Introduction

Several studies have shown that distractions impede goal-relevant processing and behavior. Recent studies suggest that the impact that distracting stimuli have on performance is mediated by the speed in which one recovers from distraction; i.e., the disengagement from distraction.

We studied the neural basis of this phenomenon using high-density EEG recordings simultaneous with a task in which peripheral visual distractors precede presentation of a target array.

Methods

Data Collection

- Thirteen younger adults (18-30 years, mean= 23.8, SD 3.96) were recruited from an online advertisement.
- Pre-screen testing for color-blindness was conducted prior to the main experimental session

Task Paradigm

- Adaptive Thresholding Task. Participants were cued by a left or right-facing arrow, followed by a target Landolt “C” presented in red among an array of three other distractor “C”s drawn in different colors on both the left and right sides of the screen.
  - They were instructed to identify the orientation of the red target “C” on the cued side of the screen.
  - The duration of the target display was adjusted up or down for each participant until they achieved a performance average of 75% accuracy.
- Capture task. Once thresholded, participants performed an onset capture variation of the aforementioned visual search task.
  - On a third of the trials, a colored “flanker” square was presented either 150, 250, or 350ms prior to target onset.
  - Flankers were either colored red (relevant) or blue (irrelevant).

Methods: EEG

- EEG data was corrected for mastoid and eye-blink artifacts.
- Trials in which subjects’ gaze deviated from the central fixation point were thrown out.
- Left cued trials were averaged with electrode-swapped right-cued trials in order to average out the effects of stimulus presentation, as well as to better compare event-related potentials from left and right-cued trials.
- In the resulting visuals, all electrodes left-of-center are ipsilateral to target presentation, and all electrodes right-of-center are contralateral to target presentation.
- Trials in which there was an irrelevant distractor were subtracted from trials in which there was a relevant distractor prior to target onset (shown on the right).
- The average difference between relevant-flanker trials and irrelevant-flanker trials from -50ms to target onset across occipital electrodes is shown to be significant (p < .05) for both 150ms and 250ms SOA.

Results: Behavior

- None
- Irrelevant
- Relevant

SOA

Results: EEG

- 150ms Relevant - Irrelevant “Flanker” Trials
- 250ms Relevant - Irrelevant “Flanker” Trials
- 350ms Relevant - Irrelevant “Flanker” Trials

Conclusion

- We find that relevant “flankers” presented at 150ms and 250ms prior to target onset significantly engage visual processing immediately before and during target presentation.
- The significant difference between relevant and irrelevant “flanker” trials presented 150ms and 250ms, but not 350ms prior to target onset mirror the behavioral results. This lends additional support to the hypothesis that subjects are still processing the “flanker” when the target appears, and that this is what leads to the behavioral deficit.