

34 Ongoing alpha oscillations, visual perception and neural mechanisms: a formal model

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A growing body of evidence has shown that prestimulus M/EEG power and phase in the alpha band account for a significant portion of trial-to-trial variability in visual perception. However, up to now the neural mechanisms related to ongoing alpha activity are not fully understood; moreover, only few studies have investigated the effects of prestimulus oscillations by evaluating the full psychometric function, which provides valuable information on the functional mechanisms involved. In the present work we describe a formal model with the aim of exploring possible neural mechanisms associated with the effects of ongoing alpha activity on visual perception, by linking the response probability of sensory neurons with the psychometric function at the behavioural level. We identified three possible mechanisms through which alpha activity may regulate sensory processing: it may alter (1) the amplitude of subthreshold oscillations, (2) the degree of synchronization, and (3) the input to sensory neurons. According to the model, each mechanism has a specific effect on the response probability function, by affecting (1) the slope, (2) the upper asymptote and (3) the threshold. Therefore, we hypothesized that selective modifications of the psychometric function could provide suggestions on the associated neural mechanisms, which cannot be distinguished non-invasively.