NEUROABSTRACTS

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EFFECT OF CONTRAST ON PERCEPTUAL AND DECISION-MAKING PROCESSES IN THE DORSAL STREAM

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Evidence supports the integration of both dorsal and ventral stream information into motion computation processes. This gives rise to intermediate object representations in the dorsal stream which in turn facilitate object selection and decision-making mechanisms. Previous work, using superimposed moving surfaces, has found that colour (a ventral stream feature) is integrated into dorsal stream object representations only after direction computations in MT (middle temporal visual area) and allows for object selection which speeds decision-making in the dorsal stream (Perry and Fallah, 2012). However, speed (a dorsal stream feature) is integrated prior to direction computations in MT, improving direction discriminations, and also reducing processing time (Perry et al., 2014). Here we investigate at what stage of processing contrast is integrated into dorsal stream object representations and used to facilitate perceptual and decision-making processes. Using contrast levels to which both the ventral and dorsal stream are sensitive, we determined the relative influence that varying the contrast of a second surface has on participants' abilities to correctly determine surface direction (perceptual task) and/or the time it takes to process and decide on the directions of both surfaces. In general, as the contrast of the second surface is reduced, speed of processing increases. However, contrast levels, to which the dorsal stream is sensitive, reduces processing time but does not improve direction discrimination. This suggests that in spite of the early contribution of contrast to visual processing, integration into dorsal stream object representations occurs after direction computation in MT.

THE EFFECT OF PREDICTABILITY OF AUDITORY DEVIANTS ON HIGH BETA BAND POWER

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Sensory prediction includes predictive timing, a prediction of when an event will occur, and predictive coding, a prediction of its content (e.g. pitch). Neural oscillatory activity in the beta band (15-30 Hz) is associated with sensory predictions. Previous studies have shown that beta band power in the auditory cortex entrains to auditory rhythms, reflecting predictive timing. In previous studies using an isochronous auditory oddball task, low-beta (15-20 Hz) power increased following occasional deviant pitches but not standard pitches, reflecting a predictive coding violation. However, the increase in beta power observed following deviant pitches in the auditory oddball task could reflect the fact that deviant tones occur rarely in the sequence, or the fact that they occur unpredictably. In order to determine whether the beta band reflects truly predictive aspects of stimulus perception, we employed an isochronous auditory oddball sequence containing deviant tones that were either predictable (occurring periodically) or unpredictable (occurring pseudorandomly), and measured beta power modulation prior to deviant tone onset. Increased high beta induced power (20-30Hz) was observed 100 ms prior to deviant tones in the predictable sequence only, suggesting that high beta power reflects predictive coding mechanisms.