FREE
Vision Sciences Society Annual Meeting Abstract | September 2015

The influence of pre-stimulus brain oscillations on the visual sense of number: an MEG study

Rakesh Sengupta; Philipp Rhinou; David Melcher; Raju Bapi Surampudi

+ Author Affiliations

Journal of Vision September 2015, Vol.15, 906. doi:10.1167/15.12.906

Abstract

The visual system is able to rapidly and accurately enumerate a small number of items (subitizing) or, instead, to estimate less precisely a large number of items (estimation). Recent computational, behavioral (Sengupta et al, 2014) and fMRI (Roggeman et al.2010; Knops et al, 2014) studies are consistent with the idea that a single enumeration mechanism may be able to account for both small and large number perception under different levels of inhibition between nodes. In other words, the visual sense of number can be explained through the dynamics of a single recurrent on-center, off-surround network in which the network produces different regimes of numerosities by modulating the inhibition between nodes of the network. Accurate and precise subitizing would require high levels of inhibition between nodes, while low inhibition would account for performance in the estimation range. In the present study we used MEG recording to study the switches in enumeration ranges across series of small (1-4 items) or large (20-30 items) numerosity trials of different lengths. We found modulation of the pre-stimulus alpha (α) and beta (β) frequency bands as a function of whether the previous trials had involved subitizing or estimation. These results, combined with behavioral results showing a specific pattern of

switch costs between small and large numerosity trials, are consistent with a change in the pre-stimulus state that prepares the visual system to most effectively enumerate items as either individuals or as an ensemble.

Meeting abstract presented at VSS 2015