

How to Start a Movement: Physiotherapy and Persistent Pain

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Disclosure

No conflicts of interest

Objectives

- Upon completion of this presentation the audience will be able to:
 - dispel current myths about the role of physical therapy;
 - describe the maladaptive peripheral and central nervous system changes associated with persistent pain;
 - describe central and peripheral nervous system therapeutic targets for movement based interventions;
 - and, describe non-threatening movement as intervention along a movement continuum.

What is PT?

- Published articles often recommend 'physiotherapy' as adjuvant treatment without specifying exactly what it is...
- Specific physiotherapy techniques poorly described.
- PT as movement specialist



Pain and neuroplastic change

- Conventional therapeutic models are rooted in a structural pathology paradigm (Pelletier, Higgins, & Bourbonnais, 2015, p. 1583).
- Neurophysiological change is observed in the development of persistent pain including:
 - peripheral sensitization resulting in increased nociceptive responsiveness;
 - and, central sensitization resulting spinal cord signal amplification.

(Pelletier et al., 2015, p. 1583)

The brain and pain

- Neuroplastic changes in cortical regions related to descending inhibition, sensory discrimination, and sensori-motor function (Pelletier et al., 2015, p. 1583).
- Reduced grey matter volume in cognitive-emotional , sensori-motor, and pain modulatory brain regions in children with pain (Erpelding et al., 2016, p. 1102).
- Evidence for a causal relationship between neuroplastic change and pain (Pelletier et at., 2015, p. 1583).

Moving with pain

- Alterations in brain and nervous system circuitry have profound impacts on pain processing, body perception, motor control, immobility, and kinesiophobia (Tajerian & Clark, 2017, p. 3).
- Neuroplastic changes are distributed across the cortical contributors to movement resulting in abnormal movement patterns (Silfies, Vendemia, Beattie, Stewart, & Jordon, 2017, p. 2051).
- Pain might be considered a perceptual inference - a “best guess” that protective action is required (Lotze & Moseley, 2015).

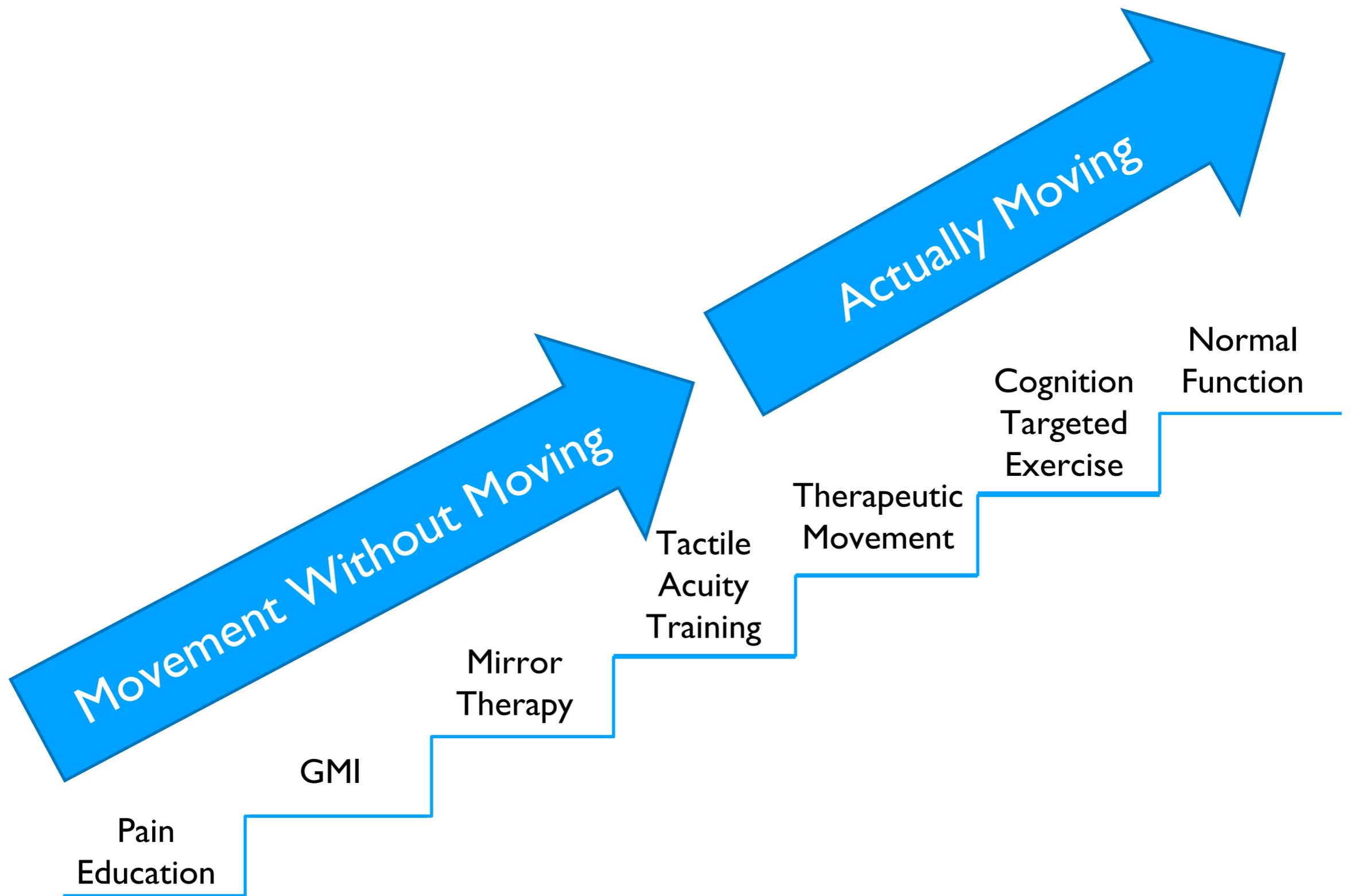
Moving with pain

- Movement has been proposed as having anti-nociceptive and analgesic properties (Tajerian & Clark, 2017, p. 4).
- The therapeutic targets must expand beyond the periphery to include the brain and nervous system (Silfies et al., 2017, p. 2052).
- Neuroplastic change is stimulus driven and can be treated (Erpelding et al., 2016, p. 1095).

Moving with pain

How then can we start a movement...

...that the patient's brain does not yet have an
opinion of?





Cognitive emotional social

- Catastrophic interpretations of pain and believing pain to be an accurate indicator of the state of the tissues are associated with higher pain ratings
- Believing that the nervous system amplifies noxious input in chronic pain states increases pain threshold

(Moseley, 2004)

Perception of illness

- Asking for specific illness perceptions in patients with chronic MSK pain is of importance to understand health behavior.
- Maladaptive perceptions about the cause of pain should be investigated, as this can be an important factor in the maintenance of chronic pain.
- Biomedical view may exacerbate maladaptive beliefs.

(van Wilgen et. al., 2014)

What matters most to people in musculoskeletal physiotherapy consultations? A qualitative study

Accepted Manuscript

What matters most to people in musculoskeletal physiotherapy consultations? A qualitative study

Rob Stenner, Shea Palmer, Ralph Hammond

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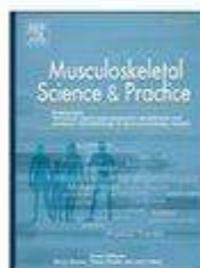
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Conclusion

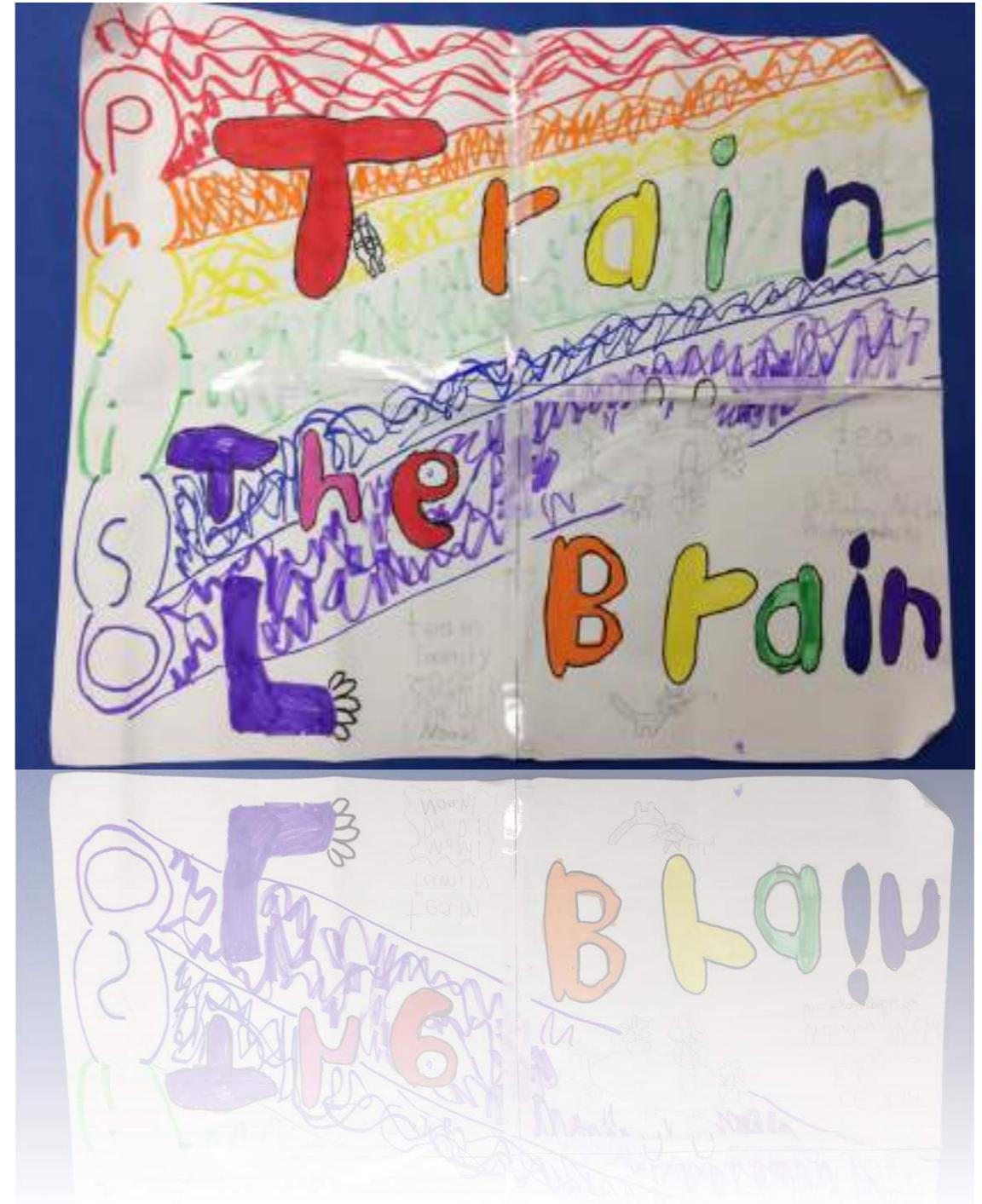
bring to a physiotherapy consultation are varied and often vague. For this group of people an **understanding of their problem** appeared to be more valued than other matters. People need to **understand their medical conditions in order for them to take an active role in their health care**. For the clinician this means it is **imperative that they understand pathology and contemporary pain biology concepts as they relate to musculoskeletal pain so that they can engage in positive dialogue with people to address their reported need for an explanation and understanding.**

For people, systems and approaches are needed to **support them to think about 'what matters to them'**. This may help them to set their priorities for the consultation and engage in more **meaningful conversations with clinicians**. Achieving desirable health outcomes is more likely when **people actively participate in their care**. Clinicians also need to be flexible. Responding to **each patient as a person is essential as no single dimension of person-centred care exists without reliance on other dimensions**. At the centre of this process is **effective communication** (Cooper et al., 2008) to fully engage the person in the process so that the issues of importance that people bring to a consultation can be successfully identified, and addressed.

Changing minds.

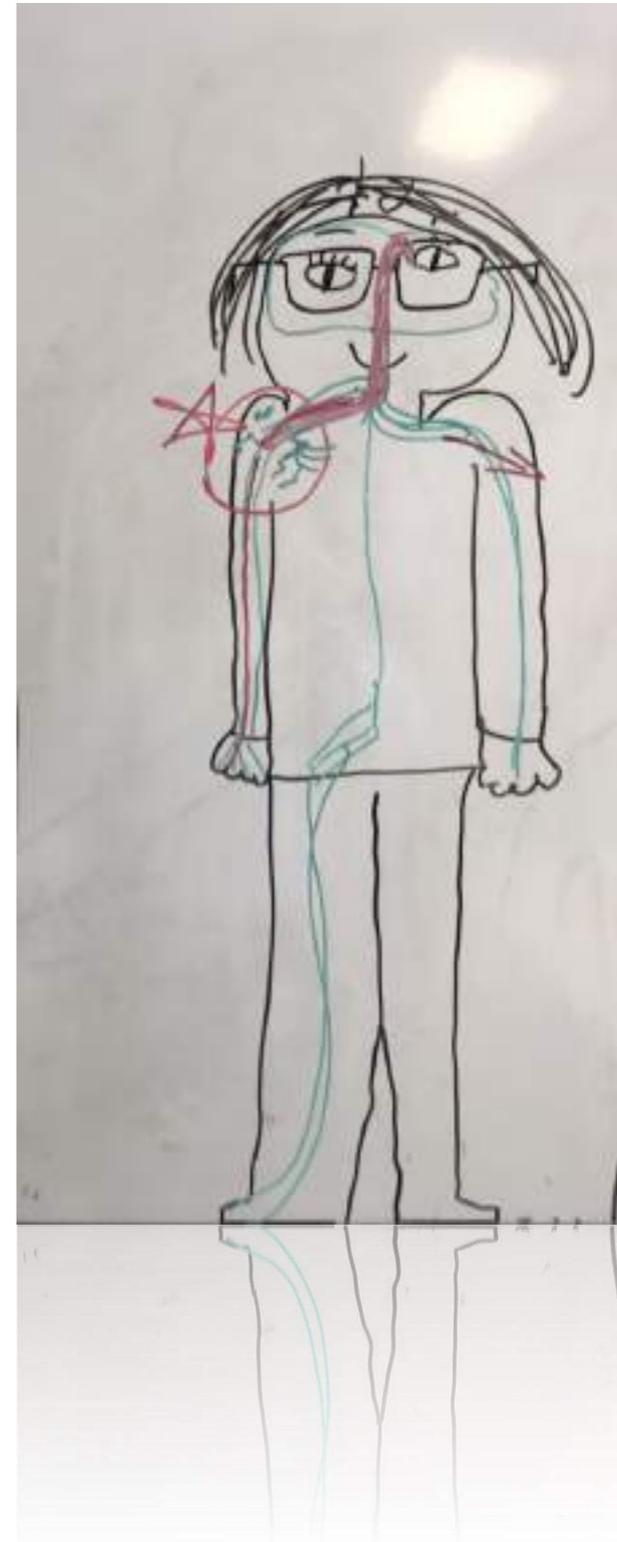
Moving in on fear

- Pain neurophysiology education (PNE) is indicated to address maladaptive pain cognitions related to movement (Nijs Girbés, Lundberg, Malfliet, & Sterling, 2015, p. 217).
- Purported to decrease amygdala, insula, and somatosensory cortex activity (Nijs et al., 2015, p. 217).



Moving in on fear

- PNE has demonstrated positive effects on descending noxious inhibitory control (vanOosterwijck et al., 2013, p. 887).
- Single PNE session was associated with a marked reduction in brain activation as measured by fMRI (Moseley, 2005, p. 52).
- PNE increases muscle endurance, pain knowledge, and self efficacy in teens (Andias, Neto, & Silva, 2018, pp. 688-690)

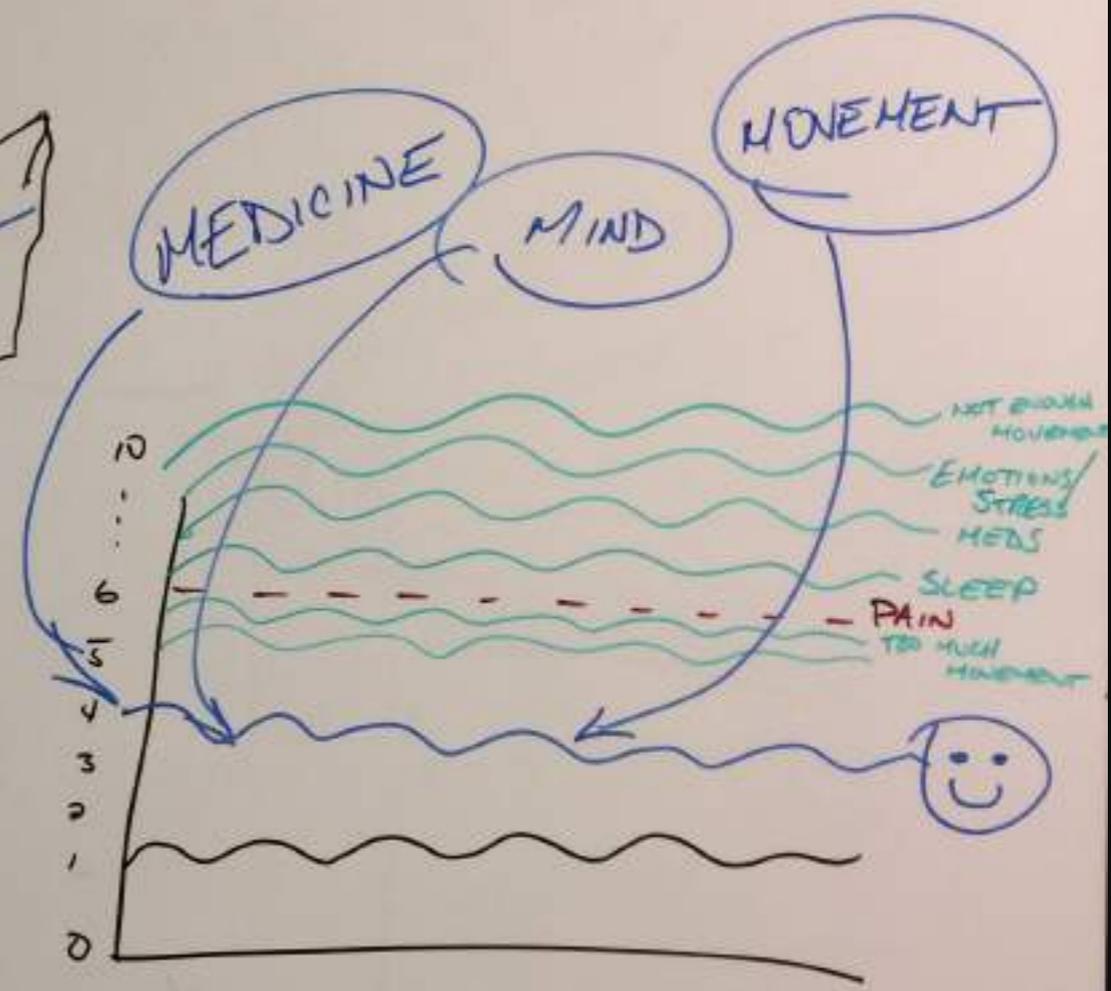
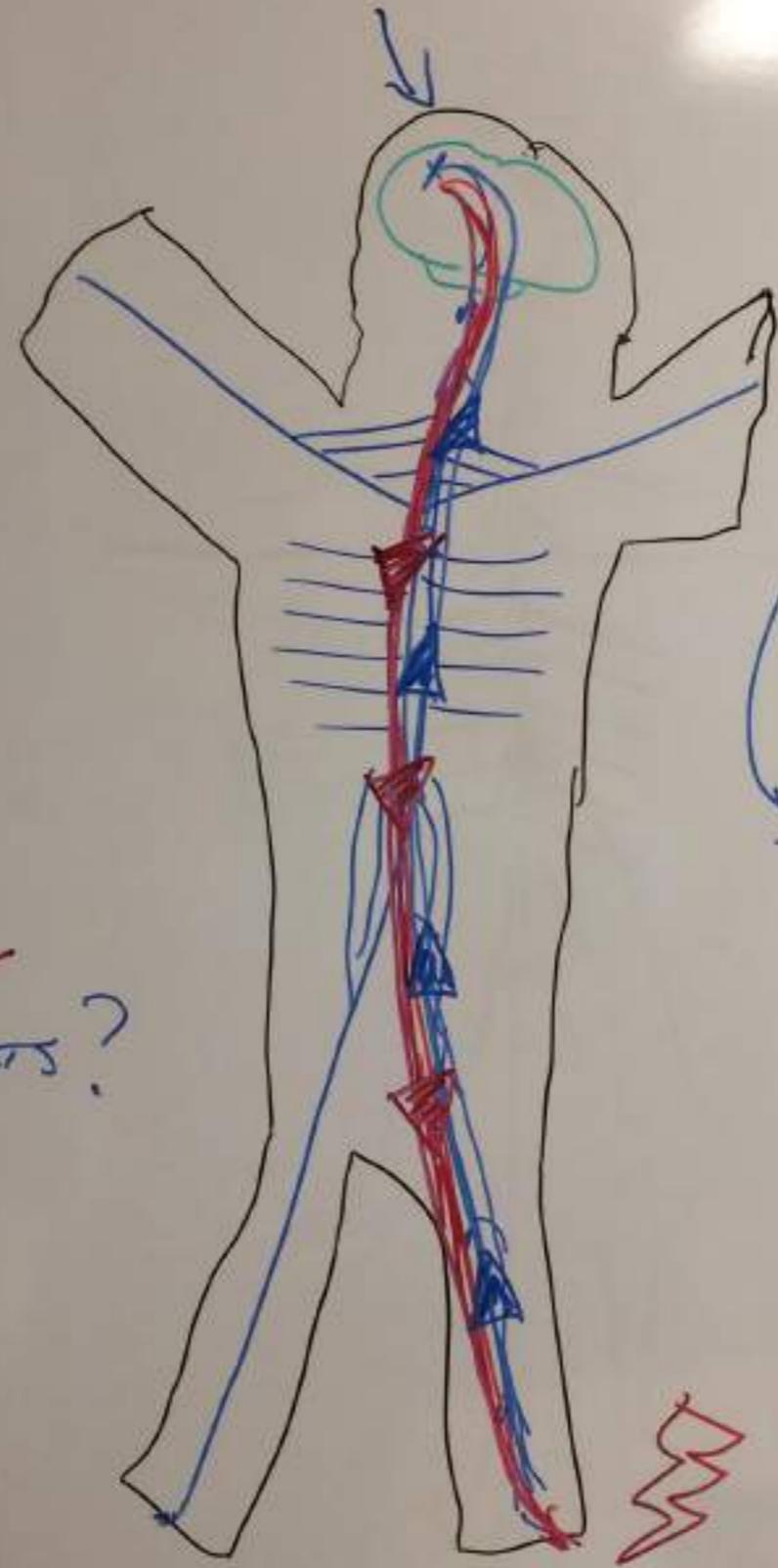


Pain Neurophysiology Education... what?

- Seven target concepts
 - There are many potential contributors to anyone's pain
 - We are all bioplastic
 - Pain is not an accurate marker of tissue state
 - Pain education is treatment
 - Pain is a brain output
 - Pain is a protector
 - Pain can become overprotective/sensitized

(Heathcote, 2018)

?
~~IS THIS REAL?~~
~~IS FALLING NORMAL?~~
~~IS THIS GOING TO GET BETTER?~~
~~MRI RESULTS?~~



PNE... how?

- Understanding pain in 5 minutes or less

<http://www.youtube.com/watch?v=RWMKucuejls>

- Why things hurt

<http://www.youtube.com/watch?v=gwd-wLdlHjs>

- The mystery of chronic pain

<http://www.youtube.com/watch?v=J6--CMhcCfQ>

- Tame the beast

<https://www.youtube.com/watch?v=ikUzvSph7Z4>

(Heathcote, 2018)

Priming movement

- Perception of action elicits neural activity (Ossmy & Mukamel, 2018, p. 145).
 - Graded Motor Imagery (GMI)
 - Laterality training or implicit motor imagery (Bowering et al., 2013, p. 4).
 - Explicit motor imagery (Bowering et al., 2013, p. 4).
 - Perceptual manipulation (Ossmy & Mukamel, 2018, p. 145).

Priming movement

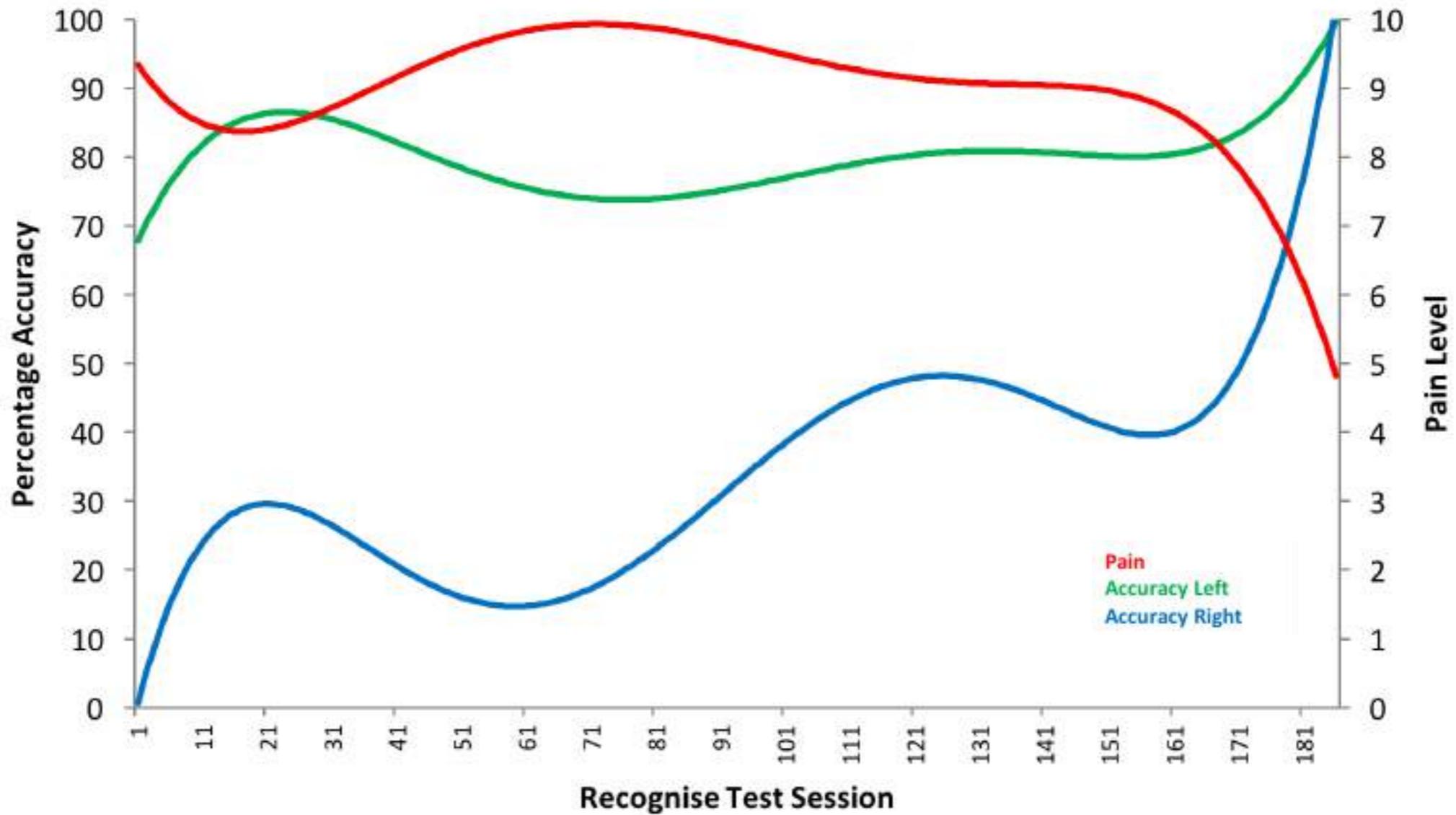
- Impairment in limb laterality recognition indicates body schema disruption
(Breckenridge, Ginn, Wallwork, & McAuley, 2018).
- Laterality training is purported to selectively activate the pre-motor cortex
(Bowering et al., 2013, p. 4).
- Sustained attention to the neglected limb.



(Neuro-Orthopedic Institute, 2016)

Recognise data

The Relationship Between Limb Recognition Accuracy and Pain Level



Priming movement

- Motor imagery appears to exercise the motor areas associated with actual movement (Bowering et al., 2013, p. 4).
- Mental representation of movement without any body movement.
- Kinesthetic imagery (first person imagery) (Kranczioch, Mathews, Dean, & Sterr, 2009).
- May precede painful movements (Dolphens et al., 2014, p. 157).

Moving towards moving

- Perceptual manipulation with mirror visual feedback (MVF) or virtual reality (Bowering et al., 2013, p. 10; Senkowski & Heinz, 2016, p. 257).
- Purported to engage the motor cortex (Bowering et al., 2013, p. 4).
- Strong visual input to the cortex that ‘normal’ movement is possible (Bowering et al., 2013, p. 4).



Moving towards moving

- Functional brain imaging studies show evidence for the purported cortical activation patterns for laterality, motor imagery, and MVF (Bowering et al., 2013, p. 4).
- Graded motor imagery (GMI) has been shown to have large effects compared to usual care in patients with CRPS (Bowering et al., 2013, p. 10).



M... ..

Moving forward therapeutically

- Neural mobilization is a movement based intervention that attempts to restore nervous system homeostasis through movement of the neural structures (Basson et al., 2017, p. 593).
- Purported to disperse intraneural edema, reduce hyperalgesia, and reverse facilitated immunoreactivity (Basson et al., 2017, p. 593).

Moving forward therapeutically

- Neural mobilization has demonstrated effectiveness in management of neck and arm pain, low back pain, and lower extremity pain of neurogenic origin (Basson et al., 2017, p. 593; Neto et al., 2017, p. 14).
- Decreased immunoreactivity of glial proteins, microglial cells and brain derived neurotrophic factor and an associated decrease in pain (Giardini et al., 2017, p. 7).

Moving

- Actually moving?
 - Cardiorespiratory capacity is associated with structural plasticity in the hippocampus and increased overall hippocampal volume.
 - Aerobic exercise is associated with increased prefrontal and temporal gray and white matter volume and white matter integrity.

(Rogge, Roder, Zech, & Hotting, 2018, p. 471)



Moving

- Exercise to alter pain memories?
 - Cognition-targeted exercise therapy is a graded approach to movement intended to facilitate systematic desensitization through creation of adaptive movement memory.
 - Purported to target the amygdala and its associated brain circuitries.
 - PNE and cognition-targeted exercise therapy act synergistically.

(Nijs et al., 2015, p. 217)

So how far have we really moved?

- Paucity of evidence regarding what constitutes PT and the most effective type of treatment for pain.
- Lack of information regarding how the treatment should be applied.
- Would a movement approach be more palatable to children, their parents, and health professionals?



Conclusion

- PTs are movement specialists.
- We know less than we think we do.
- There is a lot going on north of C1.
- We might be able to offer patients some movement that the brain doesn't have an opinion of...
- Movement is more than just movement.





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