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Searching for the best functional comparison to isolate neural processes related to response inhibition

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Abstract: Despite an extensive literature on the brain substrates of response inhibition, it still remains to be determined which is the best functional comparison to tease apart neural activity underlying this cognitive process. Here we aimed to shed light on this issue by recording event-related potentials while participants performed a modified stop-signal task that allowed us to compare the following conditions: successful versus unsuccessful response inhibitions, successful response inhibitions versus successful response executions, and easy versus difficult response inhibitions. Electrophysiological activity related to response inhibition was best isolated by comparing easy and difficult inhibitions. This activity was observed at fronto-central scalp electrodes between 260 and 300 milliseconds after stop-stimulus presentation. Notably, the stop-signal reaction time (an estimate of the time required to inhibit the motor response) fell within this window interval.