A Gratton Effect on the Syntactic P600: evidence that syntactic processing is subject to a dynamic adjustment of executive control

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It has been proposed that aspects of syntactic processing draw upon general executive processes which detect and resolve conflict between competing representations. A major feature of general conflict detection and resolution operations is their dynamic nature: increased conflict leads to the recruitment of additional cognitive resources, facilitating the resolution of subsequent conflicts. The present study aimed to determine whether the P600 – an event-related potential (ERP) associated with syntactic processing and conflict detection and resolution processes – is similarly subject to such a dynamic adjustment of control. In experimental paradigms of non-linguistic executive function, the dynamic adjustment of control manifests as the Gratton effect: a reduced cost in processing conflict trials preceded by other conflict trials, relative to those preceded by non-conflict trials. To determine whether a Gratton effect occurs in syntactic processing, we re-analyzed data from four ERP experiments in which syntactic violations in English sentences evoked robust P600 effects. We found clear effects of trial history on the P600 within and across experiments. When preceded by other syntactic violations, the amplitude of the P600 to syntactic violations was smaller than when preceded by non-violated sentences. In contrast, there was no effect of trial history on the N400 evoked by real-world violations in the same experiments. These findings suggest that aspects of syntactic processing are subject to similar dynamic control operations as classic tasks of executive function.
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