

Painfulness is Not a Quale

Austen Clark
Department of Philosophy
103 Manchester Hall U-2054
University of Connecticut
Storrs, CT 06269-2054

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When you suffer a pain are you suffering a sensation? An emotion? An aversion? Pain typically has all three components, and others too. There is indeed a distinct sensory system devoted to pain, with its own nociceptors and pathways. As a species of somesthesia, pain has a distinctive sensory organization and its own special sensory qualities. I think it is fair to call it a distinct sensory modality, devoted to nociceptive somesthetic discrimination. But the typical pain kicks off other processes too. For one it can grab your attention in a distinctive way, alerting you to its presence and sometimes obliging you to focus attention on the damaged member. Intense pain can eliminate your ability to think about anything else. Pain typically has direct and immediate motivational consequences: one wants it to stop, has an incentive to do whatever one can to reduce it, and is gratified by its termination. As these desires and motives collide with neural reality, emotional components of mental anguish, anxiety, and dread arise. The suffering involved in suffering from pain has multiple strands: it is not just the painfulness of the sensation, or the frustration of the desire that it end, but also the anguish over the possibility that it will never end, and the impossibility, if the pain is sufficiently intense, of focusing one's attention on anything else.

The ordinary word "pain", then, points dimly to a process that has multiple components. What is more, these components can be dissociated from one another. For example, nociceptive input is poorly correlated with the sensation of pain: phantom pain, causalgia, and neuralgia yield intense pain to minor or nonexistent stimuli; while stress-induced analgesia can block pain sensation in a soldier or athlete who has had major trauma. Further, the sensory aspect of pain can be divorced from its typical motivational consequences. There are well known reports of patients who have had frontal lobotomy or who

have been given various opiate analgesics and who say they still feel pain, but that it no longer bothers them. It is no longer hurtful or distressing. (Sever the cingulum--a fiber bundle from the cingulate cortex to the limbic system, about the thickness of a telephone cord--and one can get the same effect.)

Philosophers have drawn various conclusions from the premise that pain has multiple components that can be dissociated from one another. The most famous is that our ordinary term "pain" has no reference; nothing out there satisfies the conditions necessary for there to exist something you could accurately call "pain". To ask "does that hurt?" is, according to one such proponent, to ask an ill-formed question (Hardcastle 1999, 146). But this is precisely the question on which I wish to focus. If pain has multiple dissociable components, what sense if any can we make of the common sense notion that sometimes these episodes hurt? They can be awful, painful, bad. They typically have an aversive, nasty, to-be-avoided quality. If pain fractionates into multiple dissociable components, what makes the congeries bad? Wherein lies the painfulness of pain?

On this more localized question philosophers have drawn a variety of conclusions. Some describe the hurtfulness of pain as one of its intrinsic qualities, sitting firmly on the sensory side of things. It has been identified as the essential property of pain, and the one by which the reference of the term is fixed. Some moral realists have argued what makes pain bad is intrinsic to pain: the hurtful, painful, to-be-avoided character of pain is an intrinsic property of the mental state, and it provides a reason to avoid the state. I will argue against all of these positions. The argument has two steps. First I will describe what painfulness could not be. Then I will describe something that it could be.

I.

In order to show that painfulness is not a quale, it is vital first to accept some stipulations as to what it is to *be* a quale. I am going to accept, for the sake of argument, two stipulations that are common to all of those who think qualia pose a problem for materialist or functionalist theories of mind. That is, for the sake of argument, I am going to *accept* these stipulations as providing partial definitions for what we mean by "quale". (It is only then that I can show that painfulness does *not* satisfy them.) They are

1. Qualia are properties that are (somehow) instantiated in various sensory episodes; and
2. That in virtue of which two sensory episodes instantiate the

same particular quale cannot be defined in any functional or behavioral terms.

The first can be interpreted in various ways whose differences are not critical to this argument.¹ The second is commonly expressed by saying that “qualia cannot be functionally defined” or that “qualia are distinct from any functional properties or behavioral dispositions”. More precisely, there is no specification of functional roles or behavioral dispositions whose satisfaction by two episodes guarantees that both episodes are instances of the same particular quale, or whose satisfaction is required in order for two instances to be instances of the same quale.² That same quale might, on other occasions, serve different roles. For example, we currently have the disposition to stop at red lights at intersections, but we cannot define the qualitative character of the sensation we have at such junctures in terms of its role in any such dispositions, since it is readily conceivable that those same dispositions could be engaged (under a different traffic authority) by sensations whose qualitative character corresponds to that of seeing something green. The quale can have various causes and effects, but (according to our stipulation) that quale cannot successfully be identified in terms of such causes and effects.

Stipulation (2) is a powerful one, since it rules out the possibility of successfully identifying qualia using *any* functional or behavioral terms. We need somehow to comprehend the compass of what is meant by “any” functional term. For the sake of argument this should be read as broadly as possible: take any theory offered as an explanation for some psychological phenomenon. The theory can be formulated in any idiom one pleases: the theoretical terms can be biological, psycho-physical, neuro-psychological, cognitive, computational, representational, common-sense, or what have you.

- 1 Some take qualia to be properties of mental states, while others take qualia to be phenomenal properties, or characterizations of the appearance of one’s surroundings. On the latter reading, but not the former, qualia can be ascribed to regions of space *outside* the body of the sentient organism, and it is proper to speak of sensing them: so that one can, for example, *see* visual qualia, and hear auditory ones.
- 2 This leaves open the possibility that the general relation of qualitative sameness does have functional consequences, and can be functionally defined (as argued in Shoemaker 1975). That is, perhaps we could give a functional specification identifying those conditions under which two episodes happen to be qualitatively identical to one another. The problem remains of giving a functional specification which suffices to identify those conditions under any episode presents (say) a *particular* shade of blue.

Apply the Ramsey-Lewis technique for defining the theoretical terms of that theory, and one can derive what are called “Ramsey functional correlates” for those theoretical terms, relating them to one another and directly or indirectly to observations (see Block 1980). We can call the Ramsey functional correlate “behavioral” if it includes any terms that can be satisfied by observations of behavior. Then stipulation (2) implies the following claim: take any set of Ramsey functional correlates (including behavioral correlates) from any psychological theory. Two sensory episodes can equally satisfy all such correlates yet fail to instantiate the same particular quale. So sameness of qualitative character cannot be thus defined.

An implication is that there can be no relational specification whose satisfaction makes the difference between a particular quale being present and it being absent. Put another way, if the presence or absence of some property Q depends essentially upon its putative instances satisfying or failing to satisfy some set of relations, then Q is not the sort of thing that our stipulations stipulate qualia to be. The argument above uses “functional term” to include any Ramsey correlate for *any* term that might help to explain psychological phenomena. Ramsey correlates provide “definitions” by specifying the relations that the terms have to one another, to stimulus inputs, and to behavioral outputs. If we had a relational specification for Q , whatever it is, it would be grist for the mill of the Ramsey-Lewis technique. The relata will be named with terms that are either theoretical or observational, so any such specification would eventually be disgorged, as a Ramsey correlate. Hence it follows from stipulation (2) that relational characterizations must fail to identify that in virtue of which two sensory episodes are episodes of the same quale. Qualia elude such characterization.

Here’s an intuitive image for this idea. Let us construct the finest possible sieve we can, using all the psychological distinctions available to us from any vocabulary that might be of use. Observational distinctions of course are all allowed, but any theoretical term connected in some way to some observations might contribute to the project, adding some distinction somewhere. Under this criterion we would find ourselves adding vast chunks of neurobiology, biochemistry, physics, and other disciplines as well. When the sieve is finished we run two sensory episodes through it. The idea is that they might both drop through in exactly the same place—the sieve fails to differentiate them—even though they manifest different qualia. The qualitative difference between them is not captured *anywhere* in that

vast structure; they sail right through, completely untouched.³

Stipulation (2) drives us into a rather “narrow” reading for what constitutes “a” quale, and for later developments we need to spell out this implication. If there are qualia, then there must be such a thing as “a” quale. What then constitutes “a” quale? How are we to determine whether we have one of them or more than one?

If we conjoin our two stipulations, we get a quick consequence: one quale can encompass no more than a fully determinate sensible quality. A fully determinate sensible quality is one that is as distinguished as completely as it possibly can be from all other sensible qualities. For suppose we allow that “a” quale is not a fully determinate sensible quality, but instead has some determinable components. Then that quale would have some componential structure that could be analysed in relational terms. Discrimination data could tease apart the relations between the sensible qualities that compose the quale. As this contradicts the second stipulation, banning such relational differentiation, we must suppose that a quale encompasses nothing more than a single fully determinate sensible quality.

By “fully determinate” I mean that no possible discrimination data could distinguish different instances of the supposed quale. Start with the entirety of all possible pairwise discrimination tests: stimuli that present the same quale are entirely indiscriminable from one another. More strongly, one of them can be discriminable from some third stimulus if and only if the other is as well. So stimuli presenting the same quale must not only match one another; the sets of stimuli each matches must also be identical. If they pass this test, they are what one can call “globally” indiscriminable: no distinction between them can be found anywhere in the realm of discriminability, including matches and relative similarities with *other* stimuli.

A paradigm example of a quale is, then, a fully determinate shade of colour, where a “fully determinate shade” is one all of whose instances are globally indiscriminable from one another, yet each of which is discriminable from instances of any other shade. These are *points* in quality space. There is no qualitative difference, at all,

³ Perhaps this is the source of Block’s suggestion (in “Troubles with Functionalism”) that it is hard to see how psychology “in its current incarnation” *could* define qualia; the latter properties seem not only untouched but completely untouchable. (See Block 1980, 289). I do not share these intuitions, but I remind the reader that here I am accepting stipulation (2) for the sake of argument. Dispute about the *truth* of these stipulations is a dispute that must take place elsewhere.

between their instances.⁴

Now pains are very often taken to be another paradigm example--perhaps *the* other paradigm example--of states that manifest qualia. I have no wish to deny that episodes of pain typically have some sort of sensory character. But I do want to deny that what makes these episodes *painful* is a quale. Painfulness is not, and could not be, a quale. Pains have a sensory character, but it is not their sensory character--specifically, not their qualitative character--that makes them so awful. So as paradigm examples of qualia they leave something to be desired.

II.

If we abide by the stipulations above, we can identify the qualitative character of pain in a fashion that is sufficiently precise to distinguish it from other aspects that are *not* qualitative.

It helps to note, first, that pain seems to be subserved by neuroanatomical machinery that is in many respects similar to that of other sensory modalities. It has its own receptors, dedicated pathways, and central loci. We have a fast, epicritic system, that uses myelinated fibers; and a slower, protopathic system that uses the unmyelinated and well known C fibers. The epicritic system ascends the spinal cord in at least three lateral pathways, and like many other sensory systems has its first central synapses in thalamic nuclei, which project to somatosensory cortical areas. The slow pain system proceeds up the spinal cord in at least three different medial pathways. A fact that will become critical later on is that several of these tracts synapse first not in the thalamus, but in various limbic structures in the mid-brain and pons.⁵

As interesting as the neural machinery is the phenomenology it

⁴ If you believe qualia are non-relational then even global indiscriminability does not suffice to define qualitative identity. Such a philosopher could admit that the two stimuli are globally indiscriminable because they both present the same quale, but if sameness of quale is non-relational then global indiscriminability does *not* (and cannot) suffice to guarantee qualitative identity.

⁵ Specifically, the spinomesencephalic tract synapses at the peri-aqueductal gray area (PAG); two "spino-parabrachio-" tracts synapse first in the parabrachial nucleus (PBN), one of which proceeds to the amygdala and the other to the hypothalamus; and the spinohypothalamic-spinotelenencephalic tract has its first synapses in the hypothalamus and thalamus, and from there projects to the pons, amygdala, and striatum (Millan 1999, Table 4, p. 31).

supports. Consider all the different ways in which painful bodily conditions can be perceived to be similar or different. Across occasions we sense differences in apparent locations and differences in qualities that appear at those locations. Here there is a dull cramp; there, a sharp stabbing pain. Or: here there is a burning, tearing feeling; later, at the same place, one senses only a dull ache. The variety of features that appear in painful episodes is rather astounding; here is an ordering provided by Melzack and Wall (1983):

temporal: flickering, quivering, pulsing, throbbing, beating, pounding
 spatial: jumping, flashing, shooting
 incisive pressure: pricking, boring, drilling, stabbing, lancinating, sharp, cutting, lacerating, splitting
 constrictive pressure: tender, pinching, pressing, gnawing, cramping, crushing
 traction pressure: tugging, pulling, rasping, taut, wrenching, tearing
 thermal: hot, burning, scalding, searing
 brightness: tingling, itchy, smarting, stinging
 dullness: dull, sore, aching, heavy

All these terms characterize some particular aspect of the appearance of a portion of one's body during a painful episode. Each must have an apparent location; a pricking pain that does not seem to be anywhere would not be a pricking pain. We can treat them in a relatively straightforward way as features that characterize the appearance of a portion of one's body. "Appearance of a portion of one's body" must be read opaquely, so that it applies even to cases of phantom pain, in which in fact there *is* no portion of one's body at the place where the pain appears to be located. So these are phenomenal properties, or, to use the equivalent term in neuropsychology, sensory features. They appear in, appear to characterize, are attributed to, what appear to be regions or volumes of one's own body. Such locations are, obviously enough, phenomenal locations. Usually the apparent location suffices to pick out a real one (the wrenching feeling apparently in your abdomen directs your attention to your real abdomen), but sometimes they do not.

To detail the full sensory content of such an episode, one can proceed as follows. We need to canvas the content of all the similarities and differences one can possibly sense among episodes of pain. This may or may not be a tractable task. If we are lucky the features listed above arrange themselves in incompatibility groups, or "contrary ranges": axes along which just one such feature can appear to characterize a minimally discriminable location at a minimally

discriminable time. There will be a number of distinct but independent contrary ranges. Specifying a value on one says nothing at all about the other, and so specifying the full sensory content requires a specification of a value on each of the independent axes along which different pains can be sensed to resemble or differ. But, again if we are lucky, some of the contrary ranges will turn out not to be independent of the others, but instead to re-describe content already captured. Such axes may be linguistically distinct, but are phenomenologically redundant. Their values are some function of values already specified. Once you have specified a value on all the independent axes of variation of sensed similarities and difference, these all fall out as freebies.

The qualia of painful episodes are, like all sensory qualia, fully determinate sensible qualities. So the qualia of painful episodes will correspond to points in this somesthetic quality space. The contrast between a "flickering" and a "throbbing" pain is a prototypical qualitative contrast, though doubtless the English words pick out vast swaths of discriminably different somesthetic qualities. A quale can contain no qualitative variations within itself; qualia are the *points* that make up this space.

So much for the phenomenal properties; we need to apply a similar strategy to their sensed locations. Here too one can imagine cataloging the capacity of all possible discriminations among felt locations. Presumably this space is three dimensional (recall William James and his voluminous pains), but its metric is defined not by physical space but by the sensitivity of spatial discrimination. To what extent can one sense a difference between a pricking pain here and a pricking pain there? The distance needed between "here" and "there" before our hapless subject can feel two pricks *as* two varies enormously at different places on the body. A gap of a millimeter suffices on the finger tips, but one needs fifteen times that distance on the back. We want to plumb the capacities to sense differences in apparent location, and for this we need a measuring line marked in units of discriminability. These do not map in an isotropic way onto millimeters.

So to detail the sensory content of pain we need to describe the sensory content of various somesthetic qualities, and the sensory capacity to identify the different portions of one's body that those qualities appear to characterize. Both tasks will push us to the limits of what it is possible for our subject to discriminate. This catalog will need to extend to the "global indiscriminability" of two sensory qualities. That is, the difference between phenomenal properties *P*

and Q may not be revealed in any direct comparison between them. But if P is routinely judged to match some quality that Q does not, then P and Q cannot be qualitatively identical. They stand in slightly different places within the entire corpus of possible judgements of similarity and difference. And if their places can be differentiated in any way at all, then they are not identical.

III.

The catalog of possible somesthetic sensory contents is, then, rather compendious. But now I want to argue that the property earlier identified as the painfulness of pain--what makes pain hurtful, bad, aversive, awful--is not found in that catalog. It could not be.

Here is a warm-up argument. What quality must two episodes share (or appear to share) if those two episodes are felt to be equally painful? With your typical sensory quality, this question has a straight-forward answer. These two tastes are equally salty because they both present the same quality of saltiness. These two bananas match in hue because each has the color that the other does. Two episodes match on that dimension of variability because, we say, they both present the same quality. But painfulness is a different beast.

One episode can hurt as much as another, can be equally awful, even though their sensory character differs. Consider a range of examples: the ischemic pain one gets from *very* cold hands or feet; the diffuse pain of sunburn after an unprotected day on the beach; a heavy dull abdominal pain; or the burning tearing pain of a wrenched muscle. These can in their various ways be equally painful. If you had to choose between them on the basis of how much they hurt, you might be indifferent. As punishment any one of them will do, thanks.⁶ But what is the sensory resemblance between the intense freezing pain of an almost frozen foot and the diffuse hot pain of an sunburned back? The point is exactly parallel to one that Sidgwick made about the notion of pleasure:

⁶ Interestingly, you might have strong preferences based on the non-sensory representation of these various contingencies. You might realize, for example, that ischemic pain goes away as soon as circulation is restored, with no lasting ill-effect; but bad sunburn can increase your risk of developing skin cancer. The wrenched muscle might prevent you from skiing again tomorrow, while the abdominal pain might just be indigestion which will go away tonight. On the other hand, it could be stomach cancer. The sensory system cannot represent any of these future or counterfactual contingencies; from its point of view all the episodes are, simply, equally painful.

for my own part, when I reflect on the notion of pleasure--using the term in the comprehensive sense which I have adopted, to include the most refined and subtle intellectual and emotional gratifications, no less than the coarser and more definite sensual enjoyments--the only common quality that I can find in the feelings so designated seems to be that expressed by the general term "good" or "desirable" which we have before examined. Hence, while I cannot define Pleasure--at least when we are considering its "strict value" for purposes of quantitative comparison--as the kind of feeling which we actually desire and aim at, I still recognize as its essential quality some relation to desire or volition. I propose therefore to define it as feeling which, when experienced by intelligent beings, is at least implicitly apprehended as desirable or--in cases of comparison--preferable. (Sidgwick 1893, 128)

For my part, when I reflect on these episodes of pain, the only common quality I can find in the feelings so designated seems to be that expressed by the general term "bad" or "aversive". A cramp and a pinprick might be equally painful, even if no sensory quality is common to the two episodes. They are in their various ways equally undesirable. Perhaps the essential property in virtue of which two episodes are both painful is not any sensory quality at all, but simply the undesirability of whatever collection of such qualities they happen to manifest. Sidgwick held this of pleasure; I think it is true of pain as well.

But this is just a warm-up argument. Someone in the audience can and will insist that, no, when I peer into *my* consciousness I do sense a common quality, call it painfulness, that characterizes both episodes. I have a beetle in *my* beetle box. Alas, we cannot prove this person wrong. Best to agree politely: and a very nice beetle it is, too. We need a more systematic argument.

We need to specify as an essential quality some "relation to desire or volition" but in the case of pain the exact relation is of some delicacy. One typically wants an episode of painful bodily sensation to stop, and typically one would have liked to avoid it altogether, but there is no necessity in those connections. As Shaffer (1976) notes, the masochist wants some pains to continue; someone worried about peripheral nerve damage might *want* to feel pain; a proponent of natural childbirth might be gratified when the pain begins. So apart from its over-inclusiveness one cannot define painful sensations as those one wants to stop. More broadly, what is often called the "motivational/affective" component of pain has an array of different possible targets:

desire: to avoid the pain, reduce it, or have it stop

- drive: the urgency to do something about it; the degree to which the motivations aroused by pain over-ride all others
- interest: the degree to which pain grabs and holds attention, and prevents one from attending to other projects or plans; the degree to which one can be distracted from the pain
- preference: the extent to which presence of pain changes preferences among alternative states of affairs
- incentive: the degree to which reduction of pain provides a reward for other behaviors
- reinforcer: the degree to which pain decreases the probability of some behaviors (aversive conditioning and avoidance learning)

Pains might exert varying influences on these different levers, cogs, and pulleys within the motivational machinery. One might not want the pain to stop, exactly, even though it is true that one would prefer, if it were possible, to live through the same episode without the pain. Or perhaps even this preference is missing--the presence of the pain adds a certain piquant vivacity to the adventure, which one would scarce do without--but perhaps even then the pain has done its job as a negative reinforcer, and certain muscle twitches one would otherwise make have been unconsciously suppressed. Or perhaps one finds no evidence of such negative reinforcement, but nevertheless our hero feels a warm sense of gratification when the adventure is over, and this gratification prompts him to repeat the adventure again at some later date. Pain might worm its way into our motives in any of these fashions, and so one cannot pick any one of them as its essential relation to desire or volition.

But a trick similar to that used to get “global indiscriminability” can work here too. A direct comparison between two alternatives might leave an agent indifferent between them. Take this as an analog for pairwise discriminability of stimuli, and then generalize it to get a notion of “global indifference”. Think of a vast array of measurements: of *all* your motives, desires, inclinations, interests, preferences, reinforcers, incentives, and drives. We are homunculi, down in the basement of the nuclear power plant, scanning hundreds of measuring instruments. A state of affairs is a matter of global motivational indifference if it can be registered without causing a single twitch on any of those meters. Adding it to or subtracting it from any other state of affairs does not cause a single needle to budge, at all, anywhere, ever. *That* is what you might call utter indifference. Alone or in combination with others, the state of affairs in question makes no difference at all to any of one's desires, drives, preferences, reinforcers, inclinations, interests, or motives. The notion is like global indiscriminability in that there is no way for a difference to

manifest itself, no matter what the permutations or combinations.

Now there is no essential direct connection between any particular pain and any particular desire. That *S* is painful cannot be tied directly to a particular desire that *S* cease. Nevertheless, I think there is an essential global connection. If state *S* is in fact painful, if it hurts, then to its bearer it cannot be a matter of global motivational indifference. One might not want it to stop, exactly, but in one way or another it will not be a matter of utter indifference. The same is true of something that is pleasant. Pleasures and pains push one from the neutral point of utter indifference in what are, intuitively, opposite directions. Typically, something pleasant is desirable, attractive, and gratifying. It seems good. Something painful is typically undesirable, aversive, and punishing. It seems bad. These opposite poles, or the opposition between these poles, cannot be understood in purely sensory terms. But perhaps they can be understood as opposing motivations.

One can summarize the effect of something painful on one's global motivational state by saying: it arouses an *aversion*. This is a change in the disposition of one's motivations. As a disposition, it might not manifest itself in any behavior. The disposition might remain unexercised. Furthermore, the motivational change might show up in any of the different ways I listed above: as a change in the content of desires, preferences, inclinations, incentives, reinforcers, etc. The aversion might show up in any of these ways; no single one of them is essential.⁷ What is essential to painfulness is that it arouse one or another of them. Another way to put this: if *S* is painful, then *S* arouses some disposition to avoid. Avoidance, like aversion, is a catch-all term. It indicates the general direction of one's motivations, it gives their general drift, so to speak, without spelling out the precise details of heading, wind speed, tiller angle, tack angle, water currents, and sails aloft. Desires, inclinations, reinforcers, drives, interests, preferences, are all heading, roughly, that-a-way.

If *S* is painful, then, it cannot be a matter of global motivational indifference. It must be aversive. This doesn't say much, but it says enough to show that painfulness could not be a quale. For to say *S* is

⁷ Suppose I am averse to strawberries. I might positively dislike them, or I might not. Perhaps I simply want to avoid them. But I might lack that desire too. Perhaps I simply prefer dishes without them. Perhaps I simply fail to repeat orders for dishes that contain strawberries at the same rate at which I repeat orders for dishes that do not contain strawberries, even though I am not consciously aware of the presence or absence of strawberries, or of this behavior of mine. Aversion is a catch-all term, covering this entire range.

aversive implies that one must have some disposition to avoid it. Aversiveness is an essential but relational property of those states we call "painful". But then the properties that such relational characterizations describe are not qualia. For according to our earlier stipulations, there can be no relational characterization whose satisfaction makes the difference between quale Q being present and quale Q being absent. However, unless a sensory episode stands in the appropriate relations to one's motivational states, it is not aversive, and hence not painful. Hence painfulness is not a quale. It is a conative or motivational property, not a sensory one.

Suppose, for example, that the aversiveness of a particular sensory episode *S* consists in your desire that *S* cease. But then *S* is aversive only given a constellation of surrounding desires. Surround the same sensory state with a different constellation of desires, and the aversiveness of *S* could change. The same quale *Q* could come to seem less painful. The same holds for the other ways in which the aversiveness of *S* might be manifested. Perhaps one has some tendency to try to avoid it or to end it; or some preference for other states of affairs that lack the painful aspect; or some tendency to stop any actions that stimulate the pain; or some drive to indulge in behaviors that reduce the pain, etc, etc. No matter which of these strands one picks, that strand is some proclivity, inclination, or preference towards some outcomes and away from others. So aversiveness is a relational property: it characterizes that sensory state in terms of the relations in which it stands to one's preferences, inclinations, and desires.

It follows that one could have two instances of mental states that are qualitatively identical, that share all the same sensory qualia, yet which are not equally aversive. Surround that same sensory state with a different constellation of preferences, and this second instance of the same state may not be equally painful. So painfulness is not a quale. It is at best a motivational disposition occasioned by a quale. To paraphrase Wittgenstein and Anscombe (1957, 77): no immediate phenomenological quality could be an aversion, because it cannot have the consequences of aversion.

IV.

Pain straddles the divide between sensation and desire, and it also slops into neighboring compartments of motive, emotion, and mood. It is useful to point out that pain is not alone in this regard; other of our primitive "feeling" states seem also to be demanding sensations or sensible desires: states that uneasily combine sensation and volition.

Consider, for example, thirst. We speak of "sensations of thirst", but on the other hand someone who is very thirsty must, it seems, want to drink. How can there be a *sensation* of wanting to drink? The same argument as applied to pain will show that thirst *cannot* be a mere sensation. No non-relational specification of sensation could have the consequences that follow when we call it "thirst".

The sensations of dry mouth, parched throat, weakness, and perhaps dizziness must somehow engage the appropriate desire before we can label the result "thirst". Is it logically possible to have sensations exactly like those you have when you are thirsty, but not desire to drink water? Obviously so, Socrates. Sensations are one thing, desires another. Desires color our awareness of the things we sense, but they come from a logically distinct part of the zoo. But if so, it is likewise logically possible to have sensations exactly like those you have when you have pain, but have no desire to have those sensations cease. It feels just like pain, but it is not awful; it does not bother you; its continuation or cessation is a matter of indifference. Would that state be pain? Well, Socrates, yes and no.

Some states of affairs satisfy your thirst. Others frustrate it. To identify a particular desire, one must identify what it is a desire *for*, what its "satisfaction conditions" are. Notice that the behaviors produced by thirst could be produced by various distinct desires. Thirst could be: the desire to put liquid in one's mouth. The desire to swallow liquid. The desire to put liquid into one's stomach. The desire to absorb liquid. The desire to end the symptoms of dehydration. Which is thirst? We will only know when we know the satisfaction conditions for the desire.

But this raises the problem. Can you *sense* that you are thirsty?⁸ If to identify the state as thirst one must identify that which would satisfy it, then the answer must be "no". The satisfaction conditions for the desire describe an intentional object. If the desire is currently raging, unsatisfied, then its intentional object, the state of affairs that would satisfy it, is currently nowhere present. It may not exist anywhere.

⁸ Descartes seems to have noticed this problem. He identifies pain, hunger, and thirst as "confused modes of thought" that arise from the union of mind and body. He goes on: "When we say, then, with respect to the body suffering from dropsy, that it has a disordered nature because it has a dry throat and yet does not need drink, the term 'nature' is here used merely as an extraneous label. However, with respect to the composite, that is, the mind united with this body, what is involved is not a mere label, but a true error of nature, namely that it is thirsty at a time when drink is going to cause it harm." See Descartes 1984, 59.

And whatever else one might say about sensing, it is very clear that one cannot sense a *merely* intentional object. You might seem to, perhaps, but you cannot literally do so. So you cannot sense what would--if only it were present--satisfy your currently raging thirst. One can represent such states of affairs in other ways, but we do not reckon such representation to be sensory.

Similarly with pain and pleasure. Some states of affairs relieve the pain. Others aggravate it. To say "S is painful" implies certain things about that creature's motivations. And per hypothesis the mere presence of a quale cannot imply anything about the creature's motivations. It follows that the mere presence of a quale cannot guarantee any particular effect on one's motivations. So no phenomenal quale is *per se* painful; no matter what one tries to pack into the list of "immediate phenomenological qualities", one cannot guarantee that when that congeries is sensed, it will be found to be aversive.

Kripke says the reference of "pain" is fixed by its "immediate phenomenological quality", by being "felt as pain" (Kripke 1980, 151, 152). Consider "thirst" as an analog. Suppose being thirsty entails having particular motivational states--wanting to drink, for example. Two consequences follow. First, wanting to drink does not have any intrinsic phenomenological character. Any phenomenal character it happens to have is inessential to its being a desire to drink. Second, whatever phenomenological character you pick as essential to thirst, if that character is not connected with a desire, it is not connected to thirst. At best it is the "immediate phenomenological character" of a *sensation* of thirst. But a sensation is not a sensation of thirst in virtue of having one sort of phenomenological character instead of another. The essential property, which is relational, is the connection to desire. Similarly there is no phenomenological character specific to painfulness. At best there is a phenomenological character of sensations that are painful. Again the essential feature in virtue of which those sensations are painful is the relational and contingent connection to dispositions to avoid.

V.

Einstein advised that our theories of nature be as simple as possible, but no simpler. Painfulness could not be a sensory quale. What could it be? The next simplest hypothesis is that it is not simply a sensory state, nor simply a motivational state, but a tandem product, a state of affairs constituted by the two of them standing in a certain relation.

A painful quale is one identified by its effect on motivations. The

typical bodily pain engages such motivations--it is painful--but it also presents a distinctive sensory character: some range of qualities within those discriminable by nociceptive somesthetic discrimination, as already described. The qualities sensed and the painfulness thereof are not always distinguished, but they are logically distinct. Call the former pain sub sensory and the latter pain sub motivational. If painfulness is not a quale then no characterization of pain sub sensory implies a characterization of pain sub motivational. The simplest alternative that would explain the facts is that there exists a very strong but nevertheless contingent connection between them. The ordinary term "pain" refers to a state of affairs constituted by both, standing in a certain relation to one another.⁹ Suppose that we are built so that having certain kinds of somesthetic qualitative states attracts one's attention and causes an immediate, overriding, and compelling desire that such sensing cease. The link here is immediate, direct, and very strong. Suppose that sensing that kind of quality almost invariably arouses a strong aversion to that quality. The causal connection is so strong and exceptions are so rare that ordinary language can label the conjunction with just one word, and almost never go wrong. The two can be treated as a sum because they almost always occur together. But there is no logical necessity binding them, and in odd cases they can diverge. I will call this the "tandem" model. It is in the odd cases that we see the need to note the logical distinctions between the components of what ordinary language identifies, indiscriminately, as pain. The patient on opiates says he still feels the same burning pain, but it no longer bothers him. Is he in pain or not? To Socrates we said yes and no; more helpfully, perhaps the patient does have pain sub sensory--all the same sensory qualities are present--but does not have pain sub motivational--their normal motivational effects have been blunted.

On this hypothesis the painful, hurtful, or to-be-avoided character of pain lies firmly on the side of pain sub motivational. If those same sensory qualities could lose their aversive character, could cease to arouse any disposition to avoid, and if the patient became utterly indifferent to their occurrence or non-occurrence, then they would lose

⁹ This hypothesis is meant to apply to that species of bodily sensation we typically call "pain". It is *not* meant to encompass all the states of affairs that fall under one or another sense of the word "painful"--as in painful emotions, painful encounters, a painful loss, and so on. Similarly, there are many conditions that people find aversive (glaring light, sufficiently loud noise, bad smells, and so on) but only those that involve sensation in the nociceptive somesthetic modality are typically called "pains".

any claim to being painful. That same burning feeling no longer hurts. This is difficult to imagine because in our experience that kind of burning sensation invariably arouses a strong and over-riding desire that it cease, and so it is difficult to imagine that sensory quality occurring without its being aversive. Per hypothesis there is a very strong causal connection between the two. But it is not a logical connection. We are just built that way.¹⁰

If the connection between a somesthetic quality and its aversiveness is contingent, then we can explain various oddball cases, as well as what makes them odd. So for example it is possible that the very same quality that in us sets off alarms, avoidance, and evasion in the masochist stimulates some other motivational disposition. Does the masochist feel pain? Yes and no. The masochist might have the same pain sub sensory states, but different pain sub motivational states.¹¹ It is likewise easy to accommodate the “madman” of David Lewis (1980): the madman has the same pain sub sensory as we do, but it is connected to a different motivational state. (It makes him snap his fingers and think about mathematics.) “Must pain be disliked?” is an *ambiguous* question: the sensory qualities themselves cannot necessitate any particular like or dislike, but the aversions they almost invariably arouse must constitute dislike of something.

Philosophically the tandem model may seem ad hoc, but neuroanatomically there is a very interesting regularity that supports it, and in fact, suggested it. Most of our sensory modalities conduct the bulk of their traffic on myelinated pathways that proceed from receptors to the thalamus and thence to specialized areas of sensory cortex. Pain is very different. Along with the fast spino-thalamic tracts, it includes at least four unmyelinated spinal pathways that synapse first in limbic structures in the midbrain and pons. It has direct connections into the reticular activating system of the midbrain, which controls alertness, arousal, and sleep; and it has an enormous

number of projections and offshoots into a wide variety of nuclei in the limbic system. The latter is an ancient portion of our nervous system that we share with the earliest reptiles. It controls the sympathetic and parasympathetic nervous system, mediating the fight/flight responses; it has the nuclei that seem to associate positive and negative reinforcers with stimuli; it maintains homeostasis, and controls appetite and mood; it contains the famous pleasure centers, others, less famous, that yield frightful pain; it has nuclei that release endogenous opiates and can block out pain altogether. Addictions to illegal substances are all housed here. Various parts are overactive or under-responsive when one is anxious or depressed. In motivational and emotional terms, the limbic system is a potent place. Pain wraps its tendrils around all parts of it. Unlike most other sensory systems, pain has direct access into the innards of our preference functions.

Only a few systems do this: pain, smell, and taste.¹² Hunger, thirst, and other appetites are likewise limbic phenomena. These are arguably the most primitive of all our mental states. Trace your family history back far enough, and you will finally reach a primitive segmented worm, who was the common ancestor of insects, mollusca, *c. elegans*, and us (see Katz 2000). A worm is basically a moving alimentary canal, and all its mental states are imbued with the task of managing the alimentary canal. The first necessity is to wiggle away from places that cause bodily destruction, and lo, there is pain. An obvious design improvement is to avoid swallowing materials in one’s mouth that are not fit for the alimentary canal, and lo, there is taste. Even better, before putting something in one’s mouth, get a sense of whether it would be good to do so. Lo, there is smell. We are thereby fitted with primitive approach/avoid systems: wiggle towards the places that smell good, and away from those that smell bad, or cause pain. All three of these systems have initial synapses in the mid brain or lower, and all three have very strong and direct connections to parts of the limbic system. These comprise what I called the primitive feeling states. All three have direct and strong connections to motivational states. The tandem model works for all of them.

In these primitive feeling states the sensory and motivational components really do work in tandem: they do not arise entirely independently of one another, nor is one entirely antecedent to the other. Neuroanatomically, there is considerable interaction between

10 Descartes, Meditation VI: "when I inquired, why, from some, I know not what, painful sensation, there follows sadness of mind, and from the pleasurable sensation there arises joy, or why this mysterious pinching of the stomach which I call hunger causes me to desire to eat, and dryness of throat causes a desire to drink, and so on, I could give no reason excepting that nature taught me so; for there is certainly no affinity (that I at least can understand) between the craving of the stomach and the desire to eat, any more than between the perception of whatever causes pain and the thought of sadness which arises from this perception."

11 It is also possible, and perhaps more likely, that the pains of the masochist arouse the normal dispositions-to-avoid, but those dispositions are over-ridden by other desires.

12 Other modalities send collaterals into the reticular activating system (so that a flash of bright light or a loud bang can be startling, grab attention, and increase alertness), but they do not have the wealth of relatively direct connections found in pain, smell, or taste.

neurons in the medial and ventral tracts from the dorsal horn of the spine upwards (see Millan 1999, section 4), and many interconnections between the central nuclei to which they ascend. Furthermore, the sensation and the aversion have not only a common ancestor but a common object. That is, the sensory state presents certain somesthetic features as located in parts of one's body. One feels something tearing and burning here, or sharp and piercing there. The simplest hypothesis is that the "objects" to which one is averse are those very same features. One would like to get away from that tearing burning feeling, but unfortunately one cannot. The dislike is directed at the appearance of a portion of one's body. The burning and tearing feeling is what is painful; it hurts here, we say, pointing to the place that seems to be characterized by those qualities. "It hurts here" means, on the tandem model: "I sense various somesthetic features *F* as occurring here, and I am averse to those features." For somesthetic feature *F*, plug in any of the sensory qualities of pain listed above. Those features are the objects of both the sensory state and the aversion. Pace Hardcastle, "It hurts here" is not only well-formed and meaningful; it is sometimes true.

The tandem model though is true of all our primitive feeling states, not just pain. Compare "it stinks there" or "that tastes awful". An appearance is attributed to a locale and there is a disposition to avoid those features in that locale. Many of our words for bad tastes and bad smells have a striking logical similarity to those we use to characterize pains. Taste aversion in particular provides an excellent analogy for pain. Suppose you come home from vacation and, without thinking about it, take some milk from the refrigerator. Suppose that milk is not only sour but spoiled; in fact, *very* spoiled. You make acquaintance with a taste that is sour, stale, rank, loathsome, disgusting, repulsive. It arouses a strong and immediate desire to eject the liquid. If you are lucky you can act upon the desire immediately and then rinse out your mouth. Now just imagine that you cannot eject the liquid; you must keep it in your mouth. This is a good model for the aversive character of pain. There are certain distasteful features that are sensed to characterize a particular locale, and which you'd desperately like to avoid, but which you cannot avoid. The distasteful features are the joint objects of both sensory and motivational states: they are both sensed and disliked. Having a loathsome taste in your mouth is logically analogous to having a pain in your foot; "It hurts there" is logically analogous to "that taste is repulsive".

The primitive worm at our functional core did not have the need to distinguish between its sensations and its desires. In tastes, smells,

and pains we can see its ancestry in us still.

VI.

You might ask why we should have various sensory modalities coupled so intimately with motivational powers. *Why* should such and such a feeling be negatively reinforcing? *Why*? A good way to probe the motivational component of pain is to consider what happens to those who cannot feel pain. These are the ones in whom the job of pain, whatever it is, is unperformed. Then ask: how would you design a creature so that it would avoid such a fate? So consider the fate of someone who does not feel pain:

Tanya was a four year old patient with dark, flashing eyes, curly hair, and an impish smile. ...Testing her swollen ankle, I found that the foot rotated freely, the sign of a fully dislocated ankle. I winced at the unnatural movement, but Tanya did not. ... When I unwrapped the last bandage, I found grossly infected ulcers on the soles of both feet. Ever so gently I probed the wounds, glancing at Tanya's face for some reaction. She showed none. The probe pushed easily through soft, necrotic tissue, and I could even see the white gleam of bare bone. Still no reaction from Tanya.

It seems apparent that Tanya suffered from a rare genetic defect known informally as "congenital indifference to pain". She was healthy in every respect but one: she did not feel pain. Nerves in her hands and feet transmitted messages about changes in pressure and temperature--she felt a kind of tingling when she burned herself or bit her finger--but these carried no hint of unpleasantness. Tanya lacked any mental construct of pain. She rather enjoyed the tingling sensations, especially when they produced such dramatic reactions in others....

Seven years later I received a telephone call from Tanya's mother. ... Tanya, now eleven, was living a pathetic existence in an institution. She had lost both legs to amputation: she had refused to wear proper shoes and that, coupled with her failure to limp or shift weight when standing (because she felt no discomfort), had eventually put intolerable pressure on her joints. Tanya had also lost most of her fingers. Her elbows were constantly dislocated. She suffered the effects of chronic sepsis on her hands and amputation stumps. Her tongue was lacerated and badly scarred from her nervous habit of chewing it. (Brand and Yancey 1993, 3-5.)

So suppose you are God up in genomic heaven, designing survival machines to transmit and propagate your genes. Clearly one would want to lower the odds that Tanya will continue to injure her body. What is the simplest and cheapest mechanism one can imagine that would serve this end?

We would like (for example) to lower the odds that she will stand with all her weight on a fully dislocated ankle. For this we need some mechanism to register the difference between the dislocated ankle and the ankle in normal working condition; some means of making Tanya notice the difference (to get her attention, and shift it to the damaged member); some signal that makes it less likely that she will continue to stand on the fully dislocated ankle--ideally one that would make her stop immediately (provided there are no other over-riding survival needs, like running away from a tiger); and (if possible) some more enduring state that would motivate Tanya to repair her injuries, or at least allow them to heal. One would not want these signals to be easy to ignore, and one would not want the recipient to be able to habituate to them, since then they would lose their motivating power. In these ways the signals must be different from other sensory signals.

In effect we need a sensory modality that also has its foot on the brakes. It has to yell "STOP" at Tanya, and yell in a way that cannot be ignored. Avoiding further damage is probably the first thing to get right. This needs a negative reinforcer: something that decreases the odds of any action that is followed by signals of increased bodily damage. That sort of signal, I submit, is the simplest precursor for the states that could become our pains.

We can imagine elaborations. It would be nice if our signal would prompt Tanya to shift weight off the damaged leg, and then freeze. Imagine little green letters appearing on the heads-up display in Tanya's cockpit: "Damage to left ankle. Standing on it is ill-advised. Shift rightwards."¹³ We have to make Tanya pay attention to such information, and ideally make her obey. Little green letters on the screen won't do. We need whips and lashes, pleasure and pain.

In fact people have tried to develop prosthetic pain systems, and have run up against precisely this barrier. The nerve damage caused by leprosy leaves the patient insensitive to pain in feet and hands. Paul Brand showed that flesh does not rot in leprosy, nor do fingers or toes fall off; instead all the damage is self inflicted, and arises because

the patient does not feel any pain. With colleagues he put in an NIH proposal to develop a prosthetic pain system, using pressure sensors in gloves or socks and a warning signal to alert the patient if some activity was damaging. Despite years of effort the system failed, and the reasons for its failure are quite instructive. Brand says

Patients who perceived "pain" only in the abstract could not be persuaded to trust the artificial sensors. Or they become bored with the signals and ignored them. The sobering realization dawned on us that unless we built in a quality of compulsion, our substitute system would never work. Being alerted to the danger was not enough; our patients had to be forced to respond. Professor Tims of LSU said to me, almost in despair, "Paul, it's no use. We'll never be able to protect these limbs unless the signal really hurts. Surely there must be some way to hurt your patients enough to make them pay attention." (Brand & Yancey 1993, 194)

So they decided to make the signal painful: a high voltage, low current electric shock to the armpit, a place where most leprosy patients could still feel pain. But even that didn't work very well; he says most patients saw the shocks as punishment for breaking rules, rather than signals of danger one would naturally want to avoid. He says:

In the end we had to abandon the entire scheme. ...Most important, we found no way around the fundamental weakness in our system: it remained under the patient's control. If the patient did not want to heed the warnings from our sensors, he could always find a way to bypass the whole system ... Why must pain be unpleasant? Why must pain persist? Our system failed for the precise reason that we could not effectively duplicate those two qualities of pain. They mysterious power of the human brain can force a person to STOP!--something I could never accomplish with my substitute system. And "natural" pain will persist as long as danger threatens, whether we want it to or not; unlike my substitute system, it cannot be switched off. (Brand & Yancey 1993, 195-6)

As a selfish God up in genomic heaven, we must write in some aversive subroutines, or all our creatures will meet Tanya's fate. None of the genes will propagate. Pain, I suggest, can be read as a message from the genes. It says "stop that, you stupid organism; you're hurting my chances!" And the only way to make sure that the organism will obey is to wire the perception of these sensory qualities directly into the creature's preference functions. Sensing in that fashion causes an immediate and over-riding aversion. The organism wants to get on with its life, so it wants the pain to stop. It obeys. As Proust said, "To knowledge we make promises only; pain we obey".

13 The old allusion is to Descartes' pilot, who (in the Sixth Meditation) perceives damage occurring to his vessel. Pain, hunger, and thirst demonstrate that we are *not* housed in our bodies the way the pilot is in his vessel: they "arise from the union, and as it were, intermingling, of the mind with the body". (Descartes 1984, 56). The more recent allusion is to Arnold Schwarzenegger as the Terminator. Asked whether it hurt to have bullets dug out of his back, he replied: "I receive data that could be interpreted as pain". Perhaps "does it hurt?" is ill-formed when asked of the Terminator.

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