‘Psychomotor slowing’

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Disclaimer
This certifies that the views expressed in this presentation are those of the author and do not reflect the official policy of the NIH.

Disclosure
This certifies that I, Hugo Critchley, have no financial relationship that is relevant to the subject matter of this presentation.
**Definitions**

**Psychomotor slowing**
- Retardation
- Dysexecutive syndrome
- Abulia
- Avolitional
- Amotivation
- Detachment
- Apathy
- Anergia
- Flattened / blunted affect
- Resource limitation
- Diminished self-efficacy
- Negative symptoms
- Catatonia with akinetic mutism
- Obsessional slowness
- Preoccupation

**Motor activity**
- Decreased activity (actimetry)
- Slowed reaction times
- Lower velocity
- Reduced amplitude of limb movements
- Latency and accuracy of eye-movements

**Speech**
- Decreased speech production
- Increased speech pause time
- Prosody articulation

**Cognition**
- Reduced psychomotor speed (reaction time on cognitive tasks)
- Fluency impairments (self-generated items)
Adaptive autonomic engagement

Blood pressure 35yrs
Blood pressure 65yrs
Cardiac sympathetic
Anticipatory EDA
Emotional Heart rate
Error in pupil

Patient 1  Patient 2  Patient 3

BP healthy control
HR
BP cingulate lesion subject
HR

Mental stress task

Key regions and pathways

Cognitive appraisal
Sensory-motor
Motivation

Thal

Speech preparation (SET)

vmPFC

Positive relationship
Individual differences

Interoceptive access via insula

insular cortical regions: viscerosensory cortex, conscious access,
Influential theoretical models body the expression of emotive states of bodily arousal influence making. Functional neuroimaging norms that generate changes in to internal feedback signals to in the insula cortex is implicated in the psychological processes may be specialized in prefrontal cortex is recognized to inate in states of rest and dynamic interactions with the emotional and autonomic control. The insula and amygdala are proposed to enable prediction and correction of action and, by extension, the interpretation of the behavior of others. It is hypothesized that the neural substrate for these processes during motivational and affective behavior lies within the interactions of anterior insula, amygdala, and orbitofrontal cortices. Generation of visceral autonomic correlates of control reinforce experiential engagement in simulatory models and underpin concepts such as somatic markers to bridge the dualistic divide. J. Comp. Neurol. 493:154–166, 2005.

Z Manjaly et al. Pathophysiology and cognitive mechanisms of fatigue in MS JNNP 2019
Affective distraction

Positive correlation between VAS-MW and the Long > Short RT contrast

Pupllometry
HRV anxiety
Induction
Network connectivity

Makovac et al Neuroimage 2019
Affective priming

1. Subliminal word presentation ‘ANGER’ or ‘RELAX’ (Hull et al., 2002)

2. Letter string > word / non-word judgement

- Reaction times
- Within-participant design

Garfinkel et al., SCAN 2015
Affective priming

Garfinkel et al., SCAN 2015
Inflammatory feelings

Typhoid vaccine v. saline injection
2 hrs
Behavioural task
POMS ratings
VAS

Harrison et al. Biol Psych 2009
Inflammation and response

Typhoid vaccination
Correlations with response time

Brydon et al. Biological Psychiatry 2008
Inflammation and response

Substantia Nigra responses to Novel versus Familiar Stimuli

Harrison et al. Neuropsychopharmacology 2015
**Fatigue as value of rest**


**Fatigue**
- Not consumption and diminution of resources
- Value of offline internal computation of values for future benefit
- (cf boredom value of changing external behavior to gather more information)
- Explore / exploit
- Delay for ‘active rest’ to produce more accurate evaluations (e.g. hippocampal replay)

Model can be applied to allostatic interoceptive control
Inflammotion and hippocampus
Replay can be rumination
Unconscious rumination and non-restful sleep (e.g. Broschott)
Interoceptive trait prediction errors

<table>
<thead>
<tr>
<th>Dimensional level</th>
<th>Nature</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive</td>
<td>Behavioural</td>
</tr>
<tr>
<td>Metacognitive</td>
<td>Correspondence between subjective self-report and objective performance accuracy</td>
</tr>
<tr>
<td>Sensibility</td>
<td>Subjective self-report</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Objective behavioural performance score</td>
</tr>
<tr>
<td>Preconscious impact on other processes</td>
<td>Behavioural, neural</td>
</tr>
<tr>
<td>Afferent signal</td>
<td>Neural</td>
</tr>
</tbody>
</table>
Further work

- Fatigue
- Dysautonomia
- Joint hypermobility
- Fibromyalgia
- Inflammation
- Anxiety
- Neurodevelopmental disorders
- Dissociative symptoms
- FND
- MS
- Long COVID

Garfinkel, Eccles, Harrison, Quadt, Amato and many others