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# The Pain and Movement Reasoning Model: Introduction to a simple tool for integrated pain assessment

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ABSTRACT

Pain is no longer considered to be simply the transmission of nociception, but rather an output subsequent to the complex interactions of homeostatic systems. Manual therapists' clinical reasoning needs to incorporate this complexity in order to develop individualised effective treatment plans.

Pain classification strategies attempting to assist clinical reasoning traditionally define multiple types of pain – nociceptive, neuropathic, centrally sensitised – potentially fitting elements of the pain experience to linear independent systems, rather than embracing the multiple dimensions. It is our contention that pain should not be classified unidimensionally. In all pain states consideration should be given to the combined influence of physiological, cognitive, emotional and social inputs, all of which have the potential to influence nociception.

The Pain and Movement Reasoning Model presented in this paper attempts to capture the complexity of the human pain experience by integrating these multiple dimensions into a decision making process. Three categories have been created to facilitate this – central modulation, regional influences, and local stimulation. The Model allows for the identification of a predominant element to become the focus of treatment but also for the identification of changes to clinical presentation, where new treatment targets can emerge.

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## 1. Background

Pain is no longer considered to be simply the transmission of nociception. Current conceptions suggest pain is the most salient part of an activated body protection system; an output subsequent to the complex interaction of homeostatic systems in response to an identified threat (Fig. 1) (Jänig et al., 2006). The body protection system involves motor, autonomic, psychological, endocrine and immune systems, and pain emerges from the activation of a specific neurological network, matrix or signature (Gifford, 1998; Melzack, 2005; Moseley et al., 2012; Melzack and Katz, 2013). Pain perception takes place in a context of an individual's environment, including the physical, social and emotional contexts (Siddall and Cousins, 2004; Gatchel et al., 2007; Malenbaum et al., 2008), and then is managed in a clinical context influenced by the values and beliefs of the therapist (Foster et al., 2010; Nijs et al., 2012). Clinical reasoning requires that manual therapists integrate the multiple dimensions of pain to account for this variation and formulate effective treatment.

The Pain and Movement Reasoning Model presented in this paper attempts to capture the complexity of the human pain experience. The Model is strongly underpinned by Neuromatrix Theory and incorporates current concepts of neuroplastic determinants on the quality and nature of pain (Woolf, 2011; Moseley and Flor, 2012; Melzack and Katz, 2013). Consequently, the Model avoids the risk of simplifying elements of the pain experience into linear independent systems e.g. central sensitisation, neuropathic, nociceptive. In a similar way the Model does not separate the bio-psycho-social framework into its component parts, but instead integrates the combined influence of the physiological, cognitive, emotional and social inputs on neurophysiological mechanisms. Through consideration of this range of information, the predominant and changeable influences can be identified, leading therapists to select the most appropriate techniques.

The integration of information is facilitated by the triangular structure of the Model coordinated by the three categories located at the apices of the triangle – central modulation, regional influences and local stimulation (Fig. 2). By placing a grid in the centre

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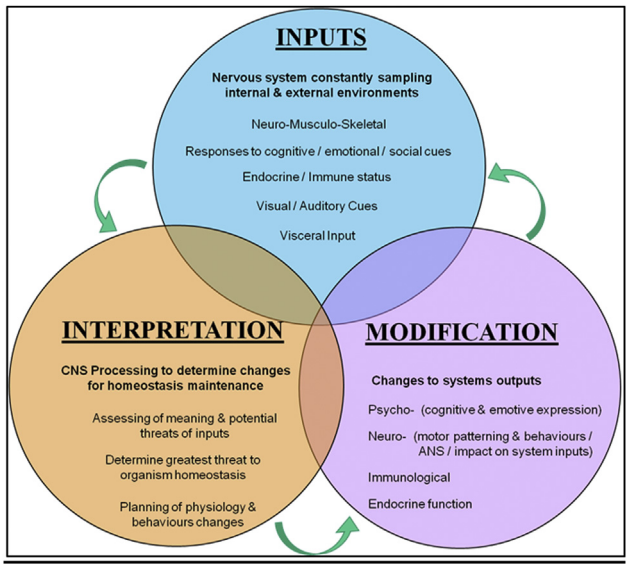


**Fig. 1.** Central nervous system sampling, processing and modifying the psycho-neuro-immunological state in the human pain experience. (Available under licence CC BY-NC Aus 3.0 at http://latrobe.libguides.com/content.php?pid=109542&sid=825367).

of the triangle, the graphic representation of the Model becomes an interactive tool to assist the reasoning process. After considering the clinical assessment of a person's presentation, the therapist marks a point on the grid to best represent the relative contribution of each of the three categories to the person's pain. Co-ordinating this plot on the grid requires thoughtful consideration of the determinants and influences across all three categories. This judgement, about factors encompassing an individual's pain experience, then enables prioritisation of management techniques that will address the most significant elements in the clinical presentation. The Model allows for continual evaluation so that as an individual's pain presentation changes, the focus of management is able to shift.

## 2. Central Modulation Category

As humans appraise their personal situation, pain perception occurs within a framework of ongoing simultaneous processing at different levels of consciousness (Moseley et al., 2012; van Ryckeghem et al., 2012; Bulcke et al., 2013). For therapists, this translates into the requirement of managing a person holistically where context is important. To do this requires an understanding that the sensory component of pain, nociception, always occurs within the broader setting of an individual's situation (Weisse, 2004; Wiech et al., 2008; Wiech and Tracey, 2013) and their psycho-neuro-immunological state (Watkins and Maier, 2000; Austin and Moalem-Taylor, 2010).

The category 'Central Modulation' is representative of the factors that have been shown to influence pain through changes to higher centre processing, reducing central descending inhibitory influences, or by increasing efficacy of spinal synapses (Woolf, 2011; Smart et al., 2012a). The overall assumption is that modification of pain via these factors can be attributed to changes in nervous system function, and in persistent cases to structure, i.e. due to neuroplasticity. The resultant change in sensitivity can contribute to an enhanced pain response (i.e. sensitisation) or a diminished pain response (i.e. inhibition), depending on the nature and context of the influence (Wiech and Tracey, 2009; Ploner et al., 2011; Melzack and Katz, 2013). All experiences are processed in the psycho–neuro–immunological systems of a person, which is why

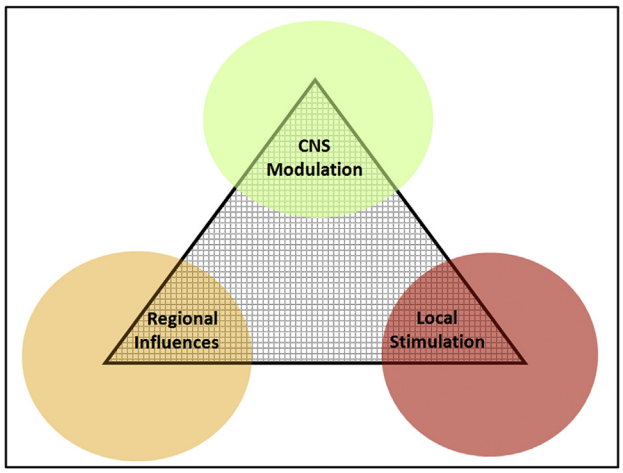


**Fig. 2.** Categories of the Pain and Movement Reasoning Model. (Available under licence CC BY-NC Aus 3.0 at http://latrobe.libguides.com/content.php?pid=109542&sid=825367).

in the clinical setting what is occurring within symptomatic tissue does not always relate to the pain expressed.

Therapists are encouraged to consider three subcategories to estimate the potential for central modulation; (1) predisposing factors, (2) prolonged afferent input and (3) cognitive-emotional-social state (Fig. 3).

### 2.1. Predisposing factors

The first subcategory recognises that prior experiences including trauma, illness and disease preset the state and structure of the nervous system. These factors may determine the baseline sensitivity of the person's nervous system to which new episodes of perceived vulnerability and threat are overlayed. Where a person has a pre-existing illness it is likely the body protection systems are activated. For example, persistent inflammatory conditions, such as inflammatory arthropathies and autoimmune diseases, can be expected to create pain sensitivity (Lee et al., 2009) through persistent chemically-generated nociception and altered immune function. Similarly, activity of the inflammatory glial cells within the CNS is increasingly seen as an important component of the pain experience (Thacker et al., 2007; Schmid et al., 2013).

People who have experienced trauma or torture have been shown to have an enhanced pain response (Linton, 2002; Granot et al., 2011; Fleischman et al., 2014; Williams and van der Merwe, 2013). This could be due to reduced central inhibition, especially where there is ongoing distress and perceived vulnerability and

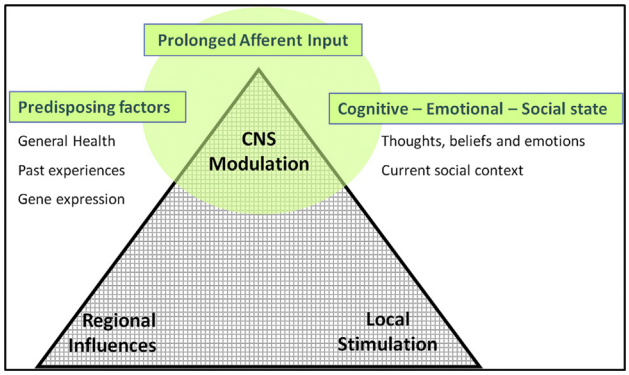


**Fig. 3.** Central Modulation Category. (Available under licence CC BY-NC Aus 3.0 at http://latrobe.libguides.com/content.php?pid=109542&sid=825367).

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