Neuromagnetic correlates of object visibility

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Many studies have shown that visual stimuli can influence subsequent behavior without reaching awareness (Dehaene et al., 1998). This raises the question to which extent the neural processing of a visual stimulus is actually affected when its visibility is changed by presenting a subsequent mask.
This study investigates the neurophysiological signature of stimulus visibility using a whole-head MEG system (CTF Omega System, 151 sensors). Nine healthy subjects participated in the experiment where stimulus visibility was varied using metacontrast masking, a special form of visual backward masking in which target and mask are temporally and spatially separated. A diamond or square shaped target stimulus was followed by a mask stimulus at different stimulus onset asynchronies (SOA) ranging from 0 to 133 ms. The mask stimulus was either a ring shape that produced no masking (control) or an open star shaped figure which produced an u-shaped masking function (masking condition) in a forced-choice target identification task. Components attributed to early visual processes (C1, visible at occipital sensors; C2, visible at parietal and midline sensors) were unaffected by stimulus visibility. However a later component, 200-250 ms after target onset, correlated well with the masking function. These results indicate that early perceptual processes as feature extraction are unaffected by the mask, but that processes at a later stage in the course of object identification are interrupted by masking.

Dehaene, S. et al. (1998) Nature 395: 597-600

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