

Look left but attend right: an ERP investigation of the effects of covert attention and saccadic eye movement on visual processing



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Introduction

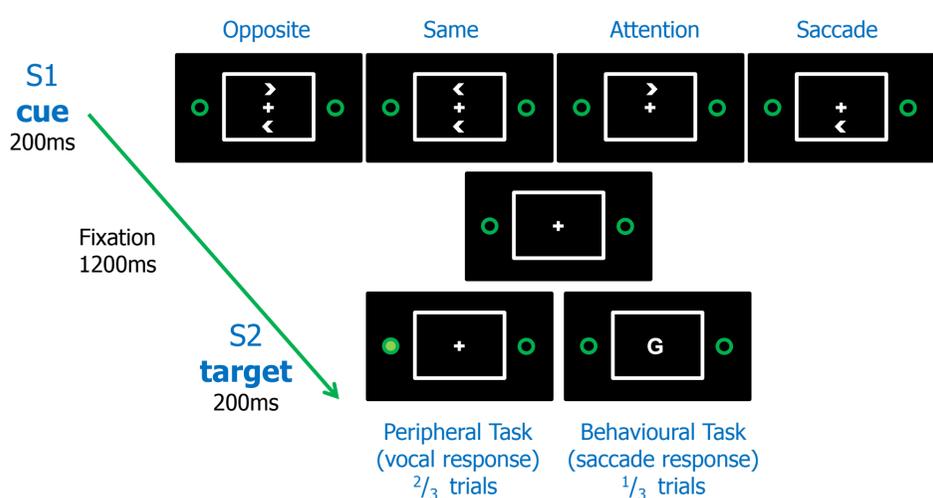
Close coupling between **saccade preparation** and shifts of **visual attention** are frequently demonstrated by more efficient processing of visual stimuli presented close to the target of an intended saccade than at other locations.

Recent evidence has individuated an 'independent' attentional component that can be directed away from the saccadic target (Montagnini & Castet, 2007).

We tested the independence of this attentional component with event related potentials by manipulating covert attention and saccadic movement

Hypotheses: Visual processing will be facilitated when cued **covert attention** and **saccadic movement** are **congruent** to target location. Facilitation effects will be attenuated/absent when cue and targets are **incongruent**.

Modified Go/No-Go Task



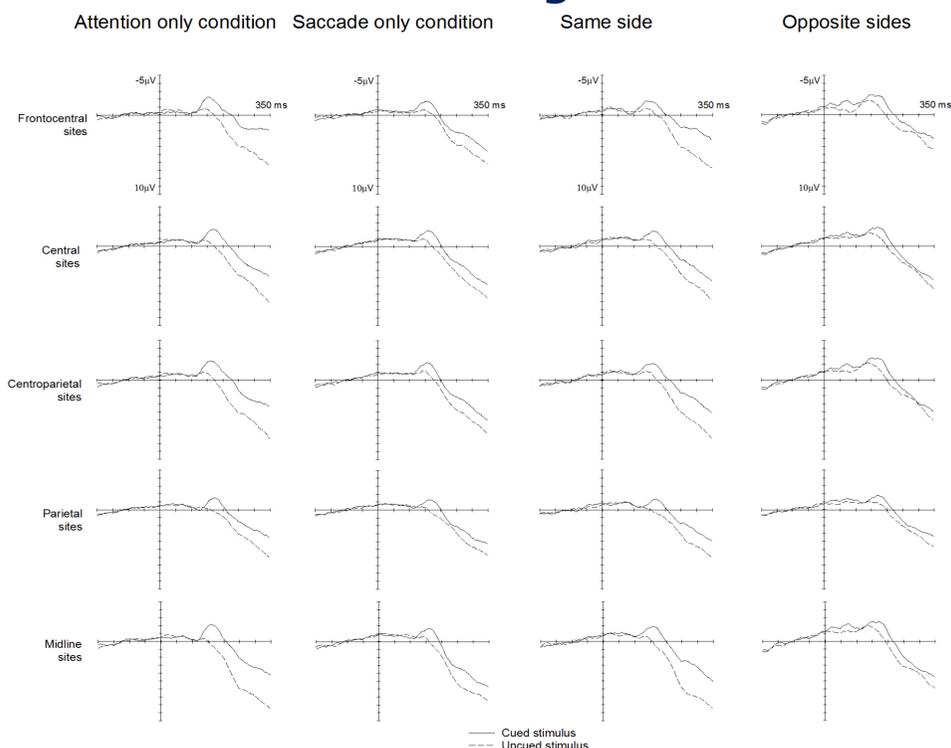
S1 defined 4 Conditions: Opposite, Same, Attention, Saccade

- Simultaneous and independent cuing of **covert attention** (top cue) and **saccadic eye movement** (bottom cue)

S2 defined 2 Tasks: Peripheral, Behavioural

- Peripheral task necessitated vocal response when a single LED flash (**target**) was **congruent** with **cued covert attention** (responses to double LED flashes (non-targets) and incongruent cues were inhibited)
- Behavioural task required the **execution** of a saccade eye movement in **cued** direction when 'G' replaced fixation cross

ERP's to non-target stimuli



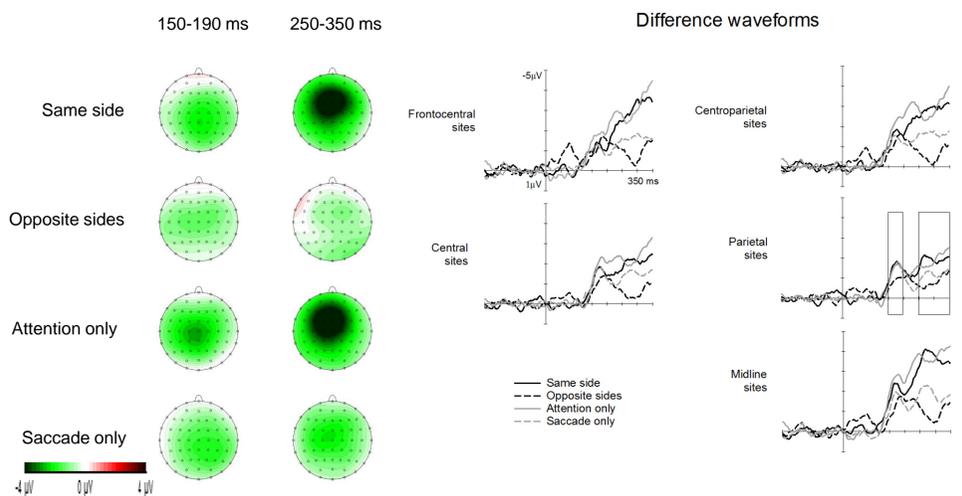
EEG Recording & Analysis

Sample: $N = 14$ (9 male; $M = 22.92$ years, 13 right-handed)

Behavioural Analysis: Repeated measures ANOVAs of reaction time and accuracy for perceptual and behavioural task

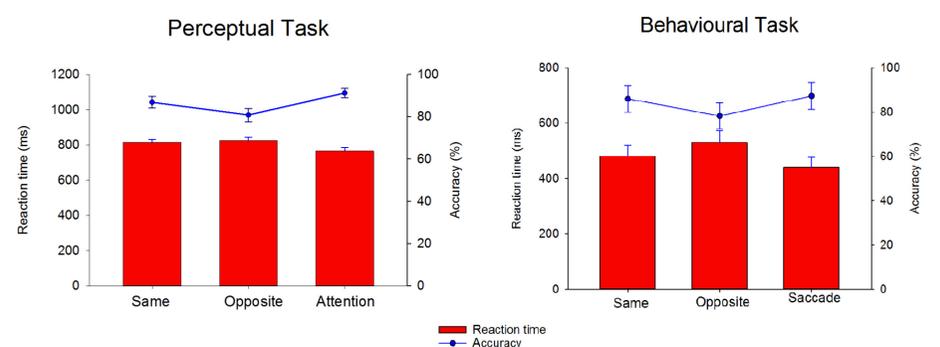
EEG Analysis: Repeated measures ANOVAs at midline and lateral electrodes for **non-target visual stimuli** including factors **condition** (same/opposite/attention/saccade) and **cued side** (left/right)

ERP Results



Enhancement of **N1** ERP (150-190ms post stimulus) for **cued** non-target stimuli in comparison to uncued non-targets across all conditions
Reduction in **attentional effects** 250ms post stimulus in **opposite** sides condition in comparison to same, attention and saccade conditions.

Behavioural Results



Conclusions

- Data suggest that independent decoupling of attentional and saccade processes in the opposite sides condition is **not possible**.
- Alternatively, visuo-spatial attention appears **serially allocated**, first to the attention task target, then subsequently re-directed towards the saccade task target closer to movement onset.