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Caffeine effects on sequential processing in the equiprobable Go/NoGo task

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Abstract

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Caffeine effects on sequential processing in the equiprobable Go/NoGo task

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Research in humans has demonstrated that caffeine produces an increase in physiological arousal, as indicated by increased skin conductance level and reduced global EEG alpha level. Also, increased skin conductance level is associated with larger evoked skin conductance responses. These links have been taken to predict global increases in event-related potential (ERP) components with caffeine. However, our previous caffeine and Go/NoGo study failed to obtain the expected arousal-based global changes in peak-picked ERP components — rather, we obtained topographic ERP enhancements.

Here we used Principle Components Analysis to extract ERP components in a similar randomised double-blind placebo-controlled repeated-measures cross-over study. After abstaining from caffeine for 4 h before each of two sessions, approximately a week apart, 24 adults received 250 mg caffeine or placebo in counterbalanced order. They responded to 50 ms duration tones (60 dB SPL, 5 ms rise/fall times) at 1000 and 1500 Hz, in an equiprobable auditory Go/NoGo task with a fixed SOA of 1100 ms.

ERP components generally replicated previous non-caffeine results in this paradigm, reflecting two streams of sequential processing. Caffeine reduced reaction time, and resulted in fewer omission errors. Major ERP effects of caffeine were larger Go Processing Negativity and P3b amplitudes. There were few effects on NoGo components. These results confirm our previous caffeine–Go/NoGo findings, but may be interpreted in terms of amplification of ERP components by caffeine-induced arousal.