Response inhibition as a function of movement complexity and movement type selection

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This study aims to determine whether response inhibition shows the same degree of effectiveness for two sources of motor complexity: (1) Movement complexity, which is measured through two actions with different motor requirements (simple lifting action vs. complex reaching action), and (2) Movement type selection, which is measured in movements performed separately (no active-movement type selection) vs. selectively (active-movement type selection). Activation-suppression model was tested in three experiments to measure activation of the preponderant responses and subsequent suppression in a Simon task. More errors and higher magnitude of congruence effect (which reflects greater effectiveness of response suppression) were expected for more difficult motor conditions. Reaction time, movement time, kinematic errors, and movement errors were recorded. Results of Experiment 1, in which movement type selection was not active, showed that both movements did not differ in their activation and suppression, as they presented similar kinematic error rates and Simon effects. Experiment 2, in which movement type selection was active, resulted in a higher kinematic error rate and higher magnitude of Simon effect in lifting. These results were confirmed in Experiment 3, in which participants performed all experimental motor complexity conditions. Finally, Experiment 4 showed that responses with similar movement complexity did not differ in their activation and suppression, even when movement type selection was active. Thus, the present study provides evidence on the varying effectiveness of response inhibition as a function of movement complexity, but only in demanding situations in which movement type selection is active. These results can be attributed to a top-down strategy to

minimize error for actions most prone to develop kinematic error. © 2018 Gálvez-García, Albayay,

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Delta-plots

Kinematic errors

Motor complexity

Response inhibition

Simon effect