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What Does Pain Hurt?

"Thank you for giving me my life back." Through frustration and failure, the promise of hearing these words sustains those who treat pain sufferers. The first time I heard them I felt great pride. With time, however, I came to understand that my efforts and my patients' gratitude were manifestations of a much larger process. This issue of *Pain: Clinical Updates* examines that bigger process and attempts to tie together some threads from my 15-year stewardship of this newsletter. As a valedictory reflection by its founding editor, it focuses upon the unique role that moral education—particularly through low-tech, social means such as conversation and personal example[1]—plays in sustaining the "pain community" of researchers[2] and clinicians, and the value of *Pain: Clinical Updates* in this enterprise. Concern for pain relief reflects human instincts for fairness and empathy in the face of suffering. Pain research, education, and care are therefore intertwined with attitudes and ethics to a degree nearly unique among biomedical fields.[3] Given pain's moral dimension, pain-related educational tools that merely convey factual information often fall flat.[4] Such resources—culminating in quantitative distillations of clinical evidence—typically fail to engage health care providers. We are now just beginning to understand the mechanisms through which social[5,6] and cultural[7] influences shape unconscious perceptions and attitudes toward people in pain. Interactions based upon shared narrative,[8,9] dialogue, tutoring, and admiration[1] have great persuasive power.

Moral education plays a uniquely important role in sustaining the "pain community"

These old-fashioned resources access belief and behavior on a personal scale, shape subconscious attitudes, convey tacit knowledge,[10] and offer a platform for dialogue among colleagues, patients,[11] and families.[2] The use of *Pain: Clinical Updates* to support international pain education and IASP's ongoing Global Year Against Pain campaigns illustrates the merit of this low-tech approach to pain education. Education about pain is a social process. So, too, is the very phenomenon of pain. Many seemingly paradoxical aspects of pain are readily explained from a social Darwinist perspective.

Paradoxical Pain

For many in the "first world," daily life long ago ceased to be a struggle to survive. Population growth, pollution, urban crowding, obesity,[12] diabetes, and information overload—problems generated by over-meeting basic human needs—persist even in the current economic downturn.[13,14] Yet survey after survey continues to find underassessment and undertreatment of pain as the default condition in developed and developing countries alike.[15,16] Pain control's recent appearance on the agenda of regulatory agencies reflects an

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enormous continuing effort by dedicated patients and health professionals worldwide, including many in IASP.[17] Clearly there is something about the relief of pain that sets it apart from other fundamental needs.[18] How ironic, given the efficiency with which individual organisms (even primitive ones) sense impending injury through mechanisms refined over hundreds of millions of years.[19] Equally ironic is the typically high level of satisfaction by patients with their pain care, even when inadequate[20]—reflecting their relationship with the person providing care and their appreciation for the provider's mere voicing of interest in adequate pain treatment.[21]

Pain's undertreatment contrasts with prosperous societies' over-addressing other human needs

What if we ourselves develop persistent pain? The remarkable restorative capacity of the body after common injury—stopping bleeding, identifying microbes and neutralizing them, strengthening bone after a fracture, closing wounds and covering them with new skin—is turned upside-down. Hyperalgesia, disuse, atrophy, contractures, immobility, fear-avoidance, helplessness, depression, anxiety, catastrophizing, social isolation, and stigmatization are the norm.[22] Irresistible behaviors, like kidnappers, bind and overpower us. Withdrawing further and further from our family, our job, and other social networks, we feel our former lives fading into distant memory. The destructive effects of normal bodily responses to persistent pain are glaring exceptions to most other examples of the elegant wisdom of the body's healing processes. To those who wonder why this should be, I would point out that Darwin understood it could not be otherwise.

The body's restorative capacity after common injury is turned upside-down during persistent pain

The Self-Culling Herd

This year marks Darwin's bicentennial.[23,24] Everyone who has ever taught about pain has described the obvious survival value of alerting the host to impending injury. As a classroom exercise for brand-new students, the author has asked them to think of serious and immediate "natural" threats to an individual's survival, that might be avoided or overcome if noticed early. Early detection of these threats is efficiently accomplished by sensing pressure (crush), stretch (ripping of flesh), heat (burn), cold, and mediators of infection or ischemia: the nociceptive repertoire. Yet Darwin's writings, particularly *The Descent of Man,* went beyond framing evolution merely as the survival of the fittest individual.[25] His descriptions of empathy, sympathy, and altruism in humans and nonhuman species laid the foundations of today's field of evolutionary psychology.[26] He considered in depth the traits and instincts that result in some members of a population (such as sterile worker bees) being unable to reproduce, or not doing so in order to play a subordinate role that promotes the group's survival.[27] The concept of "inclusive fitness" takes into account not just one organism's genes but also those of related individuals.[28] "The only thing natural selection ultimately 'wants' to keep in good shape is the information in our genes, and it will countenance any suffering on our part that serves this purpose."[26] In the case of pain, reflex behaviors that cause sufferers of persistent pain to withdraw from their surroundings synergize with their stigmatization by a society that pushes them away.[29,30] If a person with pain is a member of a group or class that society already marginalizes, it bodes even more poorly for that person's access to and outcomes of care.[31-33]

"We are left with the idea that pain is an adaptive, highly evolved process, present for hundreds of millions of years. … We also believe that human beings share a number of instincts with other animals that may be termed herd animals. Our behavioral responses are such that we exclude members of the herd who cannot help defend or feed the herd. These behaviors are not only imposed upon us by other members of our herd, but are also programmed within us. When we are ill, injured, depressed, or suffering pain, we withdraw … to our isolated cave and either recover, at which point we rejoin the herd, feeling as if life has been returned to us, or we die."[34]

Marcus Aurelius described pain's complex, self-denigrating nature: "When in pain, always be prompt to remind yourself that there is nothing shameful about it … Bear in mind also that, though we do not realize it, many other things which we find uncomfortable are, in fact, of the same nature as pain: feelings of lethargy, for example, or loss of appetite."[35] Citing Epictetus, he further advised pain sufferers against "fanciful exaggerations." My sharing these and similar words with patients has often helped them break free from self-stigmatization, forgive themselves,[36] accept that they deserve to be rehabilitated,[37] and find the strength to start again.[38]

Reflex behaviors that cause sufferers of persistent pain to withdraw from their surroundings synergize with their stigmatization by a society that pushes them away

As we reflect upon the power of words, it is sobering to consider that the historical rise of literacy (even when applied to meritorious ends such as this newsletter) may not have been a wholly positive advance—particularly as regards the inculcation of moral values. Even more disconcerting is the shift away from printed material and toward Internet-based communication and learning, in which large numbers of small pieces of information are briefly given partial attention, often without adequate time to explore and reflect upon their meaning and implications.

Don't Write Off Reading and Writing

Writing as a major means of communication among educated persons had only recently entered the scene in Aurelius's time. Earlier scholarly communication in Greece and elsewhere took place in self-assembled communities where ideas were born and shaped in face-to-face speech. Socrates emphatically rejected the written word in favor of live conversation and chose to remain illiterate, "feeling passionately that the written word posed serious risks to society … First, written words are inflexible, in contrast to … living speech [that is] full of meanings, sounds, melody, stress, intonation and rhythms."[39] Illiterate as was Homer,

Socrates was certainly correct on this point: even today science continues to explore the astonishing dynamism and complexity of human oral communication, down to its genetic basis.[40] "Second, he regarded the new—and much less stringent—requirements that written language placed both on memory and the internalization of knowledge as catastrophic." Third, he "passionately advocated the unique role that oral language plays in the development of morality and virtue in a society." He likened ideas to a child at risk of being misunderstood or abused unless its parents were nearby, poised to spring to its help.

Unhurried thoughtful reading has much to recommend it over newer, speedier methods of acquiring information

Most importantly, Socrates insisted that the best life involves daily engagement in discussions about virtue. He was horrified at the prospect of uncontrolled knowledge accessed by uncritical, untutored readers who would develop a superficial, false sense of understanding and stop searching for the meaning of virtue. Speaking at his own trial, he said: "If I tell you that the unexamined life is not worth living, you will likely not believe me. But that's the way it is, gentlemen, as I claim, though it's not easy to convince you of it." Prescient as ever, he died soon after by lethal ingestion.

For all its shortcomings, unhurried thoughtful reading has much to recommend it over newer, speedier methods of acquiring information. Neuroscientists have described a stereotypical shift in the pattern of regional brain activation that takes place as a beginning reader matures into a fluent, comprehending one.[39] The child's laborious struggle to decode information evolves into efficient, nearly automatic decoding, with simultaneous integration of metaphorical, inferential, analogical, and affective background and experiential knowledge (see Fig. 1).[41] Maryanne Wolf has surveyed brain imaging studies that correlate with a decline in these capacities as the reader's brain is trained to process multiple brief packets of information on a computer screen. She has reflected upon these findings and worries about her own Google-era children who complete school assignments online hastily, with continuous partial attention. She asks "Will the present generation become so accustomed to immediate access to on-screen information that the range of attentional, inferential, and reflective capacities in the present reading brain become less developed? Are Socrates' concerns about unguided access to information more warranted today than they were in ancient Greece?" In the brief time since Wolf's monograph was published, Twitter, a social networking site that instantly connects people through cellphone text messages, has grown to handle over 50 million visits per month. Twitter accepts a maximum of 140 *characters* per message.[42] Amidst ever-speedier "messaging" with ever-smaller amounts of content, *Pain: Clinical Updates* offers a rest stop along the fatiguing, high-speed information highway.

Pain research is a very big tent: there is no single best scale at which to study pain

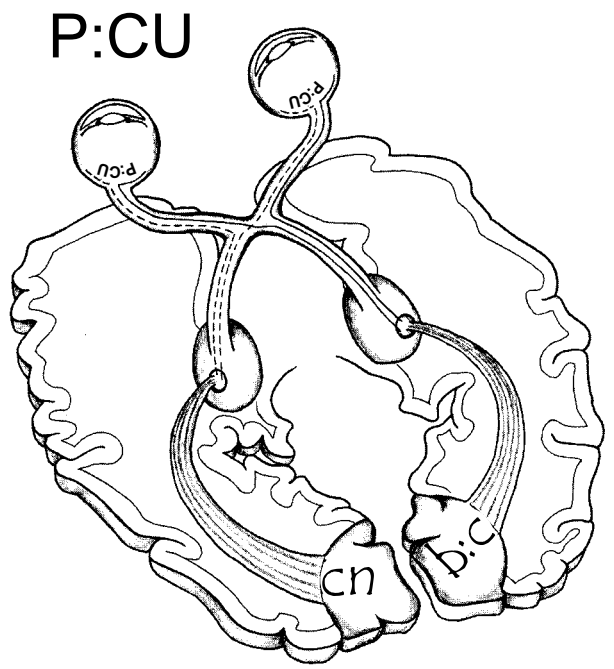

Fig. 1. The reading brain: fluent readers decode the printed word and simultaneously integrate metaphorical, inferential, analogical, and affective background and experiential knowledge. Adapted with permission from Wolf.[39]

What Pain Hurts

Is it possible to summarize 15 years of articles on a multiplicity of pain topics by a highly diverse group of contributors? The author's inaugural issue of *Pain: Clinical Updates* described pain as "a dynamic process that involves actions at multiple sites ranging from the peripheral nociceptor to the genome of cells within the central nervous system to the patient's psychosocial milieu."[43] This was too limited a view, even then. Multiple stakeholders involved in the process of pain control extend beyond the individual to include the clinician and the health care system providing care, employers, public and private insurers, the work force, government, society at large, and global organizations[44] (see Fig. 2). Pain research is a very big tent: there is no single best scale at which to study pain.[4] Advances in molecular genetics, genomics, and in the understanding of molecular targets such as receptors and ion channels have occurred together with an expansion of knowledge about the involvement of the subconscious in pain[45]; the relationship between pain and empathy[5,6,46,47]; patient-reported outcomes of care[48,49]; socioeconomic,[50,51] cultural,[52-54] racial, gender, and ethnic factors[55]; and qualitative patient-centered research.

Within the past century there have been shifts away from naive reductionism in several areas of science and mathematics, toward a more holistic acceptance of complexity.[56-58] Collective dynamic phenomena are now known to behave in ways that cannot be deduced from the properties of the elements from which they are assembled.[2,59] In fact, some physicists have abandoned the view that the cosmos is assembled bottom-up from submicroscopic components such as particles or strings.[60,61] Dissatisfied with theoretical models such as string theory, they no longer believe the

universe can be "explained" as the mere aggregate of its smallest components.[62] Instead, they view the underlying backdrop of empty space with its innate fluctuations, wrinkles, and invisible symmetries as generating both its smallest and largest occupants and the laws governing (and hence linking) both.[61] This, too, is a reductionist framework, but more subtle and inclusive than its predecessor. Intriguingly, it parallels present-day evolutionary biology, which regards the properties of individuals as necessary consequences of the evolution of larger systems to which they belong, and of which they are manifestations.

Immortal and without nociceptors, the earliest forms of life employed DNA to convey genetic material across generations. Motile single-celled organisms promptly wriggle toward nutrients and away from suboptimal pH and temperature.[19] To Darwin (and recently, Dawkins) the emergence and differentiation of nervous systems and nociceptors took place because organisms equipped with them had an advantage in propagating their genetic material. In biology as in physics, evolutionary processes at the largest scale (natural selection) are the origin, not the consequence, of processes at the smallest scale (nociception). Higher species, whose genetic material is carried by groups of individuals, each with personal intentions,[63] motivations, and near-immediate adaptive flexibility, manifest inclusive fitness sustained by instinctive empathy[64] and culture within supportive social networks.[65-70] The process of natural selection (i.e., de-selection of disadvantageous, genetically determined traits) is evident in the properties of single-celled microbes, viruses that are not even cells, and societies of brains.[64] In this context, pain's "hurt" represents the intersection of individual intentionality and inexorable genetic opportunism operating at a collective level. The herd's expulsion of weakened individuals along with the latter's self-removal are genetically programmed sociobiological processes that quicken the pace of evolution.

It is tempting to frame biologically based reinforcement and perpetuation of socioeconomic status[71-74] as another Darwinian phenomenon. Whenever moral teaching falters, instincts to stigmatize, exclude, and prey upon the weak become stronger. Pain education is not limited to "objective" knowledge but inevitably faces the challenge of reshaping attitudes and beliefs.[7] This challenge involves a struggle between altruistic and predatory instincts. Even today, despite much progress to prevent or alleviate pain, the deliberate infliction of pain and suffering through torture appears to be on the increase.[75-77] Because this conflict between instincts to help and harm is never-ending, there will never come a time when, having assembled and presented the evidence that pain treatment is a good thing, pain educators' work will be done.[78] Simple, modest means to support moral education and discussion, such as *Pain: Clinical Updates*, will always serve an important purpose.[79,80]

Caring for Outliers in a Mean-Minded World

Writing about great artists, Galenson has pointed out that those whose best work comes late in life "typically believe that learning is a more important goal than making finished paintings. … These artists are perfectionists and are typically plagued by frustration at their inability to achieve their goal."[81] Yet because their goals are multidimensional and impossible to define crisply a priori, "the imprecision of their goals means that these artists rarely feel that they have succeeded." I suspect

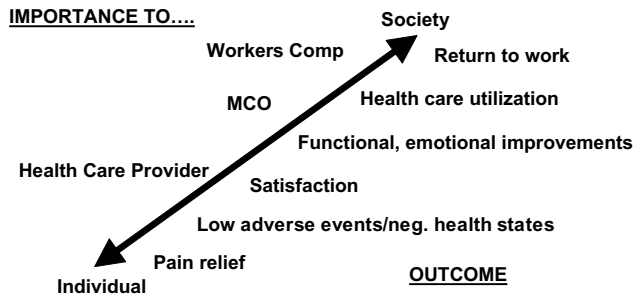

Fig. 2. Stakeholders and outcomes of pain treatment from the individual through society. MCO = managed care organization. Used with permission from Gatchel and Okifuji.[44]

the same applies to many readers of *Pain: Clinical Updates*. Huge progress has been made in pain research and care since the founding of IASP a generation ago,[82-85] even if the clinical frustrations and economic pressures[86] of everyday life rob us of time to contemplate these achievements. Globally, the control of pain is increasingly viewed as a fundamental human right,[15] and interest in effective pain management is diffusing outward into primary care.[87]

Pain educators' work will never be done

We have described above that the warning signal of acute pain is one of many processes that nature has given us to help convey our species' genetic material across generations. If despite such warning we are hurt, nature provides us with temporary endogenous analgesia to help us escape further harm. Once we successfully escape further acute injury, our bodies draw upon an integrated repertoire of restorative processes that nature has also provided. But if despite these resources we fail to reclaim our place in society, nature liquidates her accumulated investment in our individual well-being. For the patient at the start of this piece, losing her everyday social, family and vocational interactions meant losing what defined her life. As her pain came under control and these interactions resumed, she observed that she had gone from "big pain, small life" to "small pain, big life." Hearing her words, I felt what Shaw described as "the true joy in life, the being used for a purpose recognized by yourself as a mighty one…the being a force of Nature." [88]

Current research on the intersubjective nature of pain is overcoming previous "exclusion of the non-measurable from what counted as knowledge [that] left some of our most important questions not only unanswered but unanswerable."[89] I cannot think of a better subject than pain as a means to link objective measurement with existential experience,[90-94] nor a more rewarding way to spend one's time than in helping pain sufferers. In the words of Andrew Greer, speaking through the voice of the African-American female protagonist of his latest novel, "I do not know what joins the parts of an atom, but it seems what binds one human to another is pain."[95]

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