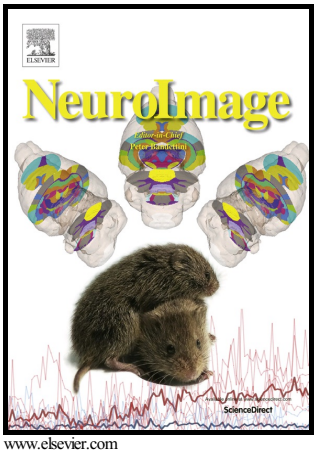

Expectation violation and attention to pain jointly modulate neural gain in somatosensory cortex

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Expectation violation and attention to pain jointly modulate neural gain in somatosensory cortex

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ABSTRACT

The neural processing and experience of pain are influenced by both expectations and attention. For example, the amplitude of event-related pain responses is enhanced by both novel and unexpected pain, and by moving the focus of attention towards a painful stimulus. Under predictive coding, this congruence can be explained by appeal to a precision-weighting mechanism, which mediates bottom-up and top-down attentional processes by modulating the influence of feedforward and feedback signals throughout the cortical hierarchy. The influence of expectation and attention on pain processing can thus be mapped onto changes in effective connectivity between or within specific neuronal populations, using a canonical microcircuit (CMC) model of hierarchical processing. We thus implemented a CMC within dynamic causal modelling (DCM) for magnetoencephalography in human subjects, to investigate how expectation violation and attention to pain modulate intrinsic (within-source) and extrinsic (between-source) connectivity in the somatosensory hierarchy. This enabled us