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Perceiving Pain: Health, Culture and Ritual

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Abstract

For most of us, coming into contact with some form of pain is a daily occurrence: it is both a usual part of the human experience and lexicon. Not surprisingly, pain has many differing and contextually specific meanings, and although it is nearly universal across the realm of human experience, its definitions and perceptions remain subjective and highly personal. In this paper, the authors outline and explore perceptions and understandings of pain, with regard to functionality at both the basic physiological level and ritual level, and the need for further cross-study and complimentary research between both clinical professionals and social scientists.

Keywords: Pain, health, ritual, culture, function

The term "pain" is derived from the Latin word *poena*, which essentially translates to "penalty" (Free, 2002). At a physiological level, pain can be categorized as a sensory and emotional experience in response to tissue injury and is mediated by specific elements of the nervous system. Although pain is typically viewed as a negative experience, it is in fact an essential physiological process that protects us from harm and alerts us to tissue damage. Without the ability to sense pain, there would be nothing stopping us from immersing our hands in scalding water. We might harbor an infection that we do not know about, or we may tear a muscle while working-out and yet continue with our exercise routine, thus causing irreparable damage. There are, in fact, patients with a congenital insensitivity to pain, also known as CIP (Drenth, et al, 2007; Nagasako, et al, 2003). Such patients typically have the usual ability to feel touch, but do not respond to painful stimuli. As a result, young children suffering from CIP are at grave risk of injury, as they are not intellectually capable of protecting themselves. Daily life for them is a minefield, and common injuries include rubbing of the eyes to the point of causing blindness, or biting off the tips of their tongues during teething. If they survive early childhood, such patients can often learn to protect themselves as adults through experience and careful monitoring of their bodies.

The consequences of CIP are exemplified in a report published in the leading scientific journal, *Nature*. The authors of this study reported on six Pakistani children, between the ages of six and 14 years old, who had a normal ability to detect touch, but who were completely insensitive to pain arising

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from physical injury (Cox, et al, 2006). All of them had endured numerous injuries such as burns, lacerations, and broken bones. Notably, one of these children - a ten-year old boy - had achieved notoriety through his street performances involving impaling his limbs with spears and knives in exchange for money. Ultimately, the boy died after jumping off a roof, likely because he was unable to associate the danger of this activity with a prior painful experience. This unfortunate case underscores the notion that pain is an essential physiological function.

On the flip side, there are types of pain that fulfill no useful physiological purpose, including chronic pain conditions such as neuropathic pain (Ossipov, et al, 2000), i.e., long lasting pain arising from nerve injury. Such neuropathies occur in about half the number of diabetics, as well as in patients with multiple sclerosis or HIV, and the associated persistent pain is extremely difficult to manage with currently available drugs. Another example of non-purposeful pain is 'phantom limb' pain, a condition in which amputees feel acute or burning pain sensations in the missing limb (see Sherman, et al, 1990; for reviews, and Weeks, et al, 2010). Finally, there are conditions, such endometriosis, where a subset of patients experience, in their abdominal area, severe tactile allodynia – a highly painful response to a normally innocuous mechanical stimuli such as light touch (Evans, et al, 2007; Jarrell, et al, 2010) As a result, such patients may find it extremely painful to dress due to the pressure exerted on their skin area by clothing. The reasons as to why only a subset of patients experience extreme pain under such conditions are largely unknown, and treatment options remain elusive despite considerable effort by pharmaceutical companies and academic pain research laboratories.

How do we detect and process pain? Tissues such as the skin or internal organs are innervated by pain sensing nerve cells, also known as nociceptors. The endings of these nerves contain a number of highly specialized ion channels and receptor proteins that allow for the detection of specific painful stimuli, such as temperature, mechanical force, acidity, and tissue inflammation (Harriott, et al, 2009; Zamponi, et al, 2009). When activated, the nociceptors then conduct electrical signals (also called action potentials) along their axons all the way to the spinal cord. There, the action potentials trigger the release of neurotransmitters (Salter, 2005), which activate nerve cells that project to the brain where we perceive pain. There are also nerve pathways from the brain to the spinal cord that allow the brain to control pain processing at the spinal level (Viisanen and Pertovaara, 2010). Finally, there are reflex pathways within the spinal cord that bypass the brain and allow us to more quickly respond to painful stimuli by, for example, rapidly withdrawing our hand from a hot object. The generation and propagation of electrical signals depends on many factors, among them sodium channel proteins. Their role is exemplified by the fact that they are the target of local anesthetics that block their ability to contribute to nerve signaling (Hille, 1977). In this context, it is interesting to note that the above mentioned Pakistani children all carried a genetic mutation in one of the sodium channel genes, thus causing their sodium channels in pain sensing nerve cells to be non-functional (Cox, et al, 2006).

Both the propagation of action potentials, and the communication between nerve cells can be regulated by a number of cellular mechanisms. For example, endorphins act on opioid receptors to reduce the amount of neurotransmitter release, thus depressing pain (Niikura, et al, 2010). The pain pathway from the periphery to the central nervous system offers multiple points of attack to interfere with the detection and propagation of pain signals. Morphine, another activator of opioid receptors, prevents nerve-to-nerve communication in the spinal cord (Scherrer, et al, 2009). Cannabinoids such as THC, a compound found in marijuana leaves, bind to receptors in pain modulating parts of the brain, thereby decreasing pain sensitivity (Ibrahim, et al, 2006). Acupuncture reportedly triggers the release of adenosine, which then inhibits pain signals by activation of adenosine receptors (Goldman, et al, 2010). Prialt, a peptide toxin derived from the venom of predatory marine snails, which is FDA approved for treatment of severe chronic pain, acts by blocking calcium channels that are involved in nerve-to- nerve communication in the spinal cord (Staats, et al, 2004). In terms of development of novel analgesics, the challenge is not only to identify drug molecules that are efficacious and do not have side effects, but which are also effective in discriminating between unwanted pain and the pain signals necessary for normal human physiology.

While numerous experimental models to accurately measure pain behavior have been developed for laboratory animals (Mogil, et al, 2010), such methods are lacking for human patients. Indeed, pain often defies scientific attempts at comprehensive measurement. An enduring problem with accurately measuring pain in humans remains the lack of objective methods of measurement. Unlike in the areas of cardiology or epileptology where heart and brain activity can, respectively, be monitored by means of ECG and EEG recordings, there currently exists no instrument that can accurately measure specific pain in humans in an unbiased manner, and without the conscious input of a patient. Instead, patients are scored on "pain scales" based on their subjective experience to painful stimuli, and these are all influenced by cultural values, ethnic heritage, religious beliefs, social pressures, and socioeconomic status, thus greatly complicating clinical trials for new pain medications (Giordano, et al, 2010). Despite such variables, scientists have long wondered if men and women 'feel' pain differently. How about people from one culture versus those from another? Not surprisingly, the answers to these questions are not easily apprehended, but the growing body of recent research in these directions is yielding informative results.

About ten years ago, scientists based in the United States undertook a cross-comparative study of pain reporting among college students (both male and female) in the US and in India (Nayak, et al, 2000). Various scales were devised to interpret the findings, and the researchers hoped to discover what, if any, differences existed between the two cultures in terms of both responses to pain and the exposing of underlying social conventions that shape perceptions of what are considered reasonable or normative expressions of pain. Acknowledging the extreme likelihood of social and cultural values influencing both the reporting and outcomes of the study, the authors concluded that, on average, the college students from India presented a higher threshold for pain tolerance, and a lower rate of overall reporting of pain than did the students from the United States. Given that there appeared to be no physiological correlate for Indian students to innately possess a higher pain tolerance than US-students, this study serves to illustrate that social conditioning and values can influence pain expression and reporting.

Acknowledging that research indicates the existence of measureable differences between how college students from India and the United States feel and report pain, what would one reasonably expect to find comparing men and women of a relatively homogenized cultural group? Researchers from the University of Florida (Robinson, et al, 2001), aware that the sexes appeared to react differently to pain, devised a study focused on eliciting data on gender expectations of pain (gender meaning the personally and socially constructed identity one has, irrespective of biological sex). The study focused on pain sensitivity, pain endurance, and willingness to report pain, and found that both men *and* women believed that men would be less likely to report feeling pain than women. Women also believed that men were generally less sensitive to pain, and men indicated they believed that women were less able to endure pain stoically. Interestingly, researchers also found that both sexes were consistent in their gendered beliefs regarding their own sensitivities to pain and pain expression. As with the study of pain reporting in college students, these results highlight the impact of societal and cultural influences on test subjects. Such responses create hosts of difficulties in carrying out clinical trials in pain medication development and underscore the need for further study to better understand and isolate the complicating variables.

In many cultures throughout the world, rituals contain pain components. One such example, ritual crucifixion in the Philippines, features physical pain as an integral component of the cultural expression of religious faith. Every year, thousands of people visit the small city of San Fernando, about 70 kilometers north of Manila, to witness and partake in the San Pedro Lenten rituals. A product of the blending of traditional Catholic beliefs and Filipino folk sensibilities, the week of festivities culminates on Good Friday, when adherents practice self-flagellation and crucifixion. Religious faith is an important part of daily Filipino life and culture, and adherents may rely on a benevolent deity to ward

off disease, strife, and economic troubles. Devotees practice *panata*, committing to a religious pledge of sacrifice in the hope of achieving divine favor (Tiatco and Bonifacio-Ramolete, 2008). This includes self-flagellation until the devotee bleeds, and wearing crowns of thorns on their heads. The ultimate expression of *panata* is a crucifixion ritual where the devotee is nailed to a wooden cross with steel nails.

In Malaysia, festival-goers to the three-day Thaipusam festival practice fasting, enter into trances, and pierce the skin and flesh with hooks and needles. Not unlike the Filipinos who undertake crucifixion as an expression of their religious faith, Thaipusam participants have also taken a vow in the hope of having a favour granted by their deities: for them, self-induced pain is a pathway to the divine. In addition to the above, practitioners fire-walk and continually carry their heavy *kavadis*, self-constructed symbolic burdens (Ward, 1984) that severely pierce the flesh. In the weeks leading up to Thaipusam, food intake and the number of sleeping hours are increasingly restricted. As a result, those who carry the *kavadis* are highly likely to slip in and out of trances as the festival wears on. As it appears that perceptions of pain are significantly altered during these trance-like states, practitioners seem able to affect a mind-body disconnect, a sort of duality that allows them to continue their ritual demonstrations, even through exhaustion, hunger, and bodily trauma. At a physiological level, it is likely that a combination of factors allows the participants to deal with the physical pain that would normally be associated with such rituals. The hyper-arousal experienced by the participants likely results in increased release of adrenaline, which is known to result in elevated tolerance to pain by interfering with pain signaling at the spinal level. This behavior is rooted in the 'fight or flight' response – a physiological reaction, in both humans and animals, to impending danger. On the other hand, meditation may help control pain processing either in the central nervous system, or by activating pain pathways from the brain to the spinal cord, thus reducing pain endured by practitioners.

In summary, pain is defined, perceived, and experienced in a multitude of ways, across cultures and through geographic locations. Because it has so many subjective implications and because many of its meanings are so often intensely personal, objectively and effectively measuring and testing pain in humans remains problematic. Despite such obstacles, scientists, medical health professionals, and clinical trials investigators continue to strive to add comprehensive meaning and understanding to the term. Reinforcing the importance of continued research on the nature of pain, advancements in scientific technologies have enabled us to examine pertinent physiological issues with a degree of clarity not possible even a few decades ago. Alongside technological advancements, qualitative studies have demonstrated that pain is vivid, personal and highly dependent on a number of psychological, social and cultural factors (IASP, 1994): we now know that pain and all its meanings are subject to change over time, and to a wide range of cultural sensibilities. Armed with this knowledge, the authors are optimistic that with the continued application of science, technology, and collaborative health research across cultures, such understandings will continue to increase.

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