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# Pain: An Epistemological Account

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Published Online 23 April 2022

*“All life is problem solving” - Karl Popper*

The following essay is my attempt to offer some ideas and arguments to those who are interested in the study and treatment of pain. I outline an account of pain by laying a foundation of epistemology and what follows from it. The ideas are not, however, new, they are those of the philosopher Karl Popper and the physicist David Deutsch, all errors are my own. I hope to point the reader in the direction of better avenues for research and for practical changes to the treatment of pain that are immediately applicable.

## 1. A foundation in epistemology, on which to build upon

To understand how pain works, one must first understand how knowledge is created - as pain is just one instantiation of knowledge creation - of which there is only one process<sup>1</sup>, that of conjecture and criticism.

That pain is just one instantiation of knowledge creation can be illustrated by understanding the problem that biological organisms face, that of surviving and reproducing within an environment that can range from friendly to hostile to deadly. To be able to survive and reproduce within an environment of this type, an organism must be able to gain knowledge of what there is, what it does, and sometimes how and why. If an organism can do this, it can then develop traits or behaviors that better allow it to solve this problem. When an organism does this, it has created knowledge.

To paraphrase Karl Popper, all knowledge starts with and must be related to a “*problem situation*”<sup>2</sup>, as raw, objective and problem-less knowledge is impossible, as you will see. The ‘*problem-situation*’ of a biological organism is to survive and reproduce within an ecological niche.

A quick aside, the following may seem tedious but its importance will become clear at the conclusion of the essay, see the terminology section to better understand the terms used. This essay will use the word knowledge in a specialised sense, and may be different from the common usage of the word. Knowledge is a physical statement or instantiation of a true proposition. Regarding truth, I will adopt Alfred Tarski’s correspondence theory of truth - that a theory is true if and only if it corresponds with the facts (or with reality). What follows from this is realism, the philosophical idea that the external world exists and is a certain way, and that if our statements and other physical instantiations of the way the external world is, corresponds with how it actually is, they are true. Discussing statements is the easiest way

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<sup>1</sup> See Popper, K. ‘Objective knowledge’ 1972.

<sup>2</sup> Knowledge consists of solutions to problems and is not - and can never be - ultimate or final. This does not mean that objective knowledge does not exist, just that, as fallible beings, we could never know or be justified in believing that we have obtained objective knowledge. Regardless, this does not matter, as we can - and do - solve problems by creating some knowledge.

to understand this concept, as we can think of statements about external reality, which can be written or spoken, for example: This is a dog → 🐕. This statement can be true (if what 'this' points at really is a dog) or false (if what 'this' points at is a cat). Knowledge of this kind is explicit, meaning that it can be formally stated in a given language. Knowledge might also be inexplicit, like the knowledge of how to catch a ball, one could know how to do this without ever stating or thinking about stating the actions required in any language. Of course, after the fact you could turn inexplicit knowledge into explicit knowledge through thought, by stating that you lift your arm, track the ball's passage through the air... and so on. Note that inexplicit knowledge can also be true (if it corresponds to the facts, in this example of how to catch a ball) or false (if it does not). Knowledge can also be unconscious, and not require a 'knowing subject' of which I will give some examples later in this essay, after laying some further foundations.

Although there is only one way in which knowledge can be created, I will illustrate it in two ways, though the similarity in the underlying structure will be clear. One is through biological evolution, and the other is through the creativity of persons, of which, humans are the only example we know. I will start with biological evolution, or 'epistemology without a *knowing* subject'.

## 2. Knowledge creation through evolution

Knowledge creation through evolution is parochial, in the sense that it solves a problem in a well-defined, narrow class, and has minimal reach. The knowledge created is that of how to survive and reproduce within a given ecological niche, hence parochial, though it is genuine knowledge all the same. The problem situation<sup>3</sup> of an organism is that of how to survive and reproduce. So how do organisms solve this problem? Organisms must create knowledge. There is only one viable way for knowledge creation, and it is through, in the words of Popper, conjecture and criticism<sup>4</sup> - that is, the conjecturing of ideas, criticism of these ideas and then the selection of the conjectures that provide the best<sup>5</sup> solution to the problem. This is the truth of epistemology and is one of the deepest truths that humans have come to understand. Let me outline how it can happen, through one of the other deep truths we have - evolution.

As we continue, understand that there is no forethought in evolution, unlike in human creativity. The earliest replicators or organisms were mindless molecules or collections of molecules that held the knowledge of how to replicate. This is the deepest fact of evolution, that molecules or organisms that could better replicate would increase in number in successive generations. It is unknown what the first replicators were but after a time, the main replicators that remained were genes. If this is mindless and just happens, how is it a process of conjecture and criticism? The conjecturing is done through imperfect copying and recombination of genes which provide organisms with differing traits and abilities. These

<sup>3</sup> I'll try not to attribute human characteristics to all organisms (as they may not have the cognitive capacities to have wants and desires, but it is illustrative). And please appreciate that an organism is not a replicator: it is part of the environment of replicators. Genes are the only replicators. An organism is likely the most important part of the environment of a gene (after its other genes), as genes will only be replicated if their carrier (organism) survives long enough to allow replication.

<sup>4</sup> See Popper's formulation in 'Objective Knowledge' 1972: ' $P_1 \rightarrow TT \rightarrow EE \rightarrow P_2$ ', where  $P$  = Problem,  $TT$  = Tentative Theory and  $EE$  = error elimination. Popper also presents arguments for this claim and demonstrates why alternative theories of knowledge creation are untenable.

<sup>5</sup> Of the conjectures offered, not all conjectures.

'conjectures', can be 'criticised', that is, tested by the environment. The organisms that have traits that are conducive to replication within a given ecological niche - that is, they survive in it - have proven to contain genuine knowledge<sup>6</sup> and will pass this knowledge onto their offspring through their genes. The 'criticism' is the 'testing' that is done by the environment. If a gene codes for a trait that helps its holder better survive and reproduce, it will be more likely to be copied in the next generation, while genes that code for less helpful traits will be less likely to be copied. In this way, the environment is in some sense 'criticising' genes that do not contain knowledge of how to survive by eliminating them from the population and leaving only those that contain genuine knowledge. If you imagine this happening long enough, and only requiring imperfect copying and recombination of genes to continue to provide 'experiments' to find new/'better' knowledge, what will prevail is the continual development of new knowledge stored within the genes of the organisms. Given enough time, this process can lead to complex adaptations like organs for seeing, hearing and even experiencing pain. All evolutionary adaptations are just conjectures that have survived criticism entailing how to survive within a given environment. For example, an organism may create knowledge of a noxious chemical in its environment, and when this is created the organism may respond with a change of behavior, like closing the eyelids if the chemical is in the vicinity of the eyes and at risk of damaging them.

In this way, genuine knowledge has been created and stored entirely within one organism through the process of *conjecture* and *criticism*. As above, this knowledge is parochial and has minimal reach in the sense that it cannot always be transferred to another ecological niche or even continue to solve this problem if the niche changes. As niches do change, the problem situation changes, and organisms continue to conjecture new solutions through ongoing gene copying errors and recombination and the conjectures that best solve the problem are selected for, as shown in Fig.1. Knowledge creation through evolution happens through random conjectures<sup>7</sup> and must involve an organism going through the stages of development and reproduction and death for genetic changes to be selected, hence it is a slow process and conjectures cannot be designed or modified to better solve problems.

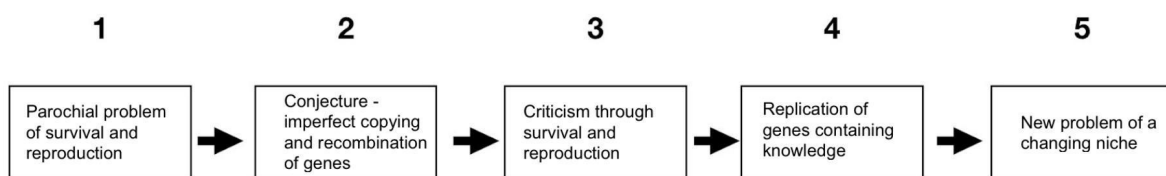


Fig 1. The growth of knowledge through evolution

### 3. Knowledge creation by persons

Knowledge creation by persons follows the same process with some important differences. Firstly, our knowledge need not be parochial and can have infinite reach as our problem situation is not limited to how to survive in an ecological niche. Our problem situation is unbounded, in the sense that we can not and never will solve all problems and that we can choose which problems to work at solving. The importance of this concept in relation to pain will become clear. Take the example of noticing in the night sky, that the vast majority of

<sup>6</sup> Of how to survive in a given niche.

<sup>7</sup> Through copying errors and recombination.

lights that you see follow the same pattern of traveling in a regular arc, while a small number of them don't and seem to wander aimlessly in irregular patterns. This can be thought of as a '*problem situation*', as humans want explanations of what there is, what it does, and how and why it does it. Now the process of conjuring solutions happens, unlike in evolution, through conjectures emerging from the creativity of persons, and can happen entirely within one mind. Conjectures can also go through a process of criticism entirely within one mind and travel through multiple iterations before proceeding to further and different forms of criticism. For this reason, Popper stated that we can "let our theories die in our place", that is instead of having random mutations and waiting for the organism to mature and die to try to 'luck out' and solve a problem, we can purposefully design and criticise conjectures creatively. This means that what takes evolution many lifetimes to do, persons can do multiple times within seconds. We can choose problems and purposefully work at finding solutions.

How creativity happens within minds is beyond our understanding, though if we did understand creativity, we would be able to program computers to be creative and would have created Artificial General Intelligence. After conjecturing solutions, we can then use evidence to choose between rival theories, if our theories are scientific, like the example of lights in the sky, we can use experimental tests to choose between our theories. This may involve using the evidence from the light that reaches us from these objects and comparing to see which of our theories is refuted, and if any are not, these will become the prevailing theory and will have proved to contain *some* true knowledge - though of course this knowledge will not be complete or final. In this example, the prevailing theory is that these dots in the sky are planets (Greek for 'wanderers' - an artifact of early conjectures) and are contrasted to all the other lights in the sky which are stars. This theory explains that these dots don't actually move in irregular patterns but just appear to do so because of our viewpoint within a solar system, in which both us and the planets are orbiting the sun in ellipses<sup>8</sup>.

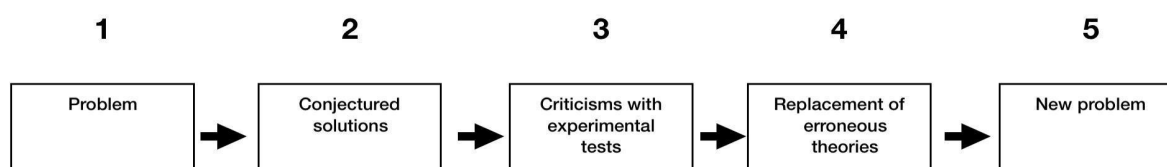


Fig 2. The growth of knowledge in science

Knowledge creation through evolution and science are, I believe, the easiest to understand when first learning of Popperian Epistemology (based on the work of Karl Popper), though the same process holds true of mathematical knowledge and moral knowledge (in which both of these, objective truth exists) though the criticism does not involve experimental tests and the reality of abstractions must be appreciated<sup>9</sup>.

#### 4. A quick aside on fallibilism and justification.

If you have followed the discussion so far, you may have noticed that through this process, there is no logical way of justifying our knowledge as true, though we can come to have better explanations of what there is, why, and how it works. There is no way to 'check our

<sup>8</sup> An example of the deceptiveness of our senses.

<sup>9</sup> Beyond the scope of this essay.

work' as it were, there are no solid foundations on which we can begin our knowledge creation process that will ensure the truth of our findings at the end of the process. Many have been proposed but none have - or will be able to - provide a method of justifying our knowledge as true. This is why, as I stated earlier, that objective knowledge is possible but we, as fallible beings, could never be justified in believing we have created it. All our knowledge is fallible, including our knowledge stored in our genes, scientific, mathematical, and moral knowledge. There are no authorities to knowledge and there is no limit to how wrong we can be, this stance is known as fallibilism. If fallibilism is true, and it must be (see what I did there), then we can never be justified in even believing what we see and hear. This might sound shocking, but one must only think of visual illusions, what we see when dreaming or imagining or any other number of ways in which our senses can trick us to become comfortable with the idea. I will now outline how our experience of reality is really an experience of *virtual reality*.

### 5. All observation is *theory-laden*

Once understood, Popperian Epistemology has significant implications for the understanding of pain and sensation in general. Namely that all observation is *theory-laden*, meaning that there is no such thing as 'raw' experience, that all our experience of the world comes through layers of conscious and unconscious theories, and none of these theories could be justified as being true. Sensing something in the world *is* knowledge creation about what is out there, what it does, and sometimes how and why. Remember that there is only one way in which knowledge can be created, through conjecture and criticism. False theories of knowledge creation can lead to misunderstanding of how sensation actually works. For example, *Empiricism* is the misconception that we 'derive' all our knowledge from sensory experience. This would involve, for the example of sight, looking out at the world and automatically seeing what there is (or in the words of some pain researchers, experiencing a sensation as 'given'). This cannot be how sight works, for it leaves unexplained how the light that is reflected from objects in the world is turned into the experience of seeing. That knowledge, of how the pattern of light that falls on our retina results in visual experience, is needed. Where did this knowledge of how to turn this light into experience come from? If one claims that it comes from an infallible source or is justified and infallible because it comes from our sense organs, it must appeal to some form of spontaneous generation or creationism, the above argument shows how this cannot be so. If one agrees that it comes about through conjecture and criticism, then one is also implicitly accepting that it is fallible, that it could be wrong, and therefore it cannot be a 'given'. Such arguments - that sensations are a 'given' - implicitly give false authority to the senses and underplay their fallible nature. In reality, the knowledge of how light hitting the retina is transduced into the experience of seeing involves the knowledge in our genes and brains, in the forms of theories (ie. programs) of how to use light that has been converted into electrical impulses in our nerves and then electrical activity in our brains as a criticism of the conjectures we have about how the world is, to refute some conjectures and leave only the ones that contain the most truth. This is then what we experience as reality. This knowledge creation has happened through evolution and experience and has been stored in our genes and brains and for this reason it is the solution to a parochial problem and, as with all knowledge, is fallible and will contain errors.

It has been shown that all observation is *theory-laden*, we have no direct access to the world and that there is no such thing as 'raw' experience. You might now appreciate that we never actually see what is in front of us, our eyes do not work like windows upon the world. When we see something, this sensation happens entirely within the mind (the place where consciousness resides, experience happens, thinking takes place and the abstraction that is "I" exists), which I believe is intimately related to the brain, and are never appreciated for what they actually are, namely crackles of electrical activity in our nerves that have been transduced from 2D images of light hitting our retina which is ultimately experienced as a 3D image of the world. In the words of David Deutsch:

*"All observations are, as Popper put it, theory-laden, and hence fallible, as all our theories are. Consider the nerve signals reaching our brains from our sense organs. Far from providing direct or untainted access to reality, even they themselves are never experienced for what they really are - namely crackles of electrical activity. Nor, for the most part, do we experience them as being where they really are - inside our brains. Instead, we place them in the reality beyond. We do not just see blue: We see a blue sky up there, far away. We do not just feel pain: we experience a headache, or a stomach ache. The brain attaches those interpretations 'head' 'stomach' and 'up there' - to events that are in fact within the brain itself. Our sense organs themselves, and all the interpretations that we consciously and unconsciously attach to their outputs, are notoriously fallible: - as witness the celestial-sphere theory, as well as every optical illusion and conjuring trick. So we perceive nothing as what it really is. It is all theoretical interpretation: conjecture"*

and...

*"Imagination is a straightforward form of virtual reality. What may not be so obvious is that our 'direct' experience of the world through our senses is virtual reality too. For our external experience is never direct; nor do we even experience the signals in our nerves directly - we would not know what to make of the streams of electrical crackles that they carry. What we experience directly is a virtual-reality rendering, conveniently generated for us by our unconscious minds from sensory data plus complex inborn and acquired theories (i.e. programs) about how to interpret them.*

*We realists take the view that reality is out there: objective, physical and independent of what we believe about it. But we never experience that reality directly. Every last scrap of our external experience is of virtual reality."*

We can now apply these ideas of knowledge creation to pain.

## **6. What follows from epistemology, in relation to pain?**

The fact is, there is nothing infallible about 'direct experience'. As shown, experience is a sort of virtual reality, created by our brains using flawed sensory clues and these clues are only given substance by our inborn theories.

The experience of pain must have evolved as an adaptation that was advantageous for survival and reproduction or as an adaptation that was associated with other genes that

were better at getting themselves copied and hence spread, ‘on their coattails’ as it were, of these genes. I prefer the former idea and see pain as an advantageous adaptation for organisms that assists the survival of an organism so that it can reach reproductive age, within a given environment, more commonly than an organism without such an adaptation. And it does this because the experience of pain encodes knowledge of how to survive and this knowledge affects survival through behavior change. If this is correct, the knowledge in our genes and brains, namely that which comprise the knowledge to create the parts of the organism that relay *and process* information about the state of the body and its relation to the environment plays the role of creating knowledge about the world to inform the organism of things that are likely *bad*<sup>10</sup> for it and subsequently to change its behavior. Note the word *likely*, as this knowledge, like all, is fallible, can be wrong or contain error. That our experience of pain can contain error is abundantly clear, the pain felt when cardiac tissue is not getting sufficient blood supply is commonly felt in the left arm, the amount of pain felt from an identical stimulus can change depending on context of the situation, and most practically for this essay, people can experience pain that is out of proportion to the amount of behavior change that is advantageous for survival and reproduction.

Quite simply, an organism that can create knowledge about the world and then change its behavior as a result of that knowledge would be better (in replication terms) than one that cannot. Though after a time, in humans, genetic changes have led to creative beings - people, who do not rely solely on *noisy* ‘bottom up’ sensory information but rather use their brain and mind to assist in this knowledge creation and interpretation. This is the ecological niche of humans, to use creativity, not just genetic evolution, to solve problems. No other organisms on earth can do this. For this reason, the creativity of humans cannot be disregarded when considering the knowledge creation pathway for our experiences of reality, in particular the experience of pain.

Now, think of the brain as the central control center of the organism, compiling information, conjecturing theories (conscious and unconscious), criticising them against the available evidence, and ultimately changing behavior. Some people call this view ‘brain centric’ without providing any other credible explanation of where this processing takes place or where the mind could reside without appealing to the supernatural. For this reason, I do not find these people’s views plausible, though I note it is quite trendy to denigrate the brain in discussions of pain, though this is just a snobby ‘language game’.

## 7. Noisy clues and a fallible brain

Now, in keeping with my terminology, pain is an instantiation of knowledge creation. Yes it is a felt experience, but my claim is that it is a felt experience that encodes knowledge of the state of the world, informing the organism to change its behavior, to its likely replicative benefit. So, this knowledge of how the world is, our relationship to it and what to do about it could be correct<sup>11</sup> and could serve its function well of changing behavior for the better in terms of survival and reproduction. This knowledge could be incorrect, as knowledge creation is conjecture and criticism and is fallible; it could urge an organism to change behavior that results in harm, remembering that there are no authorities to knowledge or way

<sup>10</sup> *Bad in the sense that the organism would likely benefit from changing its behavior in light of this knowledge.*

<sup>11</sup> *Though unjustified.*

of justifying it as true. Examples of both are easily thought of, touching a hot stove, and the experience of pain and subsequently pulling your hand away may contain true knowledge of the state of the world in relation to survival and reproduction. Having pain in the ankle preventing you from running away from a predator may be an incorrect rendering of how to respond to the state of the world, in terms of survival and reproduction as preserving an ankle is useless in a dead organism. In creative persons, the brain can serve the role of providing more theories into the calculation when creating knowledge of the state of the world and whether to produce pain. For example, the visual, auditory, and olfactory theories that conjectures that a predator is quickly approaching may contain true knowledge of what is actually required to survive and reproduce, namely not a pain experience so that you can run 'like hell'. This shows that the experience of pain is not and cannot be a simple reflection of the state of the tissues, as we can have no direct access to the state of the tissues, only our virtual reality generated experience of what our best conjectures of them are. I hope that it is clear that the ideas or conjectures that the brain and extended nervous system uses to solve problems can be both conscious (explicit and inexplicit) and unconscious. This may be one of the reasons as to why pain is such a difficult entity to understand and ultimately treat, and any explanations that do not take the creativity of persons into account, will necessarily mislead.

## 8. Can we change pain and do we really want to?

To summarise so far, pain is a felt experience that encodes knowledge, which is fallible and has no authority, about the world and what we should do in light of this knowledge, to better serve the parochial problem of survival and reproduction. It would seem there are people who have pain and don't want to have it, can they or even should they change it. "Should they?" is a moral question and will be addressed later. "Can they?", yes. Pain can certainly be changed, in the sense that we can increase or decrease it without changing the state of the tissues where the pain is felt, see literally any paper on contextual influences on pain or think of any example for yourself where context changes pain, typically distracting or enjoyable tasks can decrease pain. How to change the feeling of pain is not as well known as the fact that we know that it can be changed. And how to change it in the long term is even less well known.

But do we really want to? I think the answer is a strong 'sometimes'. That pain contains knowledge much of the time is abundantly evident. We touch a hot stove and pain urges us to recoil; we overdo it in some amateur sport, damage a ligament in our ankle and then pain urges us to retreat and recover. In these situations, I think that pain contains true knowledge that is useful if you adopt the same goals as your genes<sup>12</sup> and we probably ought not do anything to change this pain too much. The fact that this pain contains true knowledge is also probably one of the reasons why humans can't easily reduce acute pain cognitively<sup>13</sup>, for when knowledge is physically instantiated, it tends to remain so. But what about, so called, 'maladaptive pain', or what if you opt out of the survival and reproduction goals of your genes. Or what if you create a new relation to the experience of pain and no longer dislike it or want it to end. What if you adopt a neutral attitude to it and just get on with life?

<sup>12</sup> Though you don't have to.

<sup>13</sup> Though it follows from epistemology that it is possible, with sufficient knowledge.



'Maladaptive pain' is really just knowledge of the world that contains error, we roll our ankle and then experience pain that limits our activity far longer than is advantageous to our survival and reproduction. This is a simple example of 'maladaptive pain' and is in every sense false knowledge of reality, in evolution's own terms. If this is the case, we can think of this as a problem, a conflict of ideas, and the brain may serve a useful function by criticising this knowledge to further eliminate error. It might do this by changing behavior to assess the state of the ankle, test it out a bit and use this extra information to create truer knowledge regarding the need to protect this part, and ultimately lead to pain cessation. This may involve explicit conscious ideas (like learning from an essay that there are no authorities to knowledge and all theories can be criticised) to attempt to improve this knowledge, in the evolutionary sense. It will also involve inexplicit ideas and even unconscious ideas, as all explicit ideas contain an inexplicit and unconscious component. This is the reason that I believe no study to date has demonstrated the ability to consistently reduce pain in diverse subjects through cognitive interventions. This does not mean that it isn't possible, just that we don't currently have the knowledge of how to do so as we have focused mainly on explicit criticisms.

But what about pain that is correct in evolutionary terms, we roll our ankle today and pain prevents us from dancing at our wedding the next day. Should we change this pain?

## 9. Opting out

Like I stated earlier, the '*problem situation*' of creative persons is unbounded. We can opt out of the evolutionary '*problem situation*' of survival and reproduction and adopt less parochial goals and goals in direct conflict with our evolutionary goals. We can choose to be celibate and opt out of reproduction altogether. We can choose to join the alliance and go fight and risk our lives for the lives of others that are not our offspring and don't contain any of our genes. And no men choose to do what is most in our evolutionary interest, namely donating as much sperm as possible to increase their number of non-dependent offspring. This suggests that we don't solely use our brain and mind to assist the creation of parochial knowledge to better our chances of survival and reproduction, but that we can even use our mind to change pain for any number of other goals. As an extreme example, take Tich Quang Duc, the Vietnamese Mahayana Buddhist monk who burned himself to death as a protest in Saigon in 1963 (shown below). I am not claiming that Tich did not feel any pain while doing this, though he might not have, my claim is that he is certainly experiencing and responding to pain differently than someone not trained in Buddhist meditation would have in the same situation or with different goals, evidenced by the fact that he sat perfectly still as he burned to death. Tich Quang Duc changed how he responded to pain for a goal that was antithetical to his genetic self-interest but was in service of a political and religious goal.



Fig 3. Tich Quang Duc in Saigon, 1963

If you roll your ankle the day before your wedding but you live in a culture that values, and adopts, the importance of a “first dance” you may want to use methods of reducing your pain to serve this goal instead of the survival and reproductive goal of protecting the ankle (though as I write this, the dance might be thought of as a way to better reproduction in said culture). That this is possible, logically follows from the above arguments, and how to do so involves only knowing how. Until we have better explanations of how to reduce any and all pain, we can certainly use cognitive strategies to change our relationship to pain, by opting out of the negative experience associated with it.

Not only can we change the felt experience of pain, but we can also change our relationship to this experience and not experience it as aversive. This can be done with other experiences, feelings and emotions - the feeling of fear and anxiety when approaching the precipice can be felt as ecstatic joy in those who choose to do skydiving or bungee jumping. The feeling of pain can be experienced by creative persons in the same way, we are not slaves to our feelings and emotions and can create new relations to them. As shown, there are no authorities in knowledge and when you accept that pain must be felt as a negative experience, you are only lacking the creativity to solve this conflict of ideas.

## 10. Practical ways forward

If we appreciate that pain is an instantiation of knowledge about reality and how we should respond to it, and that all knowledge creation is fallible, and that these theories include, conscious (both explicit and inexplicit) and unconscious theories, including those in our genes and brain/extended nervous system, we can see the many possible ways forward in pain treatments. We can also see possible ‘dead ends’, like that of addressing the parochial problem of trying to change the activity in nociceptors alone or the parochial problem of addressing patients’ fear of movement alone. We must be far less parochial in our efforts. For the solution to this problem can come from a range of possible places, including:

1. Changes in cognition that affect our experience of pain, by lessening it. I can imagine treatments like meditation or other cognitive therapies that allow one the opportunity to have inexplicit and unconscious theories to become criticised by way of a brain state that assists, inhibits or changes our ability to criticise explicitly. Psychedelic drug therapies and cognitive therapies may show promise in this area.
2. Therapies aimed at changing one’s relationship to pain, such that it becomes less threatening or negative. Pain Reprocessing Therapy, Pain Neuroscience Education or Internal Family Systems Therapy may work in this way and may become more effective with further research in light of the above arguments of how to criticise inexplicit and unconscious theories more effectively.
3. Changes in the ‘bottom up’ inputs that are used as ‘criticisms’ in the sense discussed. This could even include devices that affect our sensory nerves and subsequent experience, resulting in changes to our experience of pain. These could be analogous to that of a television screen and speaker that can provide artificial inputs into our sensory organs that lead to experiences of seeing and hearing people or places that in reality are just light and sound emitted from a screen and a speaker.

This idea seems to already be showing promise in the form of virtual reality based treatments for pain but I imagine its potential is far greater than this.

4. Traditional changes to 'bottom up' processing like that of analgesics or other drugs/interventions that impede or affect nerve signals (including ongoing neuroimmune crosstalk), though as shown, this can only be a portion of the inputs that the brain is using as data to criticise theories and create its 'virtual reality' and for this reason it's plausible that changes made in this way may not affect the experience of pain in many patients, as is seen in practice, in which case cognitive changes would be necessarily required.

This is not an exhaustive list but provides examples of how this theory could be practically implemented.

From here, I favor thinking of pain as an 'idea' as the term 'theory' can be misunderstood, though I believe both to be interchangeable. Pain is *just* an idea of the state of the world, though we need not allow this idea to be accepted uncritically and must remind ourselves of the fallibility of our knowledge and the fact that there are no authorities to knowledge. It may be a correct idea, in the evolutionary sense, but even here it would be possible to stop ourselves from feeling it, given the knowledge of how to do so. This thought is liberating. It allows for the possibility of using our cognitive capacities to change our pain experience.

I believe that we can criticise our explicit ideas directly, like the idea that part of us is damaged and needs protection could be criticised by seeking more information in the form of seeing a therapist that can assess, scan, and explain the true state of our tissues to us. This information can be used to criticise the idea that the body part needs protecting and better theories may be created, leading to cessation of pain. I strongly believe that this is the mechanism through which *some* of my patients have recovered from pain. Though more complicated, if our ideas are inexplicit or unconscious, then explicit criticism is much harder, though the possibility of some form of criticism still exists. For example, unconscious theories relating to the processing of nerve signals from the tissues can be criticised by contextual changes, or by cognitive strategies, though this is not explicit criticism it can affect the unconscious theories themselves. Because these theories are unconscious, solutions to these problems are much more difficult and the research around this point is in its infancy or non-existent. Though this is the case, I urge the reader to be optimistic, to quote the philosopher, Friedrich Nietzsche:

*"Indeed, at hearing the news that 'the old god is dead', we philosophers and 'free spirits' feel illuminated by a new dawn; our heart overflows with gratitude, amazement, forebodings, expectation - finally the horizon seems clear again, even if not bright; finally our ships may set out again, set out to face any danger; every daring of the lover of knowledge is allowed again; the sea, our sea, lies open again; maybe there has never been such an 'open sea'."*

It is my belief that there may never have been such an 'open sea' in the possibility of the understanding and treatment of pain, and many other psychological problems aside.

## Argument

*P - There is only one process of knowledge creation, through conjecture and criticism.*

*Q - Knowledge can be conscious (explicit or inexplicit) and unconscious and does not require a knowing subject, as in the case of the knowledge stored within our genes.*

*R - There are no authorities to knowledge and no way of justifying our knowledge as true*

*S - Pain (along with all experience of reality) is just an instantiation of knowledge creation within a single organism, and consists of explicit, inexplicit and unconscious theories.*

*Therefore*

*T - Pain, like all knowledge, is fallible and can be criticised.*

*Therefore*

*U - It follows that the problem of pain, namely how to stop experiencing it once we have made the decision to do so, can be achieved through creativity which could include criticism of explicit, inexplicit or unconscious ideas or a more likely, a mixture of all of these.*

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## Terminology

*Knowledge* - a physical statement or other instantiation of a proposition that is true if it corresponds to reality, created through conjecture alternating with criticism.

*Theory/idea* - conjecture that is physically instantiated, whose purpose is that of solving a problem, and can be criticised in the process of knowledge creation.

*Theory-laden* - There is no such thing as 'raw' experience. All our experience of the world comes through layers of conscious and unconscious interpretation.

*Fallibilism* - The recognition that there are not authoritative sources of knowledge, nor any reliable means of justifying knowledge as true or probable.

*Empiricism* - The misconception that we 'derive' all our knowledge from sensory experience.

*Justificationism* - The misconception that knowledge can be genuine or reliable only if it is justified by some source or criterion.

*Parochial* - Mistaking appearance for reality, or local regularities for universal laws.

## Further readings

*Deustch, David - The Beginning of Infinity (2011)*

*Deustch, David - The Fabric of Reality (1996)*

*Popper, Karl - Objective Knowledge (1972, Revised 1979)*