

# Chapter 2

## Pain and the Dangers of Objectivity

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**Abstract** There is considerable hope and expectation that objective measures of brain function will soon replace subjective measures as the gold standard of pain measurement. Currently, there is considerable debate as to whether that gold standard will include the cortex or will focus on subcortical structures. This chapter looks beyond that important debate to ask whether *any* measure of brain function could, in principle, become the gold standard for pain measurement. Perhaps surprisingly, the answer is no, measures of brain function cannot, in principle, replace subjective measures as the gold standard for pain measurement. Essentially, the answer is no because measures of brain function measure objective physical changes, which is the wrong thing to measure if the aim is to capture subjective pain experience. Trying to read pain subjectivity through objective brain measures leads to the attribution of impossible features to physics, such as perspective, time and memory. It also leads to the attribution of implausible features to subjectivity, such as subjectivity having a determined trajectory through time. Part of the trouble arises from treating pain as a private experience when the roots of pain lie in a socially negotiated subjectivity. That socially negotiated subjectivity is lost when experience is reduced to brain function. Doubtless, the brain is *necessary* for pain, and all subjective experience, but the brain is not *sufficient*, the social negotiation is also necessary.

### 1 Introduction

Distinct medical diagnoses often turn on the evaluation of an objective measure. Lung cancer, for example, appears on a radiograph as a white area and, if the area is cancerous, the region will display increased activity in a flurodeoxyglucose (FDG) scan, which will then prompt a biopsy for a final diagnosis (Rivera et al. 2013).

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Such a process is paradigmatic of the biomedical process where diagnosis proceeds without reference to the emotional or other subjective state of the patient. What the patient thinks or feels is important because the patient is a human being and should be treated as such, but the job of diagnosis is to look through that and observe the broken mechanisms beneath.

Pain, therefore, can appear as an irritation in the diagnostic process, a symptom of something broken in the body but not important in itself. In the latter half of the 20th century, however, many clinical observations and experiments challenged the view of pain as merely a symptom of pathology (Beecher 1956; Melzack and Wall 1965). Patients vary considerably in the pain they experience from similar evidence of disease or injury (Melzack et al. 1982) and can experience pain without any apparent disease or injury (Barsky and Boris, 1999; Wessely et al. 1999; Mayer and Bushnell 2009). Moreover, the attempt to find an underlying nervous system process to account for pain intensity ran into several problems, including the fact that activation of mechanoreceptors, or “touch fibres,” could sometimes generate pain (Cervero and Laird 1996). The fact that patients might not report pain when injured, might report pain when not injured, and the difficulty of tightly coupling pain experience to a specific “pain system” gradually eroded the idea that pain could be treated only as a symptom and the idea that pain could be objectively measured. Thus, pain began to be viewed as a problem, or a disorder, in its own right and as a disorder defined by the subjective report of the patient. This view of pain as a subjective disorder was captured by the IASP (International Association for the Study of Pain) definition of pain in 1991.

[Pain is] an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage... pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life (Merskey 1991).

It was not long, however, before the IASP definition was challenged. The focus on language and subjectivity seems to deny the possibility of pain for the fetus and newborn infants, animals and possibly patients entering into dementia (Anand and Craig 1996). Consequently, there were efforts to redefine pain as an inherent neurobiological process involving cortisol release and activity in certain parts of the brain (Giannakouloupoulos et al. 1994; Anand and Craig 1996; Lowery et al. 2007). In addition, the increasing use of imaging techniques, especially fMRI, to investigate pain gradually led to an understanding of pain as involving activation in a characteristic set of brain regions, which became known as the “pain matrix” or “pain signature” (Apkarian et al. 2005; Tracey and Mantyh 2007).

Special effort is now being made to find the regions of the pain matrix that are specific to the experience of pain and to use the pattern of activation as a “biomarker” for pain (Schweinhart et al. 2006; Wager et al. 2013). That biomarker, it is hoped, can then be used to diagnose pain and to potentially test new pharmacological products. Those efforts have generated intense debate regarding the meaning of “pain matrix” versus a unique “signature” for pain (Hu and Ianetti 2016), the reliability of any fMRI based biomarker for pain (Letzen et al. 2016; Woo and Wager 2016) and even whether the so-called “pain matrix” has anything

to do with pain at all (Ianetti and Mouraux 2010; Mouraux et al. 2011). The recent startling discovery that patients born congenitally insensitive to pain nevertheless activate the “pain matrix” in response to noxious stimuli provides a considerable challenge to the idea that pain matrix activation can be used to diagnose pain (Salomons et al. 2016).

The technical debates about the reliability of fMRI as a pain measure and the exact content of any biomarker for pain are important, but are not the focus of this chapter. This chapter aims to examine the underlying principle of *any* effort to provide objective diagnostic criteria for pain, regardless of the technical difficulties. As a simple analogy, it is accepted that fever can be measured with a thermometer in the mouth or ear, and that reliable changes in thermometer readings provide an acceptable measure of treatment efficacy. If the world of thermometer manufacture were plunged into chaos and thermometers stopped agreeing with each other and stopped accurately indicating temperature, then changes in thermometer readings would cease to provide an acceptable measure of treatment efficacy. However, that would be because of practical difficulties with the measurement of temperature, measurement of temperature would remain in principle a good means of diagnosing fever and a good measure of treatment efficacy. The question posed here is whether measures of brain activity, or structure, or chemical composition, can similarly be accepted as, in principle, a good means of diagnosing pain and a good measure of treatment efficacy.

The short answer is no, brain imaging cannot provide a good means of diagnosing pain. Fever is an increase in body temperature, and temperature is exactly what working thermometers are intended to measure. Therefore, thermometers are an excellent means of diagnosing fever and that logic holds even if all the thermometers in the world suddenly stop working. In contrast, pain is not a change in brain activity, hemodynamics or chemistry, which is what most brain imaging tools are designed to detect. Therefore, brain imaging is a poor means of diagnosing pain and that logic holds even if all our brain imaging technology works perfectly. Now let us look at that logic in more detail.

## 2 Dilbert’s Error

Largely, the debate unfolding here is another version of the “hard problem” (Chalmers 1996). For those unfamiliar the hard problem is that the universe consists entirely of matter, we humans consist entirely of matter, matter has no awareness and yet we are conscious (Chalmers 1996). How? Calling that problem “hard” considerably understates the severity of the issue, which is where some of the trouble begins. The problem is exceptionally difficult and solving it will likely mean destroying much of what psychologists and neuroscientists currently hold as the central tenets of their disciplines (Fodor 2000, 2007; Tallis 2004, 2012). Right now, however, it seems that psychology and neuroscience is in some sort of denial about the hard problem. In pain research, for example, there is now widespread

expectation that the field is close to replacing subjective reports of pain with objective measures of brain activity (Tracey and Bushnell 2009; Wager et al. 2013; Davis et al. 2015). This expectation remains despite the obvious gap between measures of brain function and pain subjectivity and intense arguments about the relevance of the pain matrix to pain (Iannetti and Mouraux 2010; Sullivan et al. 2013; Salomons et al. 2016). Similarly, there is widespread expectation that behavioural problems, such as addictive disorders, will yield to neuroscientific understanding despite ongoing uncertainty about the nature of addiction, the role of volition and the uncertain relationship between brain activity and addictive behaviour (Heilig 2015; Derbyshire 2016). Psychiatry has been awaiting the neuroscience revolution for many decades but is still unable to clearly demonstrate the effectiveness of pharmacological treatments of depression (Valenstein 1988; Kirsch et al. 2008). In short, it is expected that the hard problem will eventually be resolved by continuing to look at the brain, albeit with more technically demanding, fine-grained and innovative approaches (Churchland 1986, 2002; Koch et al. 2016). That expectation misconstrues how hard the hard problem really is.

One reason why psychology and neuroscience might be so relaxed about resolving the hard problem is that the problem itself can be stated remarkably succinctly and simply. In a hilarious Dilbert cartoon (Fig. 1), Dogbert asks Dilbert if he thinks the chemistry of the brain controls what people do. Of course, replies Dilbert. Then, Dogbert points out that such a position leaves us unable to hold people accountable for their actions. Dilbert resolves this by arguing that people have free will and we can hold them accountable for actions they freely choose. Now Dogbert smells something fishy and asks if free will is a part of the brain. Yes, says Dilbert, but it is the part of the brain “that is out there just being kind of free.” Dogbert goes in for the kill, “So, you’re saying the “free will” part of the brain is exempt from the natural laws of physics?” Dilbert is forced to assert that obviously the free will part of the brain is exempt from the natural laws of physics or else we couldn’t hold people accountable. The cartoon concludes with Dogbert asking if the free will part of the brain is attached or just floating nearby.



**Fig. 1** Dogbert forces Dilbert into an error, but where is Dilbert’s error?

Thus, in a mere eight panels of a cartoon, Scott Adams manages to convey the central issue of the hard problem: how do we get subjectivity out of physics? The cartoon poses that question through an error made by Dilbert, so where is Dilbert's error? Dogbert, and many contemporary psychologists, view Dilbert's error in trying to extract free will from the brain. From there, the logic is compelling. If free will cannot be extracted from the brain, then free will is subject to the natural laws of physics just like all material things, which annihilates free will because material things do not will. Having annihilated free will, it is a small step to annihilate subjectivity entirely because it is our subjectivity that informs our will and, in any case, material things are no more subjective than they are wilful. Material things just are.

If we wish to rescue free will and subjectivity then we must find a different error for Dilbert. Perhaps Dilbert's error appears right at the beginning, when he concedes that the chemistry of the brain controls what people do. It is that concession that leads inevitably to the end of free will because chemistry and physics do not will. Thus, to rescue free will and subjectivity, we must deny Dogbert's premise and deny that the brain controls what people do. If we can successfully deny that the brain controls what people do, then the scope for brain imaging providing a measure of subjectivity, including the subjectivity of pain, becomes at least more remote.

### 3 Physics Doesn't Do That Kind of Thing

One solid reason for rejecting the brain as providing subjectivity is precisely because, as a material object following the laws of physics, the brain cannot provide the kinds of things subjectivity provides. When a person suffers an infection, the immune system releases pyrogens which are carried to the hypothalamus in the blood stream and which then raises the set point for core body temperature in response. Thus, hypothalamic activity can provide a direct indication of core body temperature, which is also recorded by a thermometer. Subjectivity, the perception of being hot or cold, however, is different from the temperature of the body. We can legitimately state that the thermometer and the hypothalamus provide a measure of temperature, but not a measure of feeling. We objectively measure temperature and subjectively feel hot, to subsume both within the activity of the hypothalamus, or the rise of mercury in a thermometer, illegitimately subsumes the subjective under the objective.

A simple trick to demonstrate the difficulty of subsuming the subjective under the objective involves two bottles of differently colored water, red and blue, for example. Then, in front of at least one other person, place one bottle in front of the other, and ask which bottle is in front of the other. The trick lies in ensuring that the other person is looking at the bottles from the opposite perspective to you—i.e. for you, the blue bottle is in front of the red but, for them, it is the other way around or

vice versa. Typically, the other person will look confused and eventually ask, “From whose perspective?”

The material world does not have “perspective,” only subjective creatures have perspective. The spatial relations among objects are not objective relations, but subjective relations that change according to the position of the subjective observer. Conscious agents pick out spatial relations because conscious agents can identify boundaries. The boundaries that we pick out, however, do not transform physical space such that each object now becomes a point of view stipulating its surroundings. The blue bottle is in front of the red bottle for *you*, not for the bottle. The blue bottle is not in front, behind, to the left, right or in any spatial relation with anything because to be in a spatial relation requires having a particular point of view. In addition, bottles most emphatically do not do that kind of thing. Bottles just are and, without subjectivity, they are not even bottles because a bottle requires a spatial relation separating the bottle from its surroundings.

A similar trick can be done with memory. Take a look at the picture below (Fig. 2).

Most obviously, the car has crashed into a tree. How can we be so certain? In large part, we are certain the car crashed into the tree because we are familiar with how cars typically look when they have not crashed, they do not look crumpled, and we are familiar with how cars and trees typically interact. We know that cars move, quickly, while trees do not, and we know that when solid items collide at speed something has to give. What gives is the metal of the car, producing the crumpled state we observe above.

We see the car as having crashed into the tree because of knowledge that we share with others, which has a recognized meaning consistent with personal experience, and with other known associations. We do not see the car as having crashed into the tree because the crumpled car contains a sort of memory of its previous non-crumpled state. Although unlikely, it is not impossible that the car was deliberately manufactured in a crumpled state and merely placed by the tree. Also unlikely, but not impossible, is that the tree was placed on wheels and driven into the car. The car-tree alignment that you observe in the photograph does not deliver the past car-tree alignment such that you know the prior arrangement of the car and tree. That is because the car-tree alignment is just physics and physics does

**Fig. 2** A car crash? Seems likely, but you do not observe the car crash and the car does not retain any memory of the crash for you to use



not carry along memories of prior physical states. One state of physicality does not provide details about causality or previous or subsequent states of physicality or the timing between events. If you think that is wrong, then you might be heading into a great deal of lunacy because, logically, you will be forced to concede that every past event is retained within every current part of physics.

The moral for neuroscientists chasing subjectivity into the brain is this: what holds true for the physical world out there also holds true for our physical brains. The inability of the physical world to spatially separate one object from another means that you cannot find spatial relations in the physics of the brain. In addition, the inability of the physical world to retain memories means that you cannot find memories in the physics of the brain, or, for that matter, temporal relations. Synaptic activity does not contain previous activity and is not about anything in respect to any other spatial or temporal event or thing.

The moral for pain neuroscientists is this: the spatial relations of pain, where a pain is felt in the body, cannot be found in the brain. The implications of pain, what it means for the person's well-being, whether it is connected to something that just happened, or happened years ago, or is seemingly disconnected from anything at all, equally cannot be found in the brain. The subjectivity of pain, how it feels, cannot be found in the brain. Trying, nevertheless, to stuff subjectivity into the brain does bad things to subjectivity and turns it into something it is not.

## 4 Subjectivity Isn't Like That

Putting subjective experience, such as pain, into brains either forces brains to have properties they do not have, such as perspective, memory, knowledge and so on, or it has to force subjectivity to be something it is not. Again, the analogy with the thermometer might be instructive. The thermometer contains within it some of the body temperature; some of the energetic activity constituting body temperature is transferred to the thermometer. Suggesting that the thermometer also picks up some of the subjective feeling of heat, however, is a tremendously strange suggestion because thermometers do not feel. One way to avoid that strangeness is to embrace it and argue that, regardless of how strange it may seem, thermometers do feel. That is the pan-psychic resolution of the hard problem—everything feels, at least a little bit (Chalmers 1996; Velmans 2000). The generally more preferred way to avoid that strangeness is to deny subjectivity and argue that any experience of heat is simply an expression of temperature that is every bit as objective as temperature (Churchland 2013). This resolves the hard problem by turning subjectivity into a determined object, making it concrete and definite instead of abstract and undecided. Thermometers might lose their strangeness, but only at the cost of subjectivity becoming very strange indeed. The elements of subjectivity that physics cannot provide, such as time, have to go.

If pain really is to be found in the brain, measureable as a property of brain activity, then pain must become determinable both going backwards *and* forwards



in time. Backwards in time, the past is not problematic. The past really is determined, concrete, and decided. In principle, we can unravel the past and know it precisely. In that sense, the past can be treated as a determined object.

Forwards in time, the future is problematic. For physics, the future is just as determined, just as concrete and definite, as the past. In principle, we can unravel the future of a physical object and know it precisely. For physics, the future can be treated as a determined object.

Human beings, in contrast, are not like that. Looking backwards, Stuart is fully determined with the past events of his life, his thoughts and feelings, forever concrete and definite. Going forwards, however, subjectivity is not concrete and definite. Stuart on Friday is not the same as Stuart on Monday. Stuart on Friday could only imagine the Stuart on Monday because the Stuart on Monday is uncertain. Stuart on Friday, for example, might imagine Stuart on Monday finishing this chapter but this finished chapter is then only a possibility that may, or may not, be a reality on Monday (it was not). Stuart on Friday contains some, but not all, of the features of Stuart on Monday. Moreover, the features of Stuart on Friday cannot be used to precisely predict the features of Stuart on Monday; future Stuart is never a strict identity, but an undecided becoming.

Denying that the future is undecided might seem an odd thing to do, but it is necessary if the aim is to make subjectivity a physical property that can be objectively recorded in brain activity. It is necessary because physics is as determined going forwards as it is going backwards, which means that time is not meaningful for physics. McTaggart (1908), for example, precisely argues that there is no such thing as time, that time is an “unreality.” In essence, he argues that on Friday, Stuart on Monday is in the future. On Monday, however, Stuart will be present and on Wednesday, Stuart on Monday will be past. Consequently, from the standpoint of today, *in the future*, Stuart on Monday will be future (still to happen), present (happening) and past (happened). Nevertheless, Stuart on Monday cannot be simultaneously future, present and past and thus, McTaggart argues, that time itself is unreal (see also Tallis 2012).

The mistake is, as already discussed, to turn future Stuart into as concrete an entity as past Stuart and to treat past, present and future Stuart as the same Stuart passing through three phases. The possible future is not the actual future; the future Stuart only becomes real when he arrives. Until then he is merely a possibility. Subjectivity does not provide the strict identity between past and future that physics provides.

In summary, treating the brain as the source of pain subjectivity leads us towards believing impossible things about physics. Those impossible things are that physics contains perspective, memories, time and causality. Treating the brain as the source of pain subjectivity also leads us towards believing implausible things about people. Those implausible things include the idea that there is a strict, concrete, human identity following a predetermined trajectory. A question obviously follows: if the brain is not the place to look for pain subjectivity, then where?



## 5 Where Else but the Brain?

We should not look for the explanation of behaviour in the depths of the brain or the soul but in the external living conditions of persons and most of all in the external conditions of their societal life, in their social-historical forms of existence (Luria 1979, p. 23).

I contend that many of the most interesting and important human cognitive achievements, such as language and mathematics, require historical time and processes for their realization...Acquiring a natural language [also] serves to socialize, to structure culturally, the ways in which children habitually attend to and conceptualize different aspects of their worlds (Tomasello 1999, p 48).

The essential reason why looking outside the brain is necessary to understand pain, and all subjectivity, is because pain is not private (Sullivan 2001). Although it is obviously a private individual that feels pain, the content and meaning of pain comes from outside the person in pain. An infant might cry, grimace or flail; a caretaker might look for the cause and connect stimuli to responses through words, actions or an emotional connection depending on the circumstance and age of the infant. In this way, the negotiation and creation of subjective experience begins.

The social nature of experience might be rendered more obvious by considering something other than pain or similar perceptual experience. In an essay considering the deficits suffered by children with autism, Gregory Hollin asks the intriguing question as to whether a person praying in isolation is engaging in a social act (Hollin 2014, and see Fig. 3). According to one view, solitary prayer is an individual act because it is performed alone. Prayer, however, even if done in isolation, involves stereotypical acts such as kneeling, holding the hands together, closing the eyes, that an individual is unlikely to spontaneously perform without prior instruction. In other words, although the act is performed alone, the act does not belong to the individual, but is a part of the communal history introduced to the individual. The same is also true for perceptual experiences. The individual does not feel private feelings because he did not, by himself, create the terms and content of their feelings. The terms and content of feeling are “borrowed” from others until

**Fig. 3** A person praying alone. Are they engaged in a solitary act, or a social act? Solitary, if you focus on the person being alone, but social, if you focus on where their behaviour originates



they eventually belong to the individual; but the individual feeling never loses its social content.

At least some neuroscientists are willing to consider the notion that knowledge has a social component and so searching for knowledge in the brain might generate problems. Far fewer, however, are willing to accept that essential sentient experiences, such as pain, also require a social explanation (Zeman 2001). Instead, the original grimace or flair is seen as expressing an already existing mental state of discomfort, which may be elaborated, but is not created, through interaction with others (Anand and Craig 1996; Tallis 2005; Grahek 2007; Devor et al. 2015). The difficulty with that view is that even the vaguest and elusive sensory experience has content that has to be isolated and separated in order for it to be experienced (Sullivan and Derbyshire 2015).

To argue that some core aspect of pain is given directly by brain activity, as a raw state of sensation that *just is*, is problematic. No words are allowed to describe such a sensation because they provide structure and meaning, which are prohibited. There can be no structure, no substance, and so the state of sensation cannot access the support it needs to exist. In addition, even if we allow an experience that somehow escapes the subjective structure necessary for experience (which is impossible), that experience would be in immediate competition with a vast number of other raw sensations. At any given moment, an organism is bombarded with a vast number of stimuli that must be appropriately held together and apart in order for specific experiences to reveal themselves against a totality of being. That would be private experience, an experience that is everything, entire being, and so nothing, because experience necessarily requires the isolation of discrete moments and elements from the totality of time and space.

The escape from this totality is to understand subjectivity as becoming rather than as a discrete thing (Derbyshire and Raja 2011). The first moment in subjectivity is when the infant is grabbed by a connection between a behavioural state and an external state. Initially, the child is determined by the external flow of stimuli, producing fixed-action patterns and catastrophic reactions. A conscious, subjective, caretaker can construct voluntary attention by highlighting the relevant elements of the environment and thereby controlling, regulating and shaping differentiated and socially responsive patterns of behaviour. The initially spontaneous behaviour of the child is guided by the intelligence of others until the child is able to regulate itself and, instead of following a stimulus, the infant now anticipates and organizes its perceptual experiences (Hobson 2002; Greenspan and Shanker 2004). The previous external regulation by conscious caretakers becomes the child's own mental regulation, which now allows specific experiences to emerge from pure, private, being.

In this conception, the subjectivity of human beings lies not in the physical structures of the brain, which are determined, but in the varied and complex social interactions of human beings, which are negotiable. This enables escape from the necessity to force physics to have impossible properties such as perspective, memory and time. Perspective, memory and time are the collective properties of humanity, a result of the "cognitive handshakes" occurring across time and space,

which are inherited by every socialized human being (Tallis 2005, 2012). This also enables escape from the necessity to force subjectivity to have implausible properties such as being determined from moment-to-moment. Freedom arises from the collective negotiation of how to organize and regulate the structure of human existence, which every human being is a part of (they are a part of the negotiation) and separate from (they embody that negotiation in their personal, physical, being).

Pain scientists cannot escape the need to study conscious experiences or subjectivity per se, which should not be problematic because the experience is the thing that requires explanation (Price and Aydede 2006). Nevertheless, many pain scientists view the study of the brain as the more objective, more scientific, route to understanding pain. The fundamental materialist position is that every experience and behaviour must be reflected in distinguishable patterns of neuronal activity (Zeman 2001). That position is undoubtedly true, the brain is undeniably part of the story, and so study of the brain should remain part of the attempt to provide a comprehensive understanding of pain. The problem lies not in the inclusion of the brain but in the view of the brain as providing, in itself, the comprehensive account of pain subjectivity.

## 6 Brains are *Necessary*, but not *Sufficient* to Understand Pain

My aim has been to boldly state the case against finding pain subjectivity in the brain. The reasons are two-fold. First, the relevance of the brain is considerably overrated, and there is unreasonable expectation and hope that better understanding of the brain will resolve a host of subjective and psychiatric problems (Andreasson 1984; Valenstein 1988; Frith 2007). Second, by stating the case against the brain as boldly and directly as possible, it is hoped that a reaction will be generated to create discussion and refine the arguments. In boldly stating a position, there is the danger of overstating. Thus, to be clear, it is not being argued that the brain does not matter. Clearly, the brain is necessary for pain because normal human beings without brains do not feel anything at all. Stating that the brain is necessary for pain, however, is not saying very much. It can be accepted that the brain provides a physiological process necessary for subjective experience, a process which Mead (1934) suggested as analogous to that of pulling down and raising a window shade. If the shade is down, it is dark, and that makes vision difficult, but if the shade is up then everyone with normal vision can see and we can then study people with normal vision without further concern as to the operation of the shade.

There remains some argument about what the “shade for pain” involves. Certain lesions and brain abnormalities can sometimes result in a complete insensitivity to pain, or to a partial insensitivity to the emotional component of pain so that they are no longer bothered, or moved, by noxious events (Grahek 2007). These findings are broadly consistent with a body of data that supports the necessity of several cortical

regions for normal pain experience (Tracey and Mantyh 2007). There is, however, substantial opposition to the view that cortex is necessary for pain. Some suggest that subcortical structures can support pain experience and recent, startling, empirical evidence implies that cortical responses to noxious stimuli are not specific to pain experience (Lowery et al. 2007; Iannetti and Moraux 2010; Devor et al. 2015; Salomans et al. 2016). Similarly, there remains considerable uncertainty about the role of brain dysfunction in neuropathic pain and argument as to whether certain non-specific pain disorders, such as fibromyalgia, involve brain dysfunction (Dennis et al. 2013).

These problems and issues remain part of the “hard problem,” which is the problem of understanding how physicality relates to subjectivity. Right now, that problem looks intractable and, as stated at the beginning, likely much of what neuroscience and psychology takes for granted will have to be jettisoned before that problem is resolved. Here, I have argued for the strong claim that one thing that needs to be jettisoned is the idea that pain can be measured via brain activity or composition in the same way that a thermometer can be used to measure fever. Subjectivity cannot be measured like that because subjectivity is not a physical process and so cannot be physically measured.

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