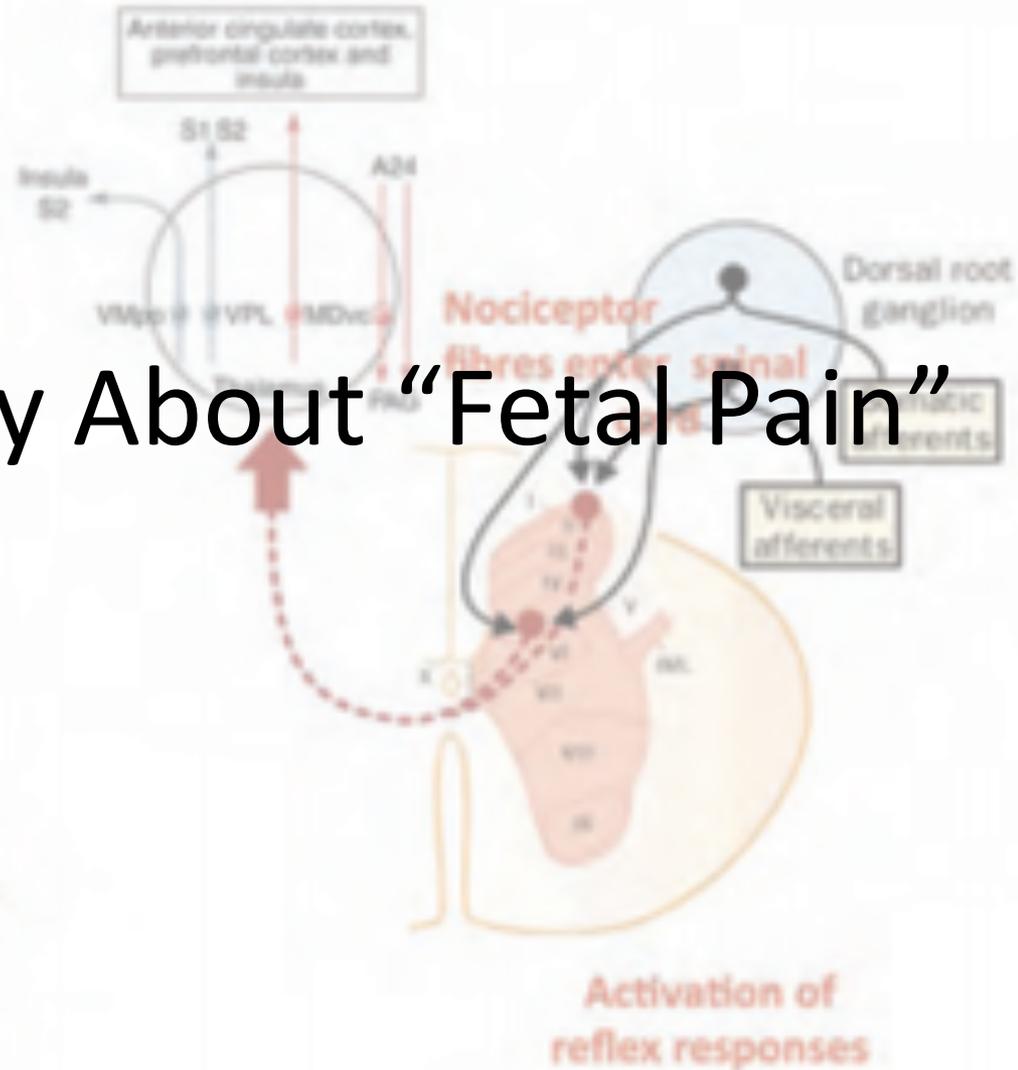


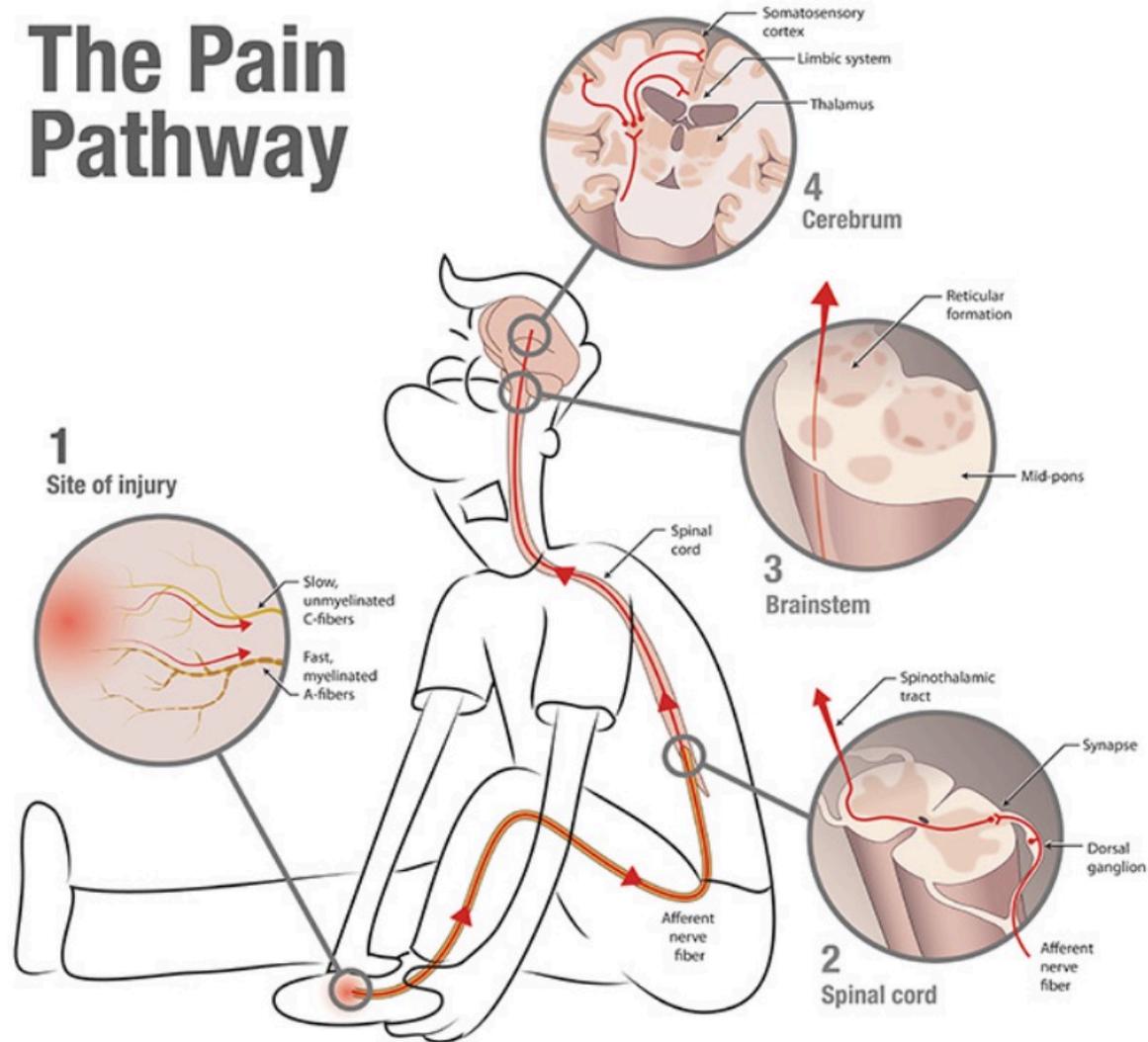


Activation of higher cortical centres



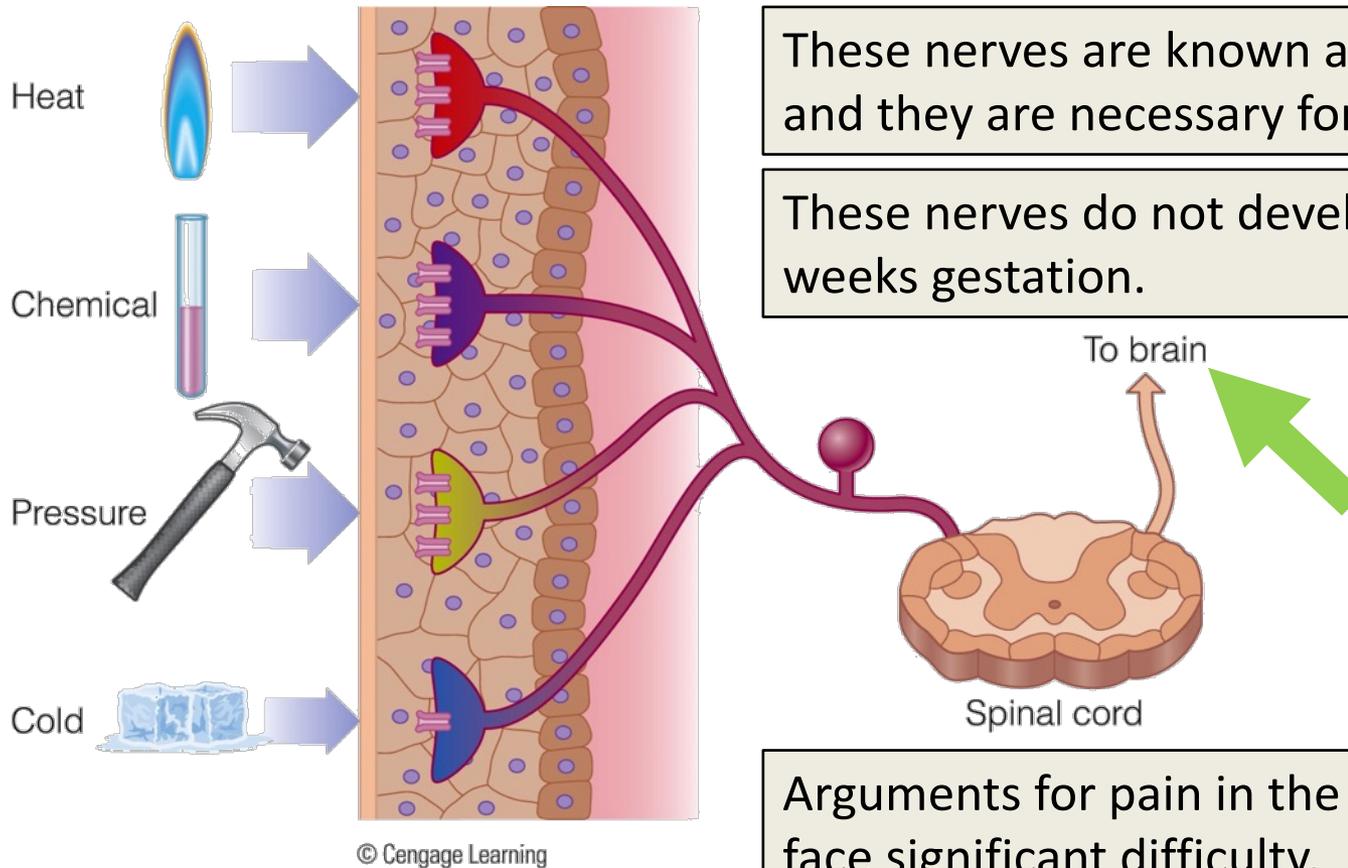
What We Can Say About “Fetal Pain”

The "Standard" Approach



Neural Development

There are nerves in the periphery (the skin) that respond to strong heat, chemical corrosion, pressure, cold and so forth.



These nerves are known as *nociceptors*, and they are necessary for pain.

These nerves do not develop before 8-16 weeks gestation.

Arguments for pain in the first trimester face significant difficulty.

The 2010 RCOG Report

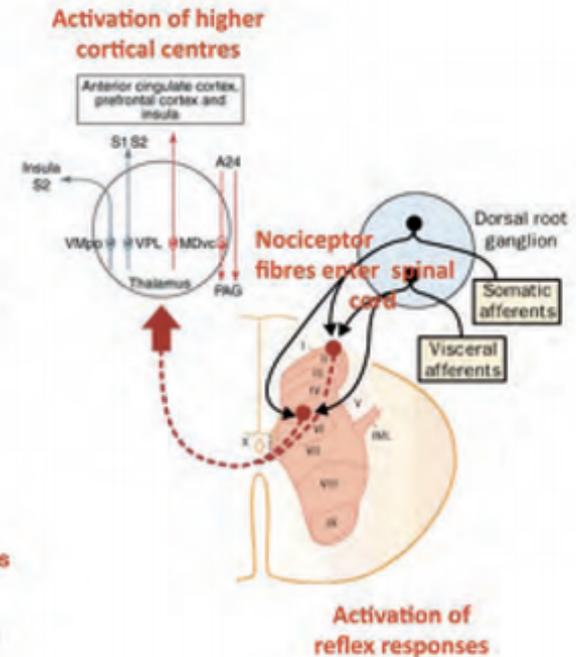
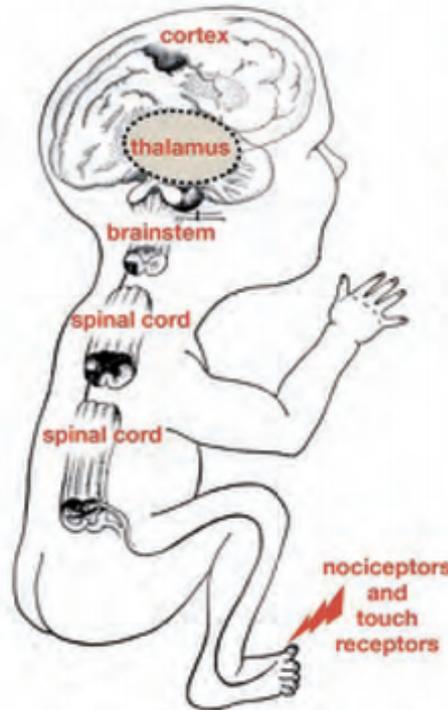


Royal College of Obstetricians and Gynaecologists

Fetal Awareness

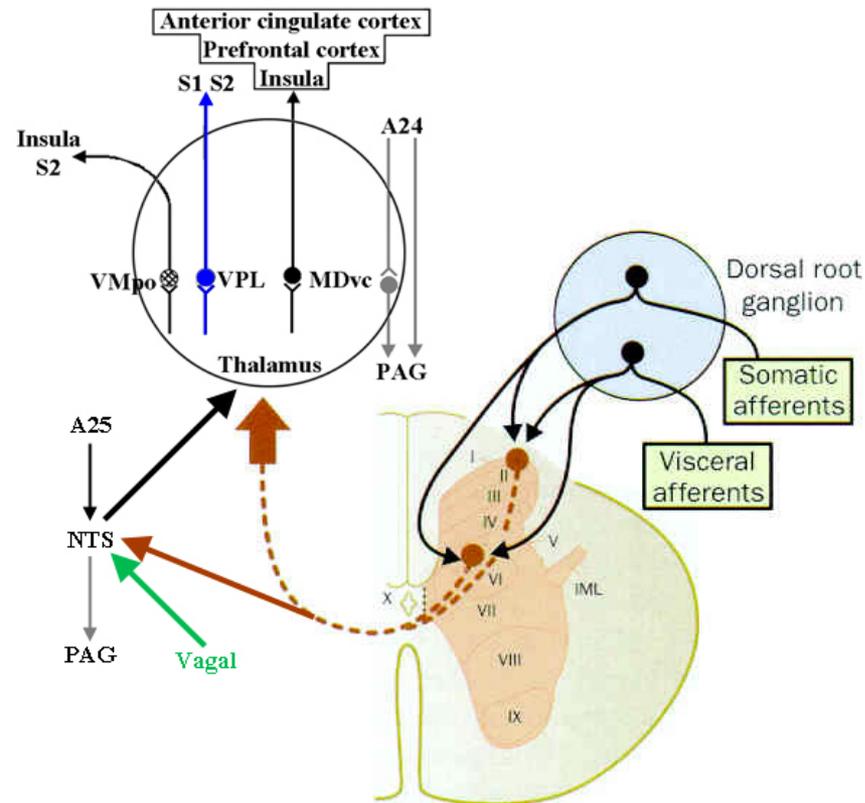
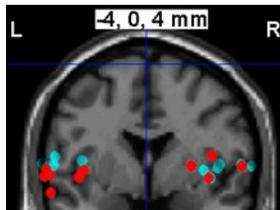
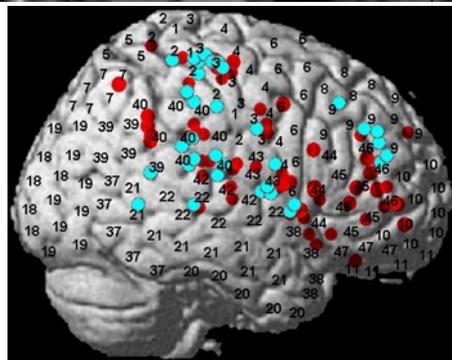
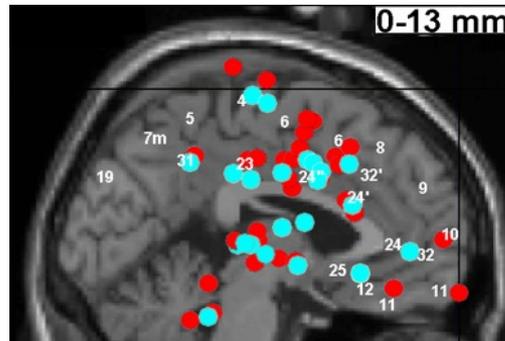
Review of Research
and Recommendations
for Practice

March 2010



“In reviewing the neuroanatomical and physiological evidence in the fetus, it was apparent that connections from the periphery to the cortex are not intact before 24 weeks of gestation and, as most neuroscientists believe that the cortex is necessary for pain perception, it can be concluded that the fetus cannot experience pain in any sense prior to this gestation.”

The Pain “Neuromatrix”



Cervero F, Laird J. *Lancet* 1999;353:2145-2148
 Derbyshire SWG. *Trend Neurosci* 2002;25:65-66

The IASP Definition of Pain

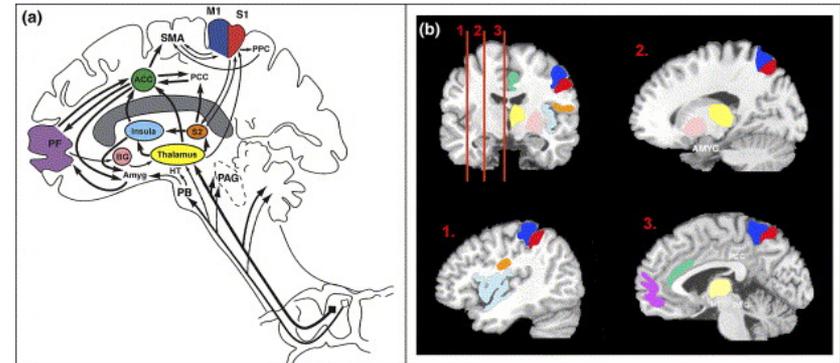
“An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”

“Pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life.”

“Activity induced in the nociceptor and nociceptive pathways by a noxious stimulus is not pain, which is always a psychological state, even though we may well appreciate that pain most often has a proximate physical cause.”

The Neuromatrix & IASP Definition

The IASP definition of pain and the concept of the neuromatrix necessary to support pain experience, gelled together nicely – and made the possibility of fetal pain somewhat remote, maybe even eccentric.



“...an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage... pain is always subjective. Each individual learns the application of the word through experiences related to injury in early life.”

My Early Views



“[Pain is] a complex arrangement, closed off to the fetus.”

“Scientific evidence suggests that women considering abortion can be assured that fetuses do not experience pain... [Pain] becomes fully formed after birth.”

“[Pain relief efforts] are unnecessary for fetuses, who have not yet reached a developmental stage that would support the conscious experience of pain.”

Fetal stress responses

SIR—Giannakoulopoulos and colleagues (July 9, p 77) report an interesting... stress response is flawed in an

Vol 344 • August 27, 1994

Do fetuses feel pain?

The past decade has seen a profound change in the way neonates and infants feel pain (p 787). Unsettling in the context of late abortions and fetal surgery, we invite a panel of specialists for their opinions.

“Fetal pain” is a misnomer

Stuart W G Derbyshire, Ann Furedi

BMJ 1996;313:795-9

Controversy

Can fetuses feel pain?

Stuart W G Derbyshire

BMJ VOLUME 332 15 APRIL 2006

What Are The (New) Issues?

The IASP revised their definition of pain.

The evidence for the cortex being necessary for pain has been substantially challenged.

Direct sensorial input is likely necessary to drive some behavioural changes, some of which appear *in utero*.

Nevertheless, our understanding of fetal pain provides no reason to alter abortion procedures or therapeutic fetal surgery.

Reconsidering fetal pain

Stuart WG Derbyshire ,¹ John C Bockmann²



The Revised Definition

Four Decades Later: Revision of the IASP Definition of Pain and Notes

The currently accepted definition of pain was originally adopted in 1979 by the International Association for the Study of Pain (IASP)

1979 Definition of Pain

An unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage

2020 Revised Definition of Pain

An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage

2020 Revised Definition of Pain Notes



Pain is always a personal experience that is influenced to varying degrees by biological, psychological, and social factors



Pain and nociception are different phenomena and cannot be inferred solely from activity in sensory neurons



Through their life experiences, individuals learn the concept of pain



A person's report of an experience as pain should be respected



Although pain usually serves an adaptive role, it may have adverse effects on function and social and psychological well-being



Verbal description is only one of several behaviors to express pain; inability to communicate does not negate the possibility that a human or a nonhuman animal experiences pain

In 2018, IASP constituted a 14-member multi-national task force with expertise in clinical and basic science related to pain, which sought input from multiple stakeholders to determine:

"Does the progress in our knowledge of pain over the years warrant a re-evaluation of the definition?"



Expert consultants



IASP council



The public



The revised IASP definition of pain: concepts, challenges, and compromises

Raja et al. (2020) | Pain

DOI: 10.1097/j.pain.0000000000001939

PAIN

The Neuromatrix & IASP Definition

Reconsidering fetal pain

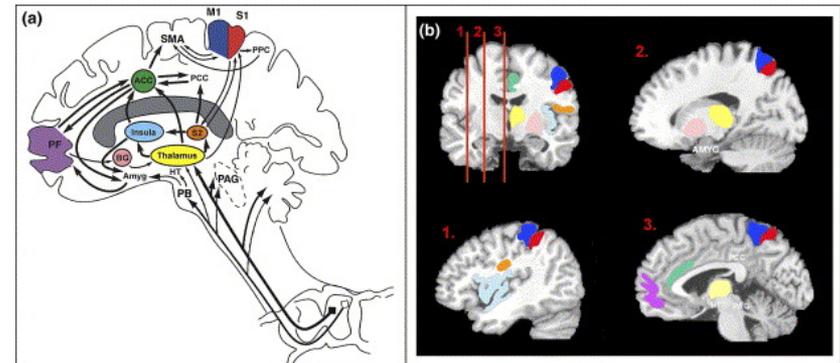
Stuart WG Derbyshire ,¹ John C Bockmann²

As others have pointed out, such a demanding definition of pain restricts pain almost exclusively to fairly mature human beings.^{36 37} To ease that restriction it might be worthwhile to consider a less sophisticated definition, which focuses less on subjective reflection (*knowing that* I am in pain) and more on the immediate and unreflective feel of pain (*being in* pain).

When writing our article, John and I agreed that whatever the fetus might experience, a self-conscious, reflective experience *cannot* be how fetal pain is experienced.

Fetal pain cannot conform to the previous, 1979, IASP definition of pain.

Journal of Medical Ethics 2020; 46: 3-6.

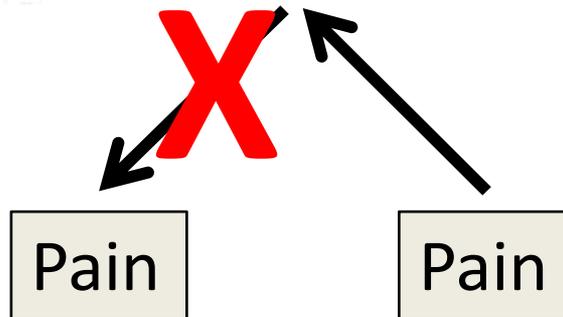
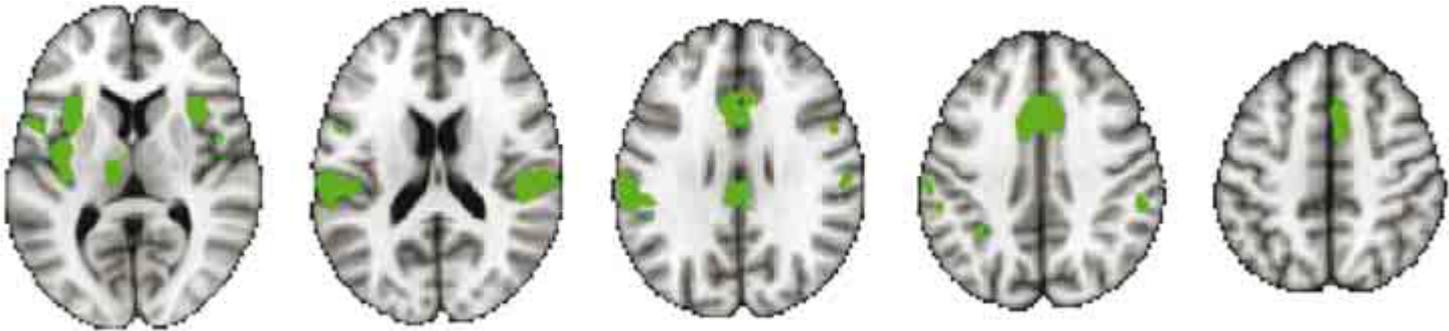


“...an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage... It is always subjective. Each individual learns the application of the word through experience associated to injury in early life.”

Is The Cortex Necessary?

Two people born congenitally insensitive to pain (no functional nociceptors).

They received noxious (but not painful!) mechanical stimulation while being scanned with fMRI, and activated the “pain” neuromatrix...

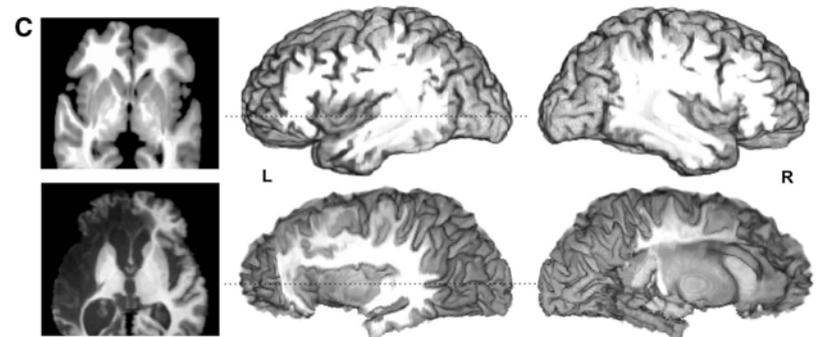
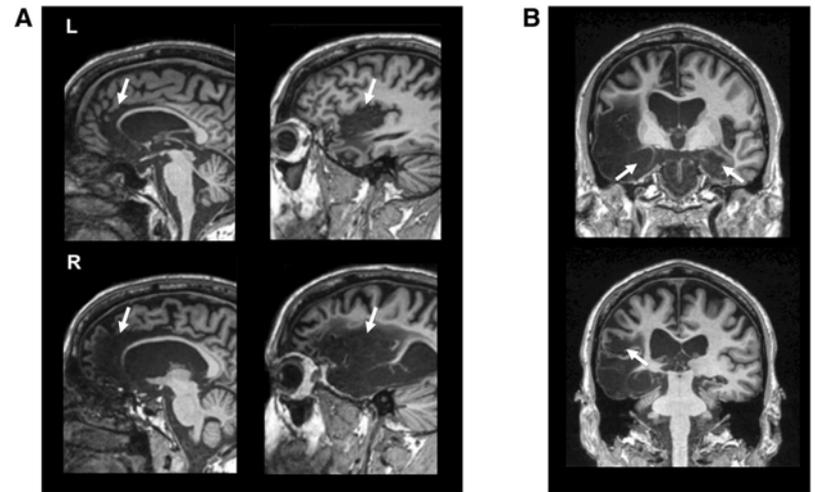
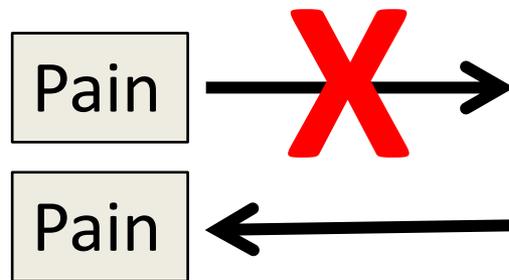


Tim V. Salomons, PhD
Gian Domenico Iannetti, MD, PhD
Meng Liang, PhD
John N. Wood, PhD

Is The Cortex Necessary?

A patient with widespread damage to the anterior cingulate cortex, insular cortex and some secondary somatosensory cortex.

Still feels pain...



Preserved emotional awareness of pain in a patient with extensive bilateral damage to the insula, anterior cingulate, and amygdala

Justin S. Feinstein · Sahib S. Khalsa · Tim V. Salomons ·
Kenneth M. Prkachin · Laura A. Frey-Law · Jennifer E. Lee ·
Daniel Tranel · David Rudrauf

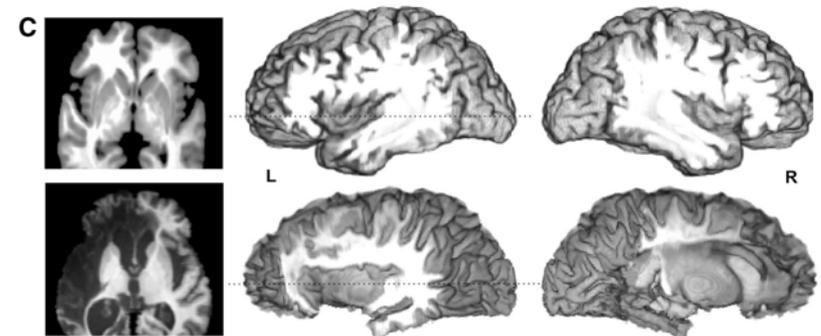
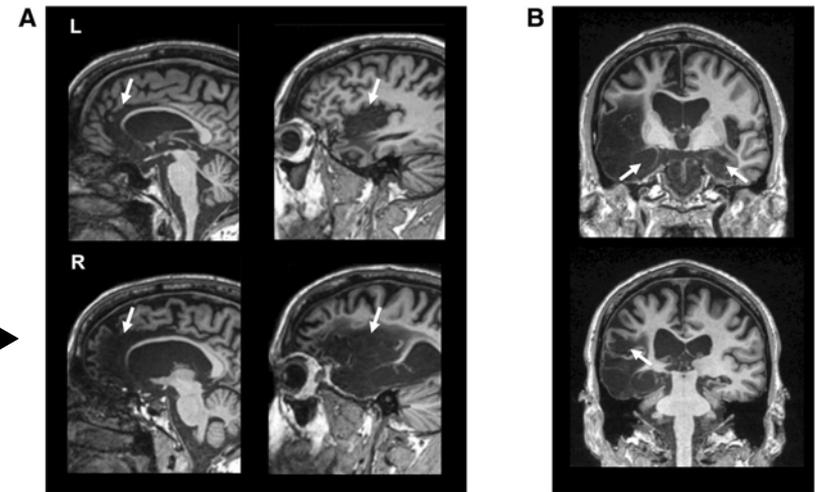
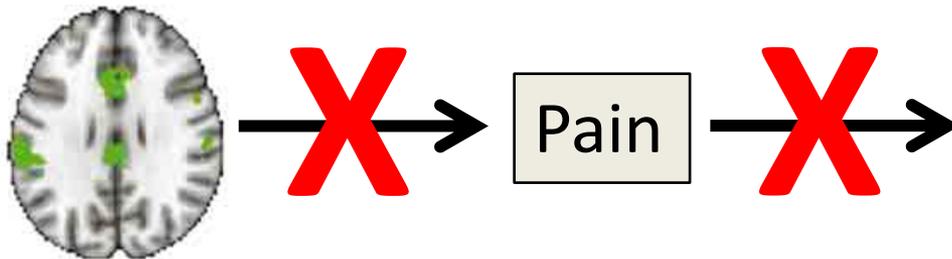
Brain Struct Funct
DOI 10.1007/s00429-014-0986-3

ORIGINAL ARTICLE

Is The Cortex Necessary?

Patients without the ability to feel pain generate pain matrix activity in response to noxious stimuli, and a patient mostly without the pain matrix still reports pain...

The two studies combined largely dissociate pain from the cortex.



Preserved emotional awareness of pain in a patient with extensive bilateral damage to the insula, anterior cingulate, and amygdala

Justin S. Feinstein · Sahib S. Khalsa · Tim V. Salomons ·
Kenneth M. Prkachin · Laura A. Frey-Law · Jennifer E. Lee ·
Daniel Tranel · David Rudrauf

Brain Struct Funct
DOI 10.1007/s00429-014-0986-3

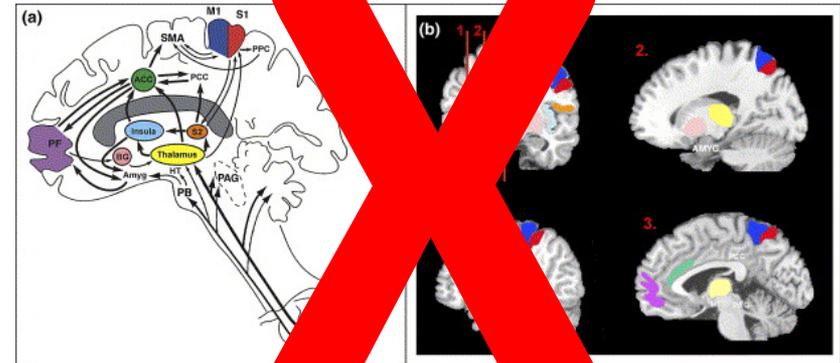
ORIGINAL ARTICLE

The Neuromatrix & IASP Definition

Reconsidering fetal pain

Stuart WG Derbyshire ,¹ John C Bockmann²

As others have pointed out, such a demanding definition of pain restricts pain almost exclusively to fairly mature human beings.^{36 37} To ease that restriction it might be worthwhile to consider a less sophisticated definition, which focuses less on subjective reflection (*knowing that* I am in pain) and more on the immediate and unreflective feel of pain (*being in* pain).



This brings me to the conclusion that we need to rethink how brains and feelings work.

“...an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage... This is always subjective. Each individual learns the application of the word through experience associated to injury in early life.”

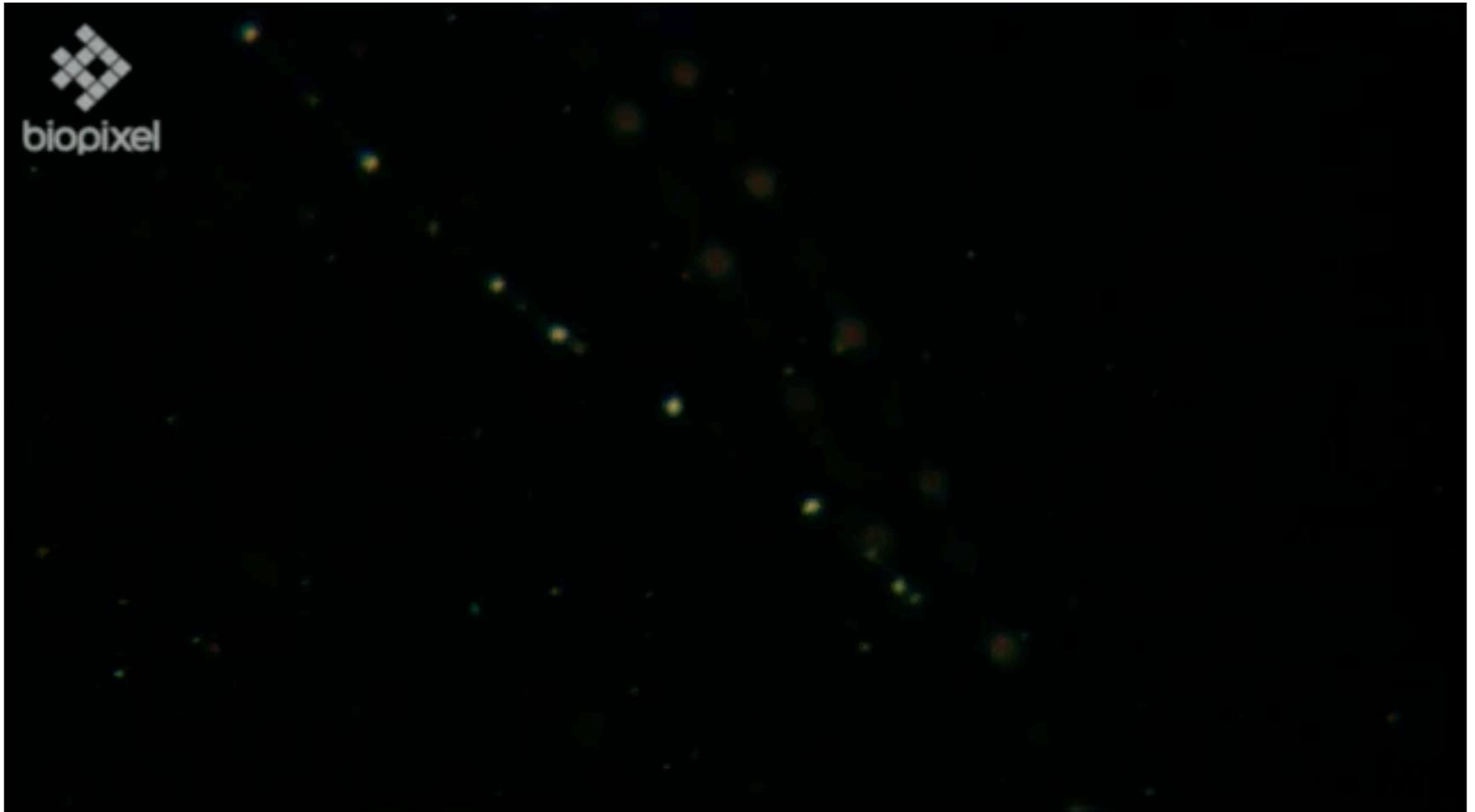
We Need A Brain For Movement

Ultimately, the brain is linked to the concept of doing something, that is, movement.

Internal processing is pointless without the ability to move.



The Box Jelly "Hunting" Or "Fishing"



Jelly Action

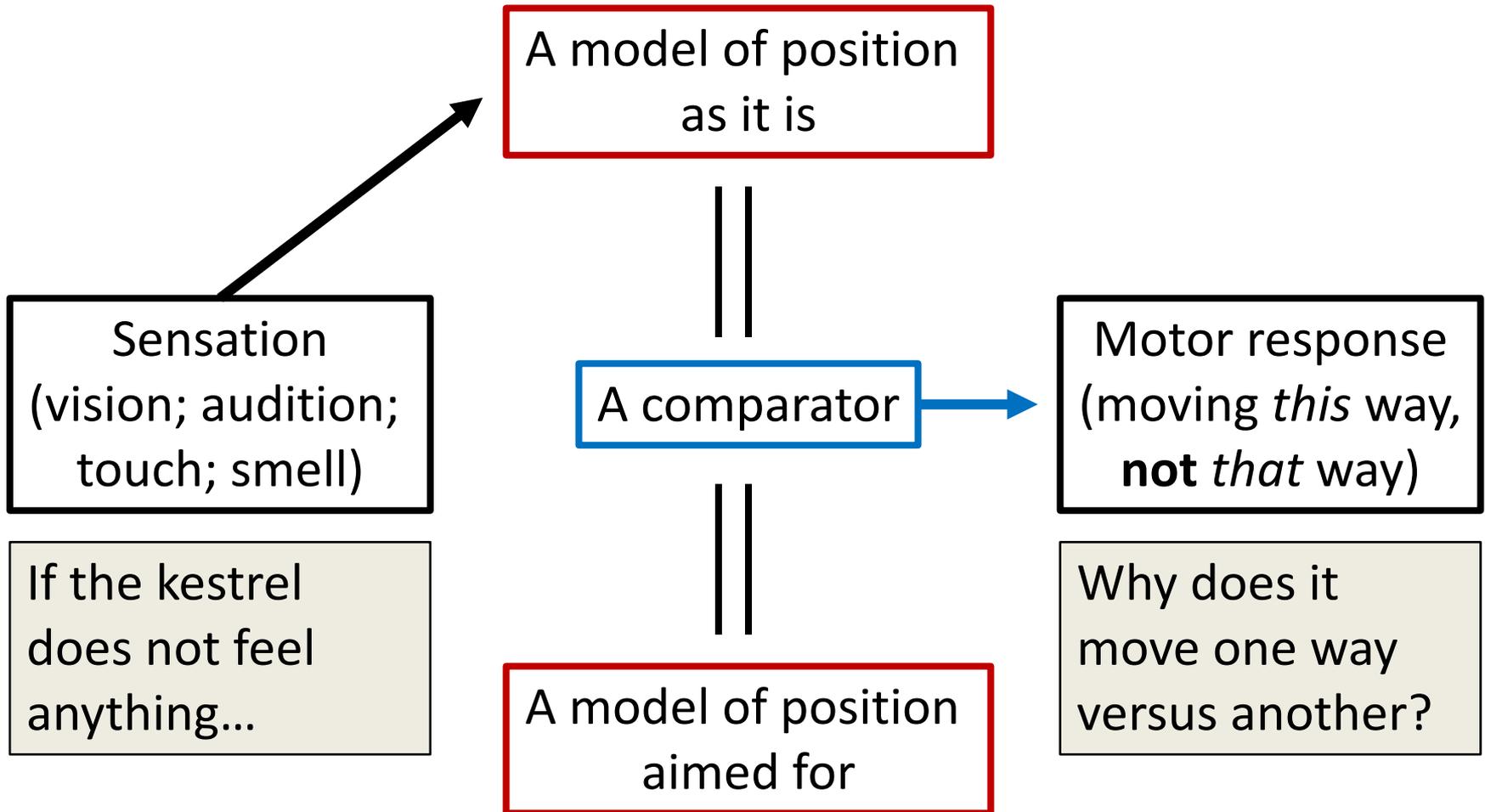


No need to suggest that the jelly *feels* anything, the response follows directly from activity invoked by tactile stimuli and the response always follows a given tactile input with a given motor output regardless of all other circumstances.

Kestrel Stability

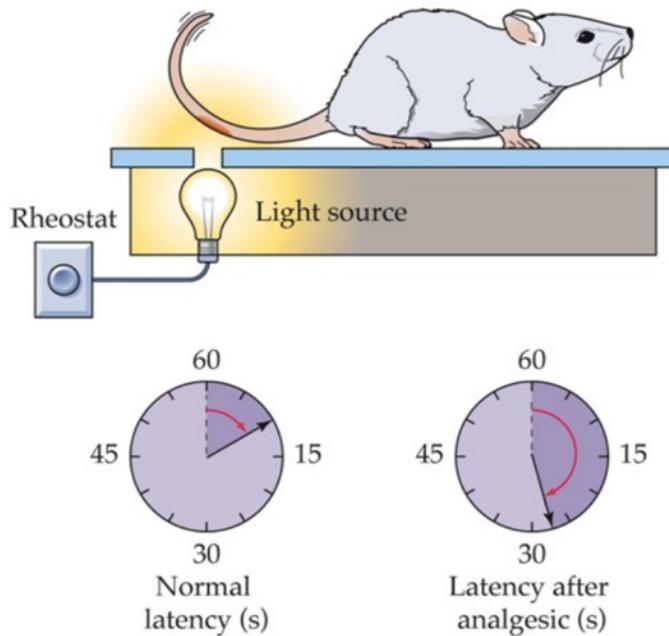


Kestrel Stability



Pain Delivers Behaviour

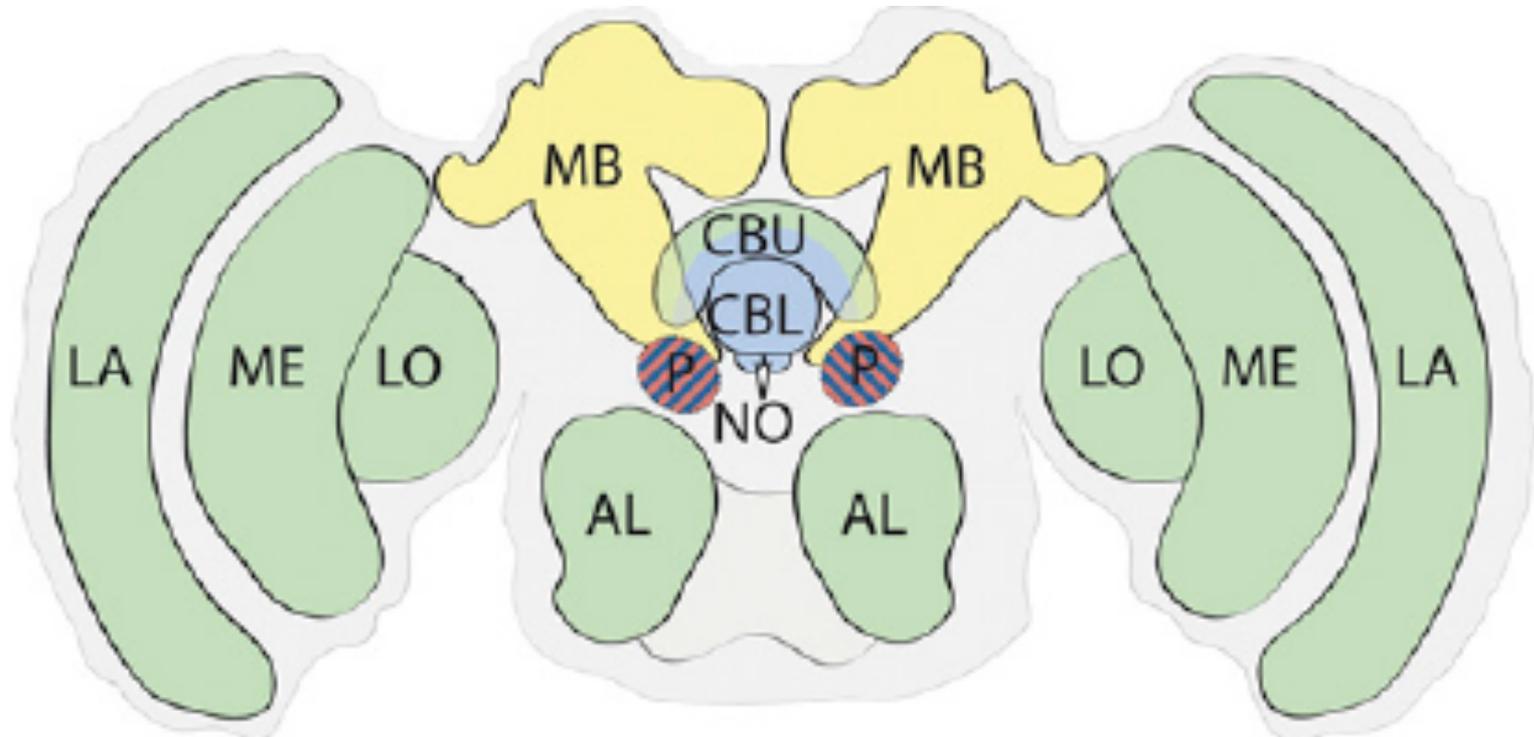
Pain at its core is an instruction to the motor system, and pain doesn't have to be multidimensional and explicitly subjective to do its job.



*“Get off
that hot
plate!”*

Klein C. An Imperative Theory of Pain. *The Journal of Philosophy* 2007; 104: 517-532.

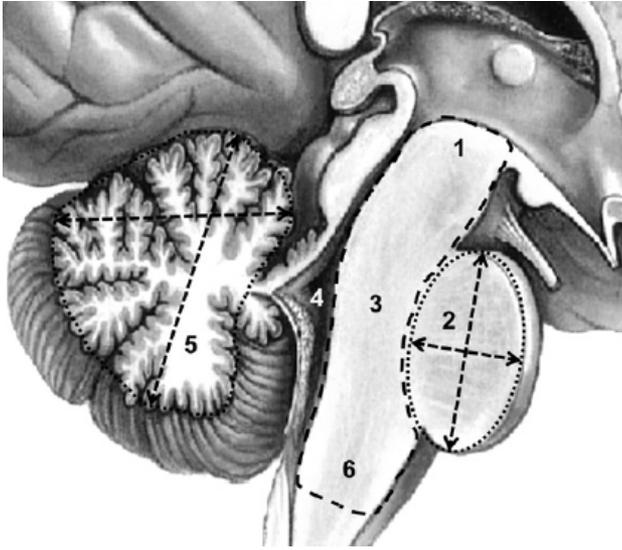
The Central Complex (CX)



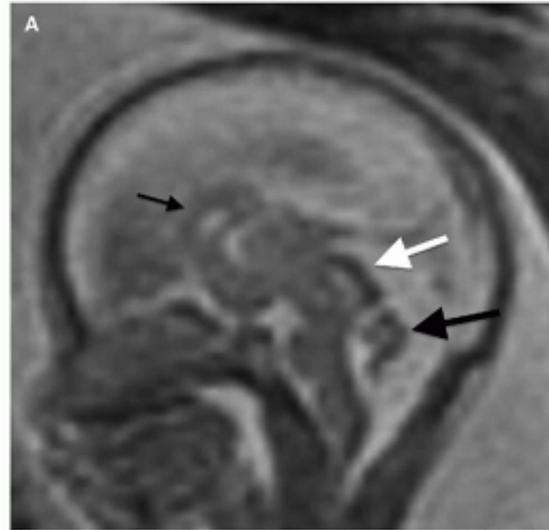
The minimal brain system necessary for such comparator control is considered to be the brainstem and midbrain – subcortical structures.

Barron AB, Klein C. What insects can tell us about the origins of consciousness. Proc Natl Acad Sci USA 2016; 113: 4900-8

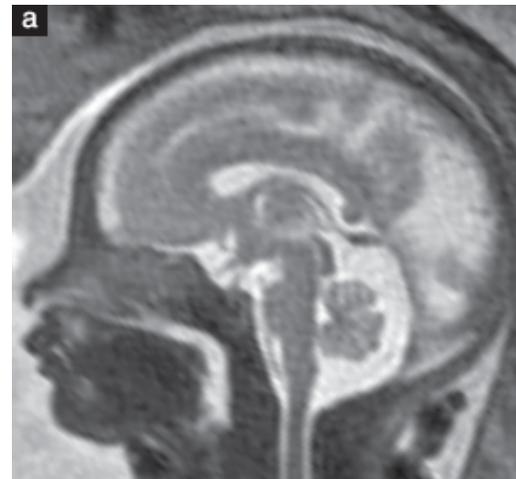
Fetal Subcortex



The structures of the brainstem, the lowest part of the brain bulging from the spinal cord, include the medulla, pons, midbrain, and cerebellum and can be observed from seven weeks GA (Kadic & Predojevic, 2012).



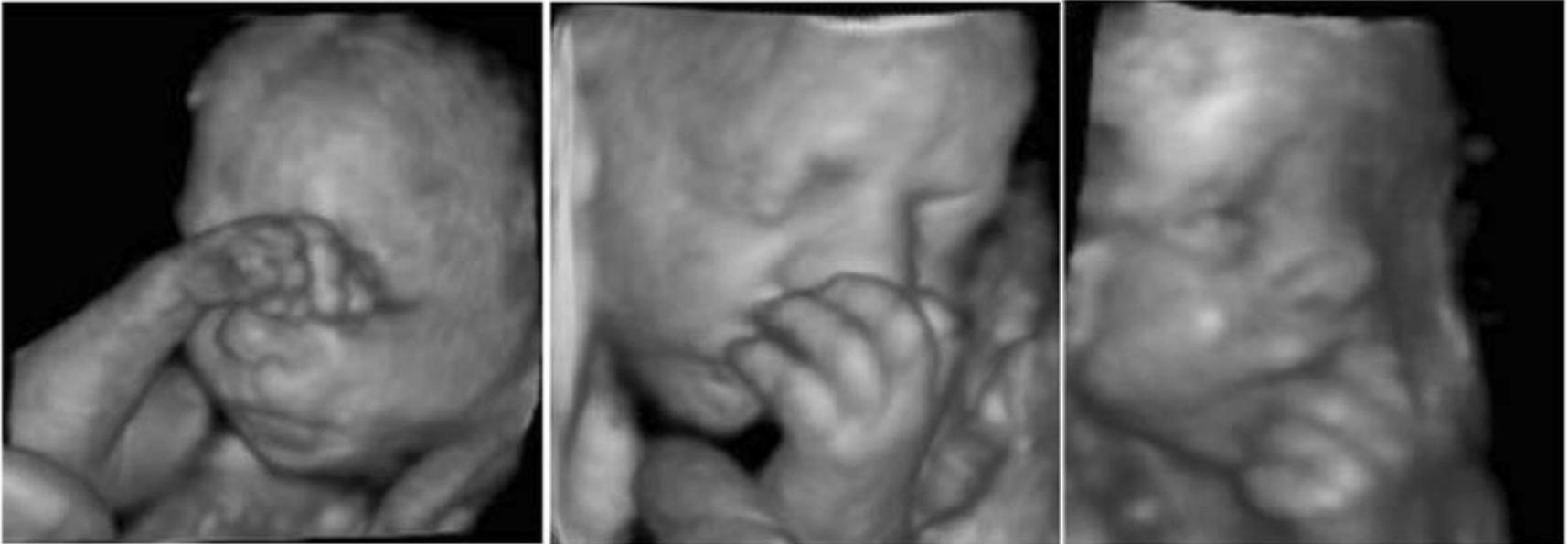
16 weeks GA



28 weeks GA



Fetal Hand Movements



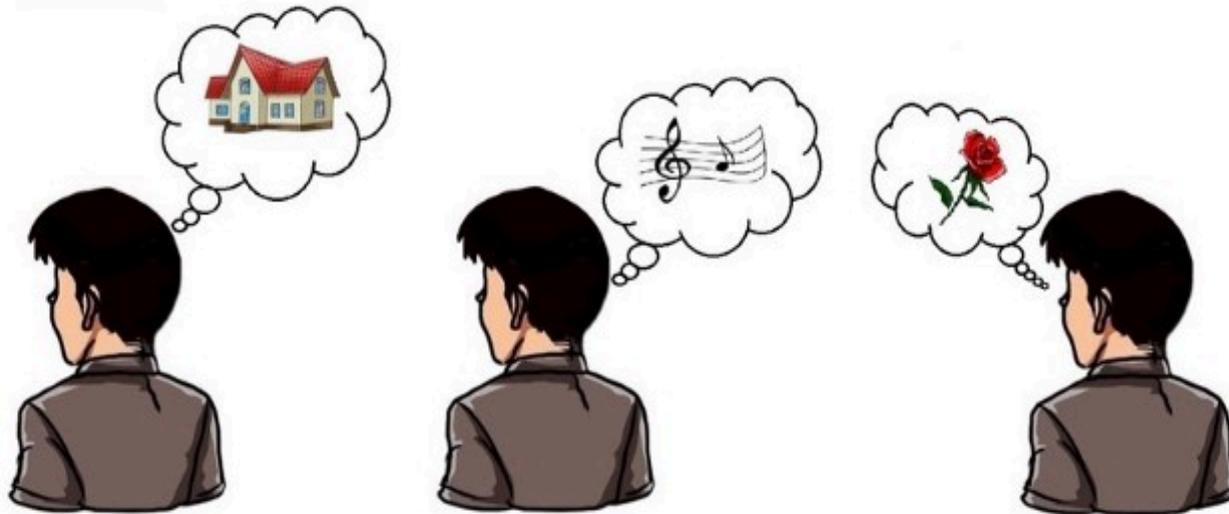
During the second trimester, the fetus makes *controlled* hand movements towards its eyes and mouth, and preferentially touches areas of its body densely innervated with tactile fibres.

Marx & Nagy. *Infant Behavior & Development* 2017; 47: 83–91; Reissland et al. *Dev Psychobiol* 2014; 56: 955–963; Parma et al. *Scientific Reports* 2017; 7: 16804.

Feel?

Feel means: “...the simplest forms of consciousness, the capacity to have subjective experience... direct awareness of the world without further reflection upon that awareness.”

Feel doesn't mean: “...self-reflexive consciousness... the ability to represent one's own subjective experience to oneself...”



Derbyshire
SWG, Raja A.
On the
development
of painful
experience.
*Journal of
Consciousness
Studies* 2011;
18(9-10): 233-
256.

Feelings (Qualia) Without Concepts Or Context



We want to say that the dog is excited to be in the snow, but we know that can't quite be right because the dog doesn't know what snow is. It's not like a child who barrels out the door having just seen snow for the first time.

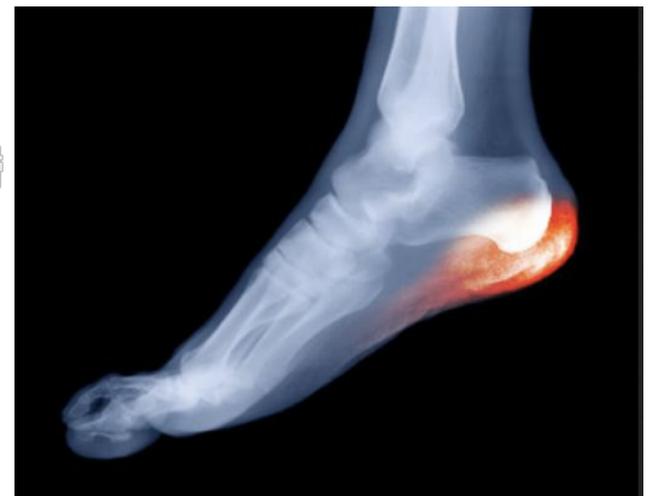
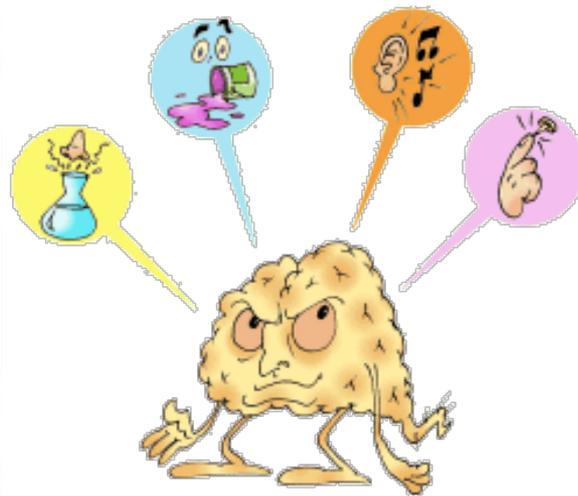
The obvious changes in the dog's behaviour indicate a change in emotional state. The dog has an amygdala for a reason, just as it has a visual cortex and sensory cortex for a reason. The sight of the snow on the ground, the feel of the cold, brings about changes in blood flow, cortisol release, dopaminergic activation and so on that generates the excited behavioural state we observe – and it is not unreasonable to associate those changes with an emotional excitement in the dog. But the dog is not *explicitly* excited by the snow, it just *is* excited - a raw emotional and behavioural snow-directed package or state.

Development Reveals Qualia

Unlike other animals, human beings have tipped into confrontation with sentience; we exist within sentience and are explicitly aware of feelings.

When we experience pain, we experience ourselves as the bearer of pain with the knowledge that we are in pain, an experience encompassing memory, understanding, and so on. We get to *that* pain experience via development.

The development of consciousness allows qualia to be discovered as what they truly are (and always were, but in a “not there” form or state). Now pain is plugged into and felt through higher-order consciousness, rationality...



Does Fetal Pain Matter?

I believe that a dispassionate reading of the pain literature allows for a fetal pain experience that is unknowable but “*there*” sometime during the second trimester when subcortical structures are mature and functional.

I am, however, also willing to accept that there is potentially a lot of nonsense being floated – an “unknowable” feeling that cannot be found is not a feeling at all; a “not there” feeling is maybe better understood as simply not there...

Regardless, an unknowable, raw, immediate, “there but not there” pain apprehension is insufficient to demand changes in the law or clinical practice.

Broadly, we accept that eliminating all pain is not possible, and broadly we know that an abortion is not performed for the welfare of the fetus, it is performed to resolve the problem of an unwanted pregnancy.

I see it as reasonable to leave any decisions regarding “pain relief” during an abortion (or a therapeutic fetal procedure) to the conscience and wisdom of those involved.

The End



Thank you for your kind attention.

Email: psydswg@nus.edu.sg

For Us, Feelings Are Explicit

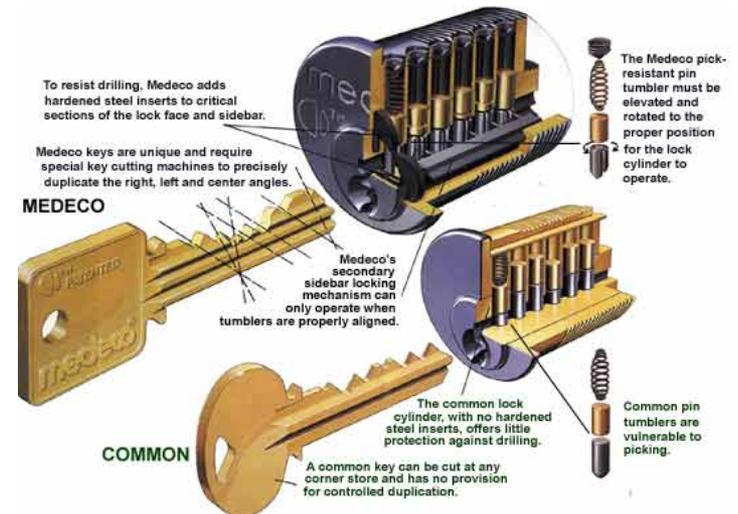
A lock is the form required for a key to express its 'keyness'.

What if there were no locks?

It would be a 'not-key'.

Eventually it will be 'there' in a form that is 'not there'.

It becomes not *anything* and not *nothing*...

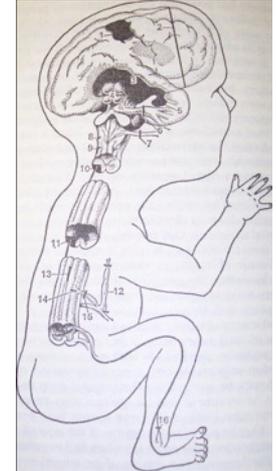
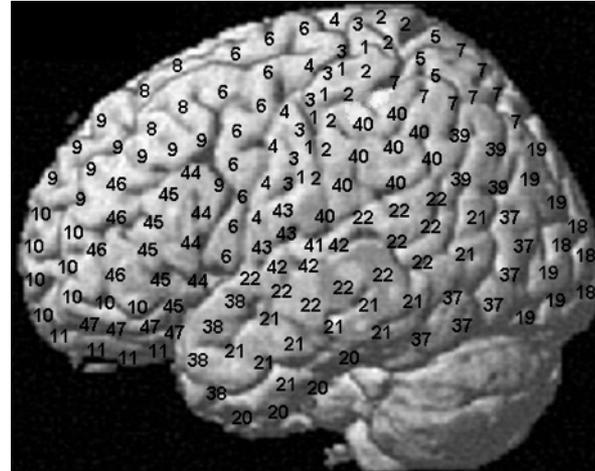


Is The Cortex Necessary?

Wilder Penfield stimulated some 800 regions of the primary sensory cortex but generally failed to generate pain.

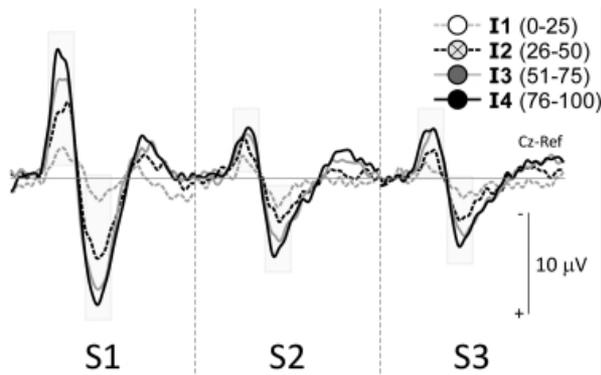
Neurosurgeons have lesioned large portions of the cortex and failed to abolish pain.

ERP studies suggest pain is subcortical.



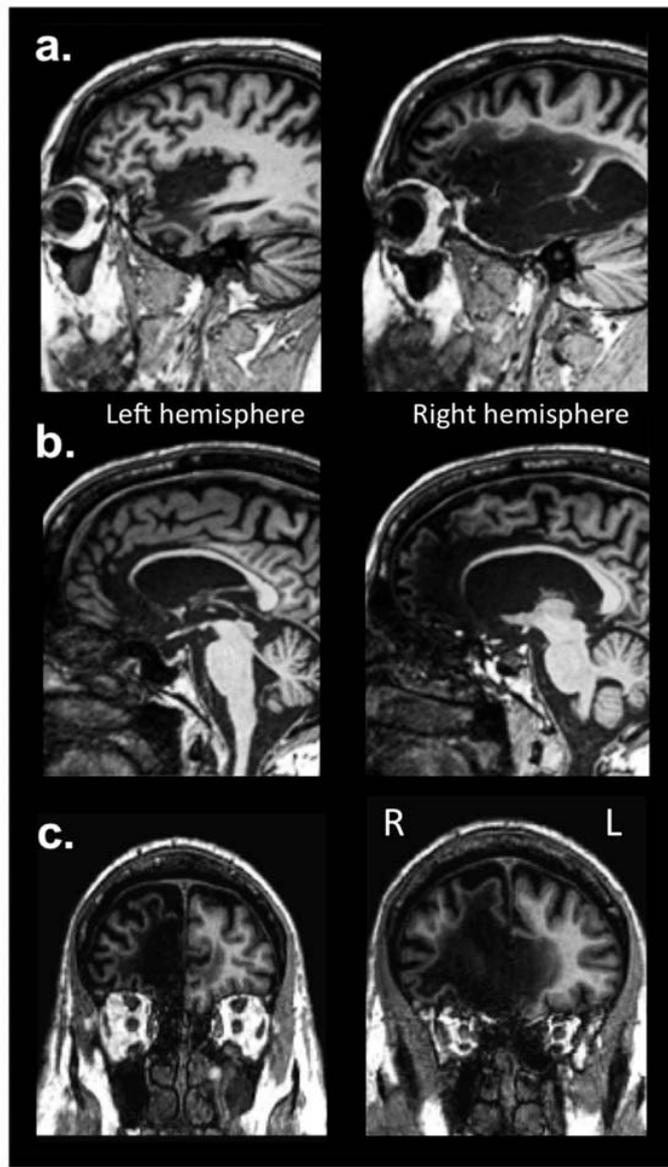
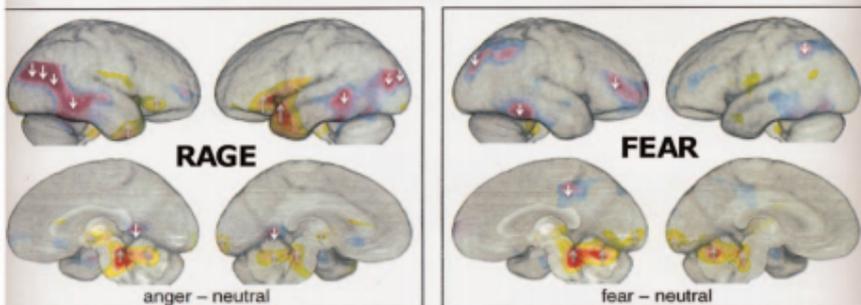
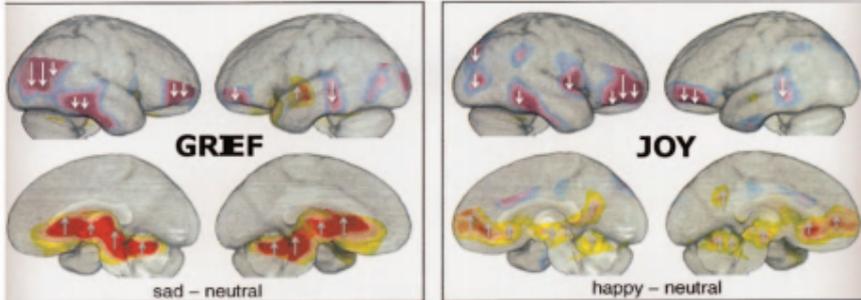
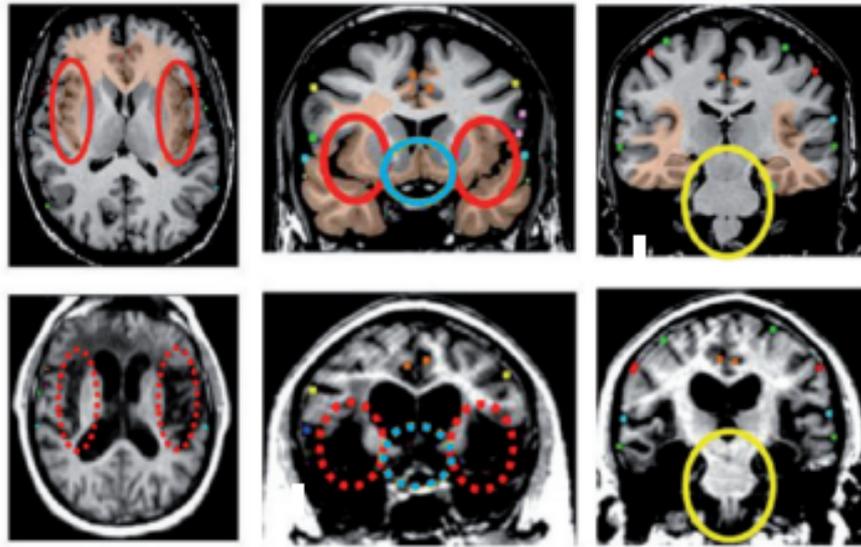
Note that in contrast to cortical stimulation, pain is readily evoked by focal (microelectrode) stimulation in certain non-cortical areas such as the thalamus and brainstem.

Pain Practice, Volume 15, Issue 6, 2015 497-508



Determinants of Laser-Evoked EEG Responses: Pain Perception or Stimulus Saliency? Iannetti *et al.*, *J Neurophysiol.* 2008; 100: 815-828

Is The Cortex Necessary?



Damasio AR, Damasio H, Tranel D. Persistence of feelings and sentience after bilateral damage of the insula, *Cereb Cortex* 23; 2013: 833–846.

Damasio AR. et al. Subcortical and cortical brain activity during the feeling of self-generated emotions. *Nature Neuroscience* 2000; 3: 1049–56.

Philippi CL, et al. Preserved self-awareness following extensive bilateral brain damage to the insula, anterior cingulate, and medial prefrontal cortices. *PLoS One*; 2012: e38413.