The Effect of Positive and Negative Associative Value on the Mismatch Negativity and P3 Responses

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Introduction

The mismatch negativity (MMN) and P3 are components of electrophysiological brain activity that are implicated in processes of distraction and attentional capture (Horváth, Winkler & Bendixon, 2008). While the MMN occurs pre-attentively, the P3 is believed to occur at the level of conscious awareness of a stimulus.

While stimuli conditioned with a value (e.g. reward) have the ability to capture attention involuntarily (Kim & Anderson, 2019), the effects of value and valence on pre-attentive neural responses are less well characterized.

It was predicted that value-conditioned, but task-irrelevant, auditory distractor stimuli would elicit larger MMN responses than neutral stimuli, and that responses to punish-conditioned tones would be greater than reward-conditioned tones. No effect of value or valence was expected for the P3.

Methodology

EEG pre-processing isolated the MMN and P3 response potentials. Results revealed a typical MMN in response to deviant tones, however, no effect of value or valence on the MMN was found (see Figure 3).

The P3 responses revealed an effect of value, but not valence (see Figure 4).

Results

It appears that value – but not valence – may influence response amplitudes implicated in the orienting of attention.

These findings suggest that associative value may not influence attentional-capture pre-attentively, but instead impact only at the level of conscious awareness or response selection.

Conclusion

References

