

Saturday

Left prefrontal regions mediate the influence of executive functioning on sentence processing in primary progressive aphasia

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Previous neuropsychological studies have shown that executive functioning (EF) contributes to performance on language tasks that pose high cognitive demand. Furthermore, functional neuroimaging studies have provided neurobiological evidence that language tasks involve an interaction between language-related and domain-general executive control regions. Finally, it has been suggested that enhanced activity (or increased connectivity) in executive control networks may support language recovery in stroke patients. Here, we sought to investigate cross-sectionally and longitudinally the relationship between EF and language, and the neural substrates of that relationship (if any), in a large cohort of 197 patients with primary progressive aphasia (PPA). First, we found a significant, positive relationship between EF and performance on two of the most demanding language tasks: sentence comprehension (SentComp) and sentence production (SentProd). Second, we identified two clusters located within the left middle frontal gyrus and left superior frontal gyrus that mediate this relationship. Third, resting-state fMRI data of healthy controls (n=132) showed that these two regions are part of the fronto-parietal executive-control network. Finally, the SentComp and SentProd scores of the patients with better EF compared to those with worse EF were significantly better across the two time points and declined significantly less over time, even after controlling for potential confounds such as severity and education. Therefore, we conclude that EF supports sentence processing in PPA, primarily through two left prefrontal regions that are part of the fronto-parietal executive-control network. Our findings also indicate that EF might play a “compensatory” role as language abilities decline in PPA.

Conflicts of interest

N/A