
Suppressing invalid response activation: RT distribution and electrophysiological arguments for common processes in Inhibition of Return and Simon tasks

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Abstract

Control of responses activation is essential to prevent erroneous actions and provide appropriated ones. RT distribution and EMG analyses in conflict tasks have led to the development of the activation-suppression model: an early "automatic" response activation is followed by the inhibition of this activation. This pattern of activation followed by suppression is also a landmark of the Inhibition of Return (IOR) paradigm. However, so far, no link between the activation-suppression model and IOR has been made. In a first experiment, we used the same tools to investigate IOR. For short cue-stimulus intervals (where compatible cueing leads to faster response), precursors of the IOR were already present, as revealed by distribution analyses. EMG analyses confirmed this pattern, suggesting a common activation/inhibition between conflict task and IOR. The goal of the second experiment was to test more specifically the suppression hypothesis. Here, we combined a Simon task with a Change task, and asked subjects to switch response during reaction time (thus, congruent trials become incongruent, and incongruent trials become congruent). The activation-suppression model predicts that, early in the processing, changing from incongruent to congruent response will be easier than from congruent to incongruent response, while later in the processing, such facilitation should disappear. Our results confirm this prediction and indicate a suppression of the location-based response as time passes after stimulus onset. Those two results provide direct support for activation-followed-by-inhibition hypothesis, and allow to generalize results across tasks.

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