Symposium

Monday, November 19, 2018
Time: 15:00 - 18:00 hrs
Location: M.0074, Grote Kruisstraat 2/1, Groningen

Studying the neural and cognitive mechanisms of the processing of information as modulated by reward and attention

dr. Marty Woldorff
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dr. Heleen Slagter
University of Amsterdam

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BCN Lecture:
The Dynamic Interplay between Reward and Attention in the Human Brain
dr. Marty Woldorff

The symposium is followed by the dissertation defense of Berry van den Berg:
The Neural and Cognitive Mechanisms Underlying Adaptation
Tuesday 20 November 2018 at 11:00 hours
Academiegebouw, Broerstraat 5, Groningen

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No evidence that predictions and attention modulate the first feedforward sweep of cortical information processing

Heleen Slagter, University of Amsterdam
Predictive coding models propose that predictions (stimulus likelihood) reduce sensory signals as early as primary visual cortex (V1), and that attention (stimulus relevance) can modulate these effects. Indeed, both prediction and attention have been shown to modulate V1 activity, albeit with fMRI, which has low temporal resolution. This leaves it unclear whether these effects reflect a modulation of the first feedforward sweep of visual information processing and/or later, feedback-related activity. In two experiments, we used EEG and orthogonally manipulated spatial predictions and attention to address this issue. Although clear top-down biases were found, as reflected in pre-stimulus alpha-band activity, we found no evidence for top-down effects on the earliest visual cortical processing stage (<80ms post-stimulus), as indexed by the amplitude of the C1 ERP component and multivariate pattern analyses. These findings indicate that initial visual afferent activity may be impenetrable to top-down influences by spatial prediction and attention.

Caffeine boosts preparatory attention for reward-related information

Berry van den berg, University of Groningen
Both the intake of caffeine-containing substances and the prospect of rewards have been associated with improved behavioral performance. These improvements might be related to an effect on attentional preparatory mechanisms, potentially through the influence of both caffeine and the prospect of rewards on the dopaminergic system. To examine the common influence of caffeine and reward-prospect on preparatory attention, we tested twenty-four participants during a 2-session experiment in which they performed a cued-reward Stroop task in which a cue informed the participants about potential performance based on predicted rewards. During each session, participants received either coffee with caffeine (3 mg/kg bodyweight) or with placebo (3 mg/kg bodyweight lactose). In addition to behavioral measures, electroencephalography (EEG) was recorded. Results showed that both the intake of caffeine, as well as the prospect of reward improved speed and accuracy. The effects of caffeine and reward-prospect were additive on the performance level. Neurally, the prospect of reward and caffeine resulted in an enlarged contingent negative variation (CNV), and reductions in oscillatory Alpha power (8 to 14Hz) which have been related to enhanced preparatory attention. Interestingly, the reward-related CNV enhancement was more pronounced in the caffeine condition as compared with the placebo condition. These results revealed that caffeine intake boosts preparatory attention for task-relevant information that can lead to rewards.