

Introduction

- The ERP component most consistently modulated by emotion is a parietally-distributed late positive potential (LPP), but the cognitive process reflected by this component is not clear.¹
- Researchers have noted the similarity of the LPP to the well-studied P300 component. Both are later parietal positivities, highly sensitive to context and task-relevance.¹
- Some have suggested that the P300 and LPP are the same component, but this hypothesis has not been directly tested.^{2,3}
- We orthogonally manipulated the factors that classically influence each component, emotion (LPP) and stimulus probability (P300), via a classic oddball task with neutral and negative words as the stimulus categories.

Methods

Stimuli

- 300 neutral, low arousal and 300 negative, high arousal words
- The two conditions were matched on: length (letters), morphemes, phonemes, syllables, orthographic neighborhood, phonological neighborhood, mean bigram frequency, bigram frequency by position, log word frequency, log contextual diversity, age of acquisition, concreteness, semantic neighborhood, lexical decision RT, naming RT

Paradigm

Words presented one at a time in three blocks:

- 20% NEG, 80% NEU
- 50% NEG, 50% NEU
- 80% NEG, 20% NEU

Task

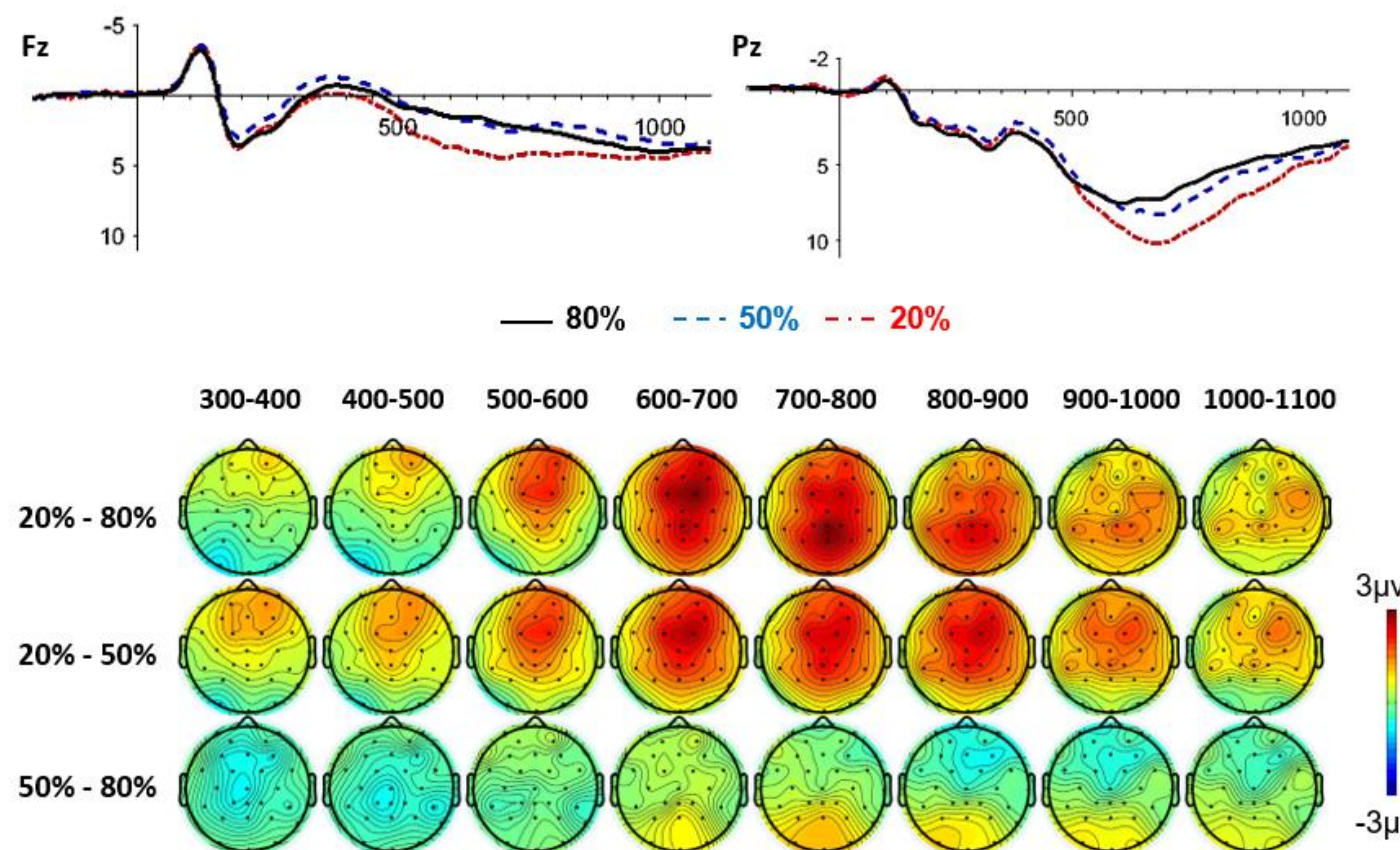
Categorize each word as neutral or negative

Results

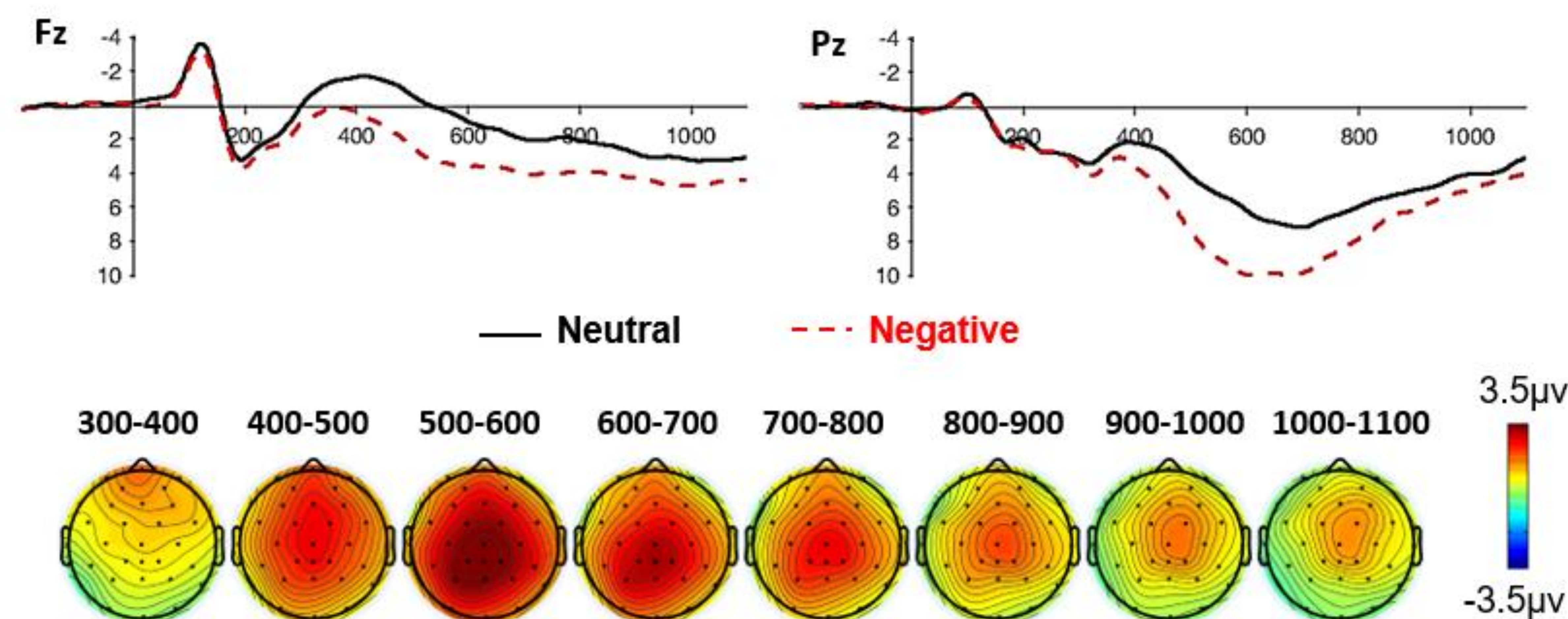
Summary

- We observed the well-established late positivities for both Probability (P300) and Emotion (LPP).
- Probability and Emotion **did not interact** ($p > 0.6$).

Main Effect of Stimulus Probability (Oddball)



Main Effect of Emotion



Discussion

- Although the effects of probability and emotion were very similar, clear evidence that emotion and probability modulate the same component was not observed: the factors had independent, rather than interacting, effects.
- It remains possible that probability and emotion independently modulate the same cognitive process, or that the P300 and LPP reflect similar underlying computational principles.
- Future research should further explore differences in the cognitive function of these components by testing specific functional theories, testing the effects of other factors (e.g., divided attention), and testing correlates of each effect (e.g., later memory for stimuli).

References

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- Fields, E. C., & Kuperberg, G. R. (2016). Dynamic effects of self-relevance and task on neural processing of emotional words in context. *Frontiers in Psychology*, 6(2003).

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