Age-Related Changes in Task Switching: An ERP Analysis

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INTRODUCTION

Task switching paradigms assess the ability to rapidly switch between tasks and are sensitive to impairments in fronto-parietal cortex function. Consistent with processes involved in cognitive control relying on prefrontal cortex, studies generally suggest that, although a network of brain regions is recruited, areas of the prefrontal cortex are engaged in keeping the task set available for the next task. Using fMRI, DiGirolamo et al. (2001) reported that medial and dorsolateral frontal cortices, theorized to subserve executive processes, showed large areas of activation in both young and old adults during switch trials. By contrast, the old recruited them during switch as well as no-switch trials, the latter trials presumably not involving heavy executive demands.

Here, we sought to characterize age-related differences in the ERP correlates of task switching. Although a few ERP investigations of young adults have been published (e.g., Rushworth et al., 2002), none have examined older adults. A number of ERP investigations of young adults have employed sEEG recording (e.g., Rushworth et al., 2002), but none have used scalp recording to study the ERP correlates of task switching in older adults, and none have examined the influence of age on the ERP correlates of task switching.

METHODS

Participants

Twenty-four native English speakers participated (18-27 years; 7 men). All participants had normal or corrected-to-normal vision and were right-handed.


RESULTS

Behavioral Data

Figure 1 depicts the grand averaged reaction time data for the switch trial and the no-switch trial following the switch. The grand mean RT for the switch trial was slower than for the no-switch trial (F(1, 23) = 15.71, P < 0.001). The old showed greater switch cost and residual switch cost. However, there were no significant age x trial type interactions.

ERP Data

Figure 2 depicts the grand averaged ERP waveforms corresponding to the 1 Before and the 1 After the switch trials. The P3 elicited on the switch trial was larger than for the no-switch trial (F(1, 23) = 40.50, P < 0.001). The young and the elderly differed most markedly in the P3 associated with the switch trial. For the young, the P3 elicited on the switch trial was larger than for the no-switch trial (F(1, 23) = 5.19, P < 0.05). The old showed a frontally-oriented distribution, whereas, for the elderly, the positivity was more posterior.

DISCUSSION

Although a few ERP studies have been published (e.g., Rushworth et al., 2002), none have examined older adults. A number of ERP investigations of young adults have employed sEEG recording (e.g., Rushworth et al., 2002), but none have used scalp recording to study the ERP correlates of task switching in older adults, and none have examined the influence of age on the ERP correlates of task switching.

REFERENCES
