Behavioral and neural characterization of distraction across the adult lifespan

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Introduction

Our recent work demonstrated that performance during one type of interference, interruption (e.g. multitasking) declines with advancing age (Anguera et al., 2013).

Using the same paradigm (NeuroRacer), we evaluated another type of interference, distractibility, during the settings of distraction & no distraction (see below).

We characterized distraction-related abilities across the adult lifespan by having 174 adults (~30 participants in each decade of life) perform each condition below. In a 2nd experiment, 20 young (24.1 ± 2.9), 19 middle-aged (40.0 ± 4.2), and 20 older adults (70.5 ± 5.9) completed the same NeuroRacer paradigm while recording EEG to assess the neural correlates of distraction in different age groups.

Methods

NeuroRacer Experimental Conditions

Prior to each experiment, participants were thresholded to an ~80% performance level for both visuomotor tracking and target discrimination without interference using a dynamic staircase algorithm.

For Experiment #2, each experimental run (3 x 180s) contained 24 relevant targets (green circles) and 48 lures (green, blue and red non-circle shapes). Each trial was timelocked to sign onset, and divided into -1000 to +1000msec epochs, with posterior alpha band activity analysed by resolving 4–100 Hz activity using a complex Morlet wavelet in EEGLAB and baseline corrected (-900 to -700).

Results

Distraction Costs Across The Lifespan

Unsurprisingly, increased age was associated with increased distraction. This result agrees with our previous findings involving another type of interference, interruption (e.g. multitasking; Anguera et al., 2013).

This age-related decline was driven by hit rate during the distraction condition (SWR) as opposed to performance during the baseline condition (SO) or one’s false positive rate, which agrees with previous work (Jost et al., 2011; Wais et al., 2012).

These findings suggest that while middle-aged and older adults still show similar extents of alpha desynchronization as younger adults, they do not effectively modulate this activity for different target types in a distracting environment.

Future analyses include the interrogation of ERPs to assess these effects at an earlier time point than the observed alpha desynchronization effects, and fronto-posterior coherence analyses to assess network changes associated with distraction.

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References

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