Electrophysiological differences in the processing of task-irrelevant vs. task-relevant emotional words

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Abstract

Cognition and emotion are intricately intertwined, because individuals process external stimuli in the context of their motivational and behavioural significance. Event-related brain potentials (ERPs) offer millisecond information and can contribute to the understanding of the modulation of cognitive processes by emotions. We recorded brain electrical activity from thirty-six middle aged healthy women when they performed two tasks in which the emotional valence of the stimuli was irrelevant (task 1) vs. relevant (task 2) for the performance. In task 1, we presented 3 blocks of words (60 negative words, 60 neutral and 60 positive), with the same emotional content in each block, and participants were asked to respond to the colour of the words (red, blue or green), with no mention to their emotional content. In task 2, the same words were presented randomly, and participants had to press a button assessing the emotional valence of the words, while ignoring their colour. Reaction times data revealed that participants were slower in responding to negative stimuli. In the first task, negative words were also associated with enhanced P300 latencies. Altogether, the results indicate a longer processing time and thus a stronger interference of irrelevant task information when processing threatening words. In the second task, we could not confirm a greater interference of negative content in any of the ERPs indices considered. Only neutral words were associated with a delayed and extended N200 component, suggesting that the categorization according to the emotional valence is more difficult for neutral than for positive and negative words.

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