What make us aware of our (partial) errors? EMG and EEG experiments

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Abstract

In conflicting situations, incorrect responses tend to be activated. Subjects consciously and reliably detect suprathreshold activations leading to error commission ($> 90\%$). However, electromyographic recording in such tasks reveal that most of the incorrect activations remain subtreshold. In such trials, called partial errors, the subliminal activations have been interrupted and corrected, revealing the involvement of cognitive control processes. The question as to whether those subliminal incorrect activations are consciously perceived remains an important open issue since it has been argued that cognitive control processes require conscious experience.
Awareness of incorrect response activation was assessed by asking the participants, after every trial, to report how confident they were to have activated the incorrect response. Signal Detection Theory was used to characterize subject detection performance. Results indicate that subjects were only able to detect few partial errors, but reported such detection only when they were certain.
Furthermore, we used logistic regression's based methods to try to predict subject detection, and to identify the behavioral and electromyographic parameters allowing such detection.
This classification, allows to analyzed separately detected and undetected partial errors on EEG experiments, with emphasis on two different error potentials, namely error negativity and error positivity

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