Feature

First-person neuroscience and the understanding of pain

Might science need philosophy for a precise and complete understanding of pain?

Michael A Thacker
PhD, MSc, FCSP, Lecturer[1]

G Lorimer Moseley
BAppSc(Phty)(Hons), PhD, Professor of Clinical Neurosciences and Chair in Physiotherapy,[2] and Senior Research Fellow[3]

1 Centre of Human and Aerospace Physiological Sciences, and Pain Research Section, Department of Neuroimaging, Institute of Psychiatry, King's College London, London, UK.

2 Sansom Institute for Health Research, University of South Australia, Adelaide, SA.

3 Neuroscience Research Australia, Sydney, NSW.

lorimer.moseley@gmail.com

doi: 10.5694/mja12.10468

We were invited to reflect upon brain–mind–pain interactions and to opine on whether modern neuroscience adequately considers pain phenomena and experience. One might suggest that adequacy is not a particularly lofty goal in this respect. However, if we were to consider whether modern neuroscience thoroughly, or precisely, considers pain phenomena and experience, we would have to conclude in the negative.

Classically, clinicians have been taught to ask patients a series of questions to extract the information required to establish a diagnosis. Although this is standard practice, it may mean that the individual patient's experiences are not heard. This is not always seen to be a bad thing — removing the patient's perspective might be considered to make the interview more objective. Contrast this view, however, with the common complaint from patients with longstanding pain that they feel they have never had a chance to fully explain what is going on with them, that no one has ever fully understood what is wrong and, moreover, that no one is listening. Dissatisfaction and disempowerment are not the only risks here — scientists show us that such feelings are likely to be associated with up-regulation of our protective systems, most notably the nociceptive pain system.[1] Aside from that, the folly of eliminating a patient's report from his or her pain assessment has been highlighted for decades. Patrick Wall, perhaps the forefather of modern pain science, repeatedly stated that pain research was a waste of time unless it directly answered questions that are of interest to patients as well as clinicians.[2]

Brain neuroscience as it relates to our understanding of pain really only arrived a century ago. It was pioneered by such Cartesian dualists as Charles Sherrington and John Eccles, who separated the concept of the mind from the brain, and whose data paved the way for an alternative perspective — that the mind could be directly attributed to the brain. Quickly, aspects of the mind were attributed to specific areas of the brain, and the brain was considered to directly possess experiences. The brain was seen as able to reason, to perceive and to construct schemata. These abilities were, more and more, considered properties of specific anatomical centres within the brain.

Philosophy offers a different viewpoint, classifying such conclusions as mereological fallacies — or the misattribution of a property of the whole being to a single part of that being.[3] The problem arises because the terminology of these "fallacies" fits with common language and syntax and represents a logical argument for the way things "are". While the linguistic aspects of such fallacies are easy to appreciate, the philosophical perspective suggests that the "logic" is seriously flawed. For example, taking time to consider commonly used statements such as "the brain thinks" or "the brain produces pain" leaves fundamental questions over their plausibility. Could we really enact Roald Dahl's fantastic story of William,[4] who is kept alive and conscious by an eccentric neuroscientist as only a brain and an eye, floating for eternity in a tub of fluid with a heart–lung machine pushing blood in and out? Could we seriously expect the brain formerly belonging to William to be capable of thinking or of producing pain? A philosopher might disagree with William's neuroscientist friend, and suggest that it is instead the whole person who experiences, reasons, perceives and constructs schemata. If so, it is also clearly the whole person who is in pain.

The study of pain has historically been closely linked to dualism and therefore to similar mereological fallacies, that raise their head in both the clinical and research settings. Increasingly, patients are being told that their pain is in their brain. We have no doubt that such messages are delivered by well intentioned clinicians, who are rightly dissatisfied with outdated concepts of the biology of pain. Such dissatisfaction certainly lends itself to ready acceptance of new paradigms, however implausible they may be — fancy proposing that one's pain is in one's head when it is clearly in one's back! It is a fine line, though, between embracing the critical role of brain-held mechanisms in producing pain and presuming that it is in these mechanisms where the pain itself resides.

Our perspective is that pain is emergent. Emergent properties are those that are possessed by entire systems. A system comprises several distinct parts, and these parts interact with one another to give the system its emergent properties. There are two ruling criteria of emergence: that the one system, comprising the same components, can produce a range of emergent properties; and that none of the individual units comprising the system are capable in themselves of producing any of the emergent properties. The temptation is to simplify things a little and state that pain is an emergent property of the brain.

Indeed, either or both of us have fallen into this oversimplification in our writing at some stage. However, on what grounds do we confine the system to the brain? A more accurate position is that pain is an emergent property of the person who is suffering it. There is a compelling body of research that clearly challenges a "neurocentric" view of pain and, in so doing, allows the propagation of new conceptual models with which to investigate conditions such as complex regional pain syndrome.[5,6]

Does this Gestalt-like view have any relevance for the attempts of modern neuroscience to elucidate pain? A cynical view might suggest that neuroscientists are bothered by data that deviate from the expected results (a problem confined to neither neuroscientists nor modern times[7]). In such instances, outliers might be omitted until the data fit the expected and "acceptable" level, or the composite images from functional imaging studies may be "cleaned up" to look more like the predicted pain matrix. Furthermore, the concept of emergent properties requires clinicians and scientists to understand pain across several domains: to have contextual knowledge of neuroscience, immunology, endocrinology, psychology, sociology and philosophy. Most of us have been trained as specialists in one area and are reluctant to dip even a toe into other specialties, especially, perhaps, philosophy, which is notoriously challenging due to its strange and difficult terminology.

Yet pain is well within the scope of philosophers — Brentano, Husserl, Heidegger, Sartre and Merleau-Ponty all discussed pain as a phenomenological entity. Phenomenology refers to the study and understanding of human experience and the way in which things are perceived, as they appear in the structure and processes of consciousness, and therefore directly deals with the subjective aspects of pain. As biomedically trained clinical scientists, we have a growing interest in how this philosophical field may influence both the scientific and clinical understanding of pain. Phenomenology takes a first-person perspective — it is based on what the person experiences. This contrasts with empirical science and clinical observations, which have an observational, objective, third-person perspective. The dialectical challenge here is patently obvious: there seems to be a very large gap between the two perspectives that requires considerable confidence to leap.

What might be needed to help us make this leap? Several groups have proposed methods with which to bring the first- and third-person perspectives together[8-10] — collectively forming a new field of "first-person neuroscience", or the study of a "first-brain perspective".[9] First-person neuroscience attempts to combine the subjective experience of an individual with physiological data obtained in the third-person domain.

> "the conceptual gap between pain as an injury, a dysfunction or even a disease and pain as a state that emerges from the whole person is vast"

The first-person perspective is dependent on both introspection and phenomenological analysis, and its proponents claim that they are elucidating the "science of experience". This is where the whispering in our minds becomes distracting — "How can we control for confounders?"; "Look at all the bias-related threats to validity!". Yet ground is surely being made — a small community of first-person neuroscientists has formed the vanguard in this area, with elegant studies of psychopathological abnormalities, mental illness and neurological disease.[9] Work has been done in the pain field,[10] but, perhaps not surprisingly, it has received little attention from the wider pain community.

Might the clinical community more readily embrace first-person neuroscience in their pain practice? We suspect that there are already a select few who go beyond the routine medical history to extract the feelings and experiences of the individual patient, together with the meaning for the person and its impact on his or her life. Psychologists are charged with first-person assessment, although few schools of psychology pay attention to phenomenological aspects. Most other specialties apply third-person analysis to evaluate a series of answers in the hope of identifying the source structure or dysfunction that is causing the pain. Clearly, the conceptual gap between pain as an injury, a dysfunction or even a disease and pain as a state that emerges from the whole person is vast. If we are to bridge this gap, we need conceptual frameworks that provide a way of integrating first- and third-person perspectives into our thinking about pain. Long have we all lamented the barriers that seem to stand between clinicians and scientists as they search for better treatments for people in pain. But the ante may well have been upped, for it is time to also bring the philosophers to the table.

Competing interests: Lorimer Moseley has received consultancy fees from Grünenthal and speaker's fees or travel expenses for meetings organised by NOIGroup Australia, Boehringer Ingelheim Europe, Grünenthal Europe and Sandoz.

Provenance: Commissioned; not externally peer reviewed.

1 Butler DS, Moseley GL. Explain pain. Adelaide: NOIGroup Publications, 2003.
2 Wall P. Pain: the science of suffering. London: Orion Books, 1999.
3 Bennett MR, Hacker PMS. Philosophical foundations of neuroscience. Oxford: Blackwell Publishing, 2003.
4 Dahl R. William and Mary. In: Kiss kiss. Harmondsworth: Penguin, 1960.
5 Marinus J, Moseley GL, Birklein F, et al. Clinical features and pathophysiology of complex regional pain syndrome. *Lancet Neurol* 2011; 10: 637-648.
6 Moseley GL, Gallace A, Spence C. Bodily illusions in health and disease: physiological and clinical perspectives and the concept of a cortical 'body matrix'. *Neurosci Biobehav Rev* 2012; 36: 34-46.
7 James W. The principles of psychology. New York: Henry Holt, 1890.
8 Gallagher S. Phenomenology and experimental design: toward a phenomenologically enlightened experimental science. *J Conscious Stud* 2003; 10: 85-99.
9 Northoff G, Qin P, Feinberg TE. Brain imaging of the self — conceptual, anatomical and methodological issues. *Conscious Cogn* 2011; 20: 52-63.
10 Price DD, Barrell JJ, Rainville P. Integrating experiential-phenomenological methods and neuroscience to study neural mechanisms of pain and consciousness. *Conscious Cogn* 2002; 11: 593-608.