Title: Tracking perceptual integration and differentiation using EEG information-theory metrics during a no-report paradigm.

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Abstract: 1.15

According to Integrated Information Theory (IIT), integration and differentiation form the key properties of phenomenal consciousness. Moreover, IIT postulates that these properties should also apply to the physical substrate of consciousness. In other words, neural information integration (NII) and neural information differentiation (NID) are hypothesised to jointly give rise to conscious experiences. Recently, it was shown that NII and NID go hand in hand with phenomenological integration and differentiation in the auditory domain, respectively. Problematically, this study, and the scientific study of consciousness in general, requires subjects to report about their experiences. Therefore, neural activity related to decision-making or reporting might be obfuscating the findings. Studying pure phenomenal consciousness thus requires no-report paradigms, in which conscious experience is inferred from objective measures. Here we investigate the neural underpinnings of phenomenal consciousness by measuring neural integration and differentiation in a combined report/no-report EEG paradigm. In alternating blocks, participants do and do not report their perception of a bistable stimulus. The bistable stimulus switches between an integrated and a differentiated percept, which allows us to test the hypotheses of IIT. Crucially, we expect that we can track perceptual switches in the absence of report by exploiting the occurrence of optokinetic nystagmus (small eye-movements).

Our preliminary results appear to indicate that NII goes along with phenomenological integration in the visual domain. Taken together with previous work, it appears that the coupling between phenomenology and neurophysiology is a general phenomenon that is not bound to any specific modality. Moreover, our preliminary results indicate that our experimental design is suited for future use as a no-report paradigm. With that, we aim to eliminate report-related confounds and investigate pure phenomenal consciousness in the near future.