes the principled possibility of the influence of neuroscience on FP, and I will now attempt to provide some reason to believe that such influence is not just principled, but actual for pain as a category of experience. Given the general influence of science on everyday parlance, it is likely that many of the O-terms of our folk psychology are derived from scientific psychology and neuroscience. This influence is particularly conspicuous in medicine because clinical encounters require that physicians use biological explanations to alleviate the patient’s health problems, including their pain. We often talk, complain, and seek advice from physicians to obtain pain relief. And when we do this, the causal role of pain changes to accommodate the information provided by the physician. When speaking to physicians about our pain, we incorporate the characterizations of pain utilized by healthcare professionals. The patient might learn about the biological causes of their stabbing eye pain and might discover the best way to relieve pains of particular biological causes. In some instances, the process of speaking to a physician about one’s pain might lead to an understanding of the biological processes that might cause the particular pain or the biological mechanisms that lead to pain relief. Physicians use the reported location, intensity, duration of pain, and its proximate causes to fix its etiology and to treat it. Medical encounters require sharing similar concepts to achieve the solution to quotidian problems, such as the occasional experience of unpleasant sensations.

Now, if the category of folk-psychological ‘pain’ and the category of neuroscience ‘shmain’ were entirely incompatible, such an identification would be impossible. Assuming that it is indeed the case that folk-psychological ‘pain’ does not pick out a natural kind, but that ‘shmain’ does, then for patients and physicians to achieve analgesia, the disparate categories of pain would have to overlap to a certain extent. If scientists were to eliminate the use of pain and if there were no correspondence between pain in FP and the terms used by scientists, then clinicians, who use evidence-based methods to alleviate pain, would simply not have a way of addressing pain as a quotidian problem. Moreover, if first-person reports of pain are the basis of diagnosis and treatment, using a term that does not designate a natural kind would mostly impede the ability to find relief from one’s symptoms. As Klein (2022) argues, *contra* Corns, it is not straightforwardly clear that the folk-psychological category of pain is that useful in the clinic because of the variability of pain reports. Thus, it makes sense to argue that if pain is not a natural kind, then it should be replaced by a more useful category even in everyday parlance. This is why EM is the solution to the problem of shared terms like ‘pain’ as it calls for their elimination

in favor of those that designate natural kinds. The upshot here is that scientific eliminativism is unmotivated unless pain is a shared term. But because pain is a shared term, then scientific elimination would result in the elimination of pain from folk psychology. As Klein (2022) points out, if one takes the view that folk psychology and neuroscience are not distinct domains but differ primarily in rigor and quality, then “the two stand or fall together” (Klein, 2022, 995).

Finally, it is now possible to also show that the type of elimination that is proposed both by SE and EM, which is the preemptive elimination of a category to promote scientific progress, is unnecessary. The scientific elimination of pain is warranted only if both folk-psychological pain is not a natural kind and if neuroscientific pain is attempting a reduction of the former. Based on my argument neither of those conjuncts obtain. If there is not an attempt to reduce FP pain to neuroscience, then pain can be characterized or not by neuroscience in ways that are not limited or guided by the folk psychological category. So, the first motivation for eliminativism does not obtain.

The second motivation for eliminativism is the static nature of folk psychology that creates an incompatibility between folk psychology and neuroscience. As I argued before when I asserted that pain is a shared term, this type of incompatibility is unlikely because quotidian parlance about pain is modified by scientific conceptions of pain. It is important to note that my claim is not that because pain is a shared term the way in which we currently characterize and identify it will remain unchanged or that the scientific endeavors on the nature of pain have to ground their inquiry in our current quotidian conceptions of pain. Instead, my argument is that the scientific conception of pain or related phenomena shapes the folk psychology of pain.

A reason to think that neuroscience can influence our quotidian concept of pain is the evidence for the influence of cognitive processes on how individuals experience pain, e.g., the effects of expectation, and learning on pain experience. I take this cognitive influence on pain to support two claims: First, Churchland’s claim, as described in Sect. 5 of this paper, that the tacit endorsement of a psychological framework contributes to how inner states are individuated and therefore how they are experienced. This argument as applied to pain is that the folk-psychological concept of pain shapes how quotidian pains are experienced. Alternatively, changes to this concept would affect both the individuation and the experience of pain. Second, I take the evidence for cognitive effects on pain to support the claim that the folk-psychological concept of pain is shaped by interactions with medical professionals who contribute to the patients’ concepts of pain by creating positive treatment expectations, by bracing them for intense pain, or by explaining to them the etiology of painful experiences. Furthermore, through this influence, physicians have an opportunity to shape the layperson’s concept of pain and bring it in line with the neuroscientific characterization of pain and pain-related phenomena. In what follows I will provide an overview of the evidence that expectation and learning related to pain contribute to the experience of pain or to the experience of pain relief.

Much of the evidence of the cognitive influence of pain is focused on how pain-related expectations contribute to the experience of pain. Expectation of pain relief contributes to pain placebo effects and expectation of pain results in nocebo effects.

A pain placebo effect is the experience of pain relief that is due primarily to the expectation of such relief, e.g., taking a pill that one expects will generate pain relief can induce analgesia even when one is taking a pharmacologically inert substance (Wiech et al., 2008). Additionally, positive treatment expectations can also contribute to the effectiveness of proven analgesics. Bingel et al. (2011) demonstrated that patient expectations could influence the effectiveness of the pain reliever remifentanyl (Bingel et al., 2011). Positive treatment expectations, i.e., anticipation of pain relief, doubled the analgesic effects of the drug, while negative treatment expectations, i.e., expectation of exacerbation of pain, diminished analgesic effects. The overall increase in effectiveness was correlated with the way in which physicians presented the effectiveness of the drug. When a physician described the drug as being effective in treating pain, patients experienced greater pain relief. Alternatively, when the medication was presented by the physician in a neutral way, its effectiveness in relieving pain did not increase. Hence, the way the clinician presented the treatment affected the degree of pain relief experienced by the patient.

Similarly, expectations set by physicians can increase the likelihood that pain will be experienced by the patient (Wells & Kaptchuk, 2012), which is the nocebo effect. For example, the application of a low intensity noxious stimulus coupled with a warning to expect a high intensity stimulus produces the experience of high-intensity pain (Wiech et al., 2008, 2014). Additional studies indicate that words chosen by medical providers can affect pain intensity. For example, venipuncture could be perceived as more or less intense based on whether the provider chooses to describe the prick from the needle as 'sharp' (Boerner et al., 2015). As individuals continue to experience blood draws, they will come to develop beliefs about the pain of venipuncture partially based on the descriptions formulated by their healthcare provider.

Furthermore, interactions with clinicians in situations where patients seek pain relief will shape how they understand the underlying mechanisms for pain, thereby contributing to the patient's concept of pain. And there is reason to think that the putative causes of pain contribute to the experience of pain. For example, noxious stimuli perceived to be more life threatening, for example, are ranked as more unpleasant (Arntz & Claassens, 2004). Most physicians are bound by the requirements of informed consent and are expected to disclose to patients the relevant details of their diagnosis, prognosis, and potential treatment alternatives. Disclosing a diagnosis, for example, will require describing the biological causes of the condition. For example, a physician must disclose to a patient that their knee pain is caused by a particular type of arthritis. This, in turn, leads to a discussion of potential treatment. Physicians have some discretion when deciding how to present relevant medical details to patients, but they must disclose the details required for the patient to consent to treatment. For the patient to opt for a particular medication, e.g., choose one out of three alternatives, a clinician will describe the relevant facts about the medicine, which will include at least some explanation of its mechanism or in the very least disclosure that a pain reliever is an opioid or a nonsteroidal anti-inflammatory pain reliever. This, of course, will not make a patient an expert on the biological mechanisms for pain relief, but it will induce them to conceptualize their pain as having a particular biological cause and it will help them understand the biological mechanisms that make pain relief possible. What I have argued thus

far is that the interaction among patients and physicians creates the opportunity for physicians to shape the layperson's concept of pain and bringing the latter in line with the neuroscientific characterization of pain or related phenomena. And there is empirical evidence that physicians make a concerted effort to shape the patient conceptualization of pain by utilizing 'a pain neuroscience approach' to pain treatment (Louw et al., 2016). This approach is a direct attempt to contribute to the ordinary conception of pain through neuroscience education.

Additionally, conceptualizing one's sensory and perceptual experiences as having biological underpinnings in the medical context will spread to non-medical contexts also. If one knows that knee pain is sometimes caused by arthritis, one might, for example, develop a disposition to explain one's knee pain by invoking arthritis. In addition, one might predict the occurrence of pain based on the possibility of exacerbation of arthritis in the knee. Going further, one might use the knowledge related to knee pain and arthritis to explain and predict other individuals' knee pain. For example, one might proffer advice to friends about ways to treat their knee pain if they experience it. Furthermore, if one conceptualizes one's pain as having a particular cause, they might develop a tendency to explain pain in terms of a biological cause in other instances of pain as well. Thus, what a folk-psychologist learns in the medical context, can spread to quotidian invocations of pain as well. Given that most people experience pain during their lifetime, and since many of them also seek medical care for the treatment of pain, it stands to reason that this process of incorporating neuroscience about pain into quotidian conceptions of pain happens with some frequency, thereby increasing the likelihood that current ways of thinking of pain are influenced by biological facts about pain. If this process of reconceptualization happens as I described it, then pain in everyday parlance is not incompatible with scientific conceptions of pain and related phenomena. Thus, if the folk-psychological category of pain is both a shared term and revisable in the way that I have described, then there is no reason to assume that it is incompatible with the scientific conception of pain in a way that warrants its preemptive elimination. This is not to deny that over time our quotidian concept of pain might become significantly revised or even that new concepts might be introduced into our folk psychology. My argument is that preemptive elimination of current concepts of pain is not required to achieve the revision of quotidian parlance about pain.

7 Conclusion

In this paper, I argue that the elimination of pain, as a category of experience, is unnecessary. To support that conclusion, I argue against the claim that there is a circumscribed version of eliminativism that can be contained only within the scientific domain. I demonstrate that scientific eliminativism is akin to eliminative materialism because both types of eliminativism are the view that false theories posit entities that do not identify natural kinds, and that elimination is required to promote scientific progress. I further demonstrate that this type of eliminativism cannot be constrained solely to the scientific domain because science and folk psychology sometimes share terms. Specifically, I argue that for phenomena, like pain, that

have crossover appeal, i.e., they are both used to designate quotidian problems and are targets of scientific inquiry, there is a need for shared conceptual frameworks such that elimination of a concept from scientific domain will require elimination of that same concept from folk psychology. I argue, however, that because scientific conceptions of pain are incorporated into the folk psychology of pain, preemptive elimination is not necessary for scientific progress because quotidian avowals and identifications of pain are influenced by biological and neuroscientific theorizing of noxious experiences.

Declarations

Conflict of interest The author confirms that the manuscript is comprised of original material that is not under review elsewhere. The author also declares that they have no competing interests—intellectual or financial—in the research detailed in the manuscript.

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