After-effort of Expenditure on Empathy:
Cognitive effort reduces empathic neural responses while physical effort does not

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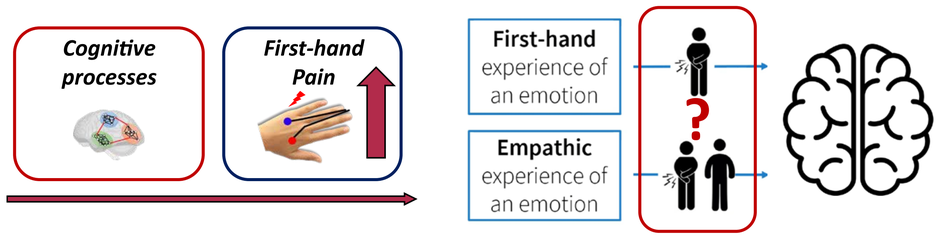
Introduction

- We aimed to address a significant research gap by examining how empathic processing of others' pain is affected by prior effort expenditure
- Traditional theories emphasize empathy as a reflexive and automatic process, while recent theories highlight it as a motivational phenomenon actively regulated by individuals



Hypotheses

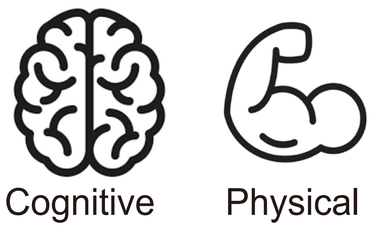
(1) Cognitive effort enhances empathic responses to others' pain due to depletion of shared resources

(2) Cognitive effort diminishes empathic responses because of the enhanced avoidance motivation

Desensitization

or

Hypersensitization



Domain general

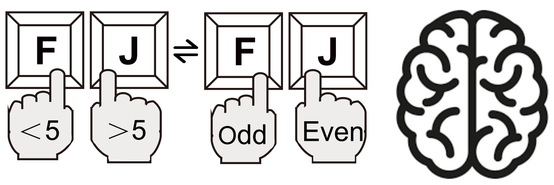
or

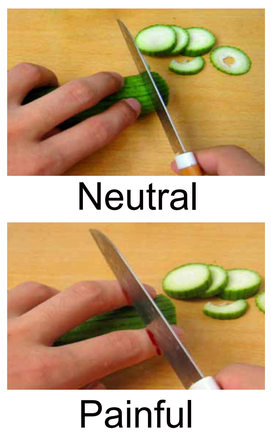
Domain specific

Design & Methods

Experiment 1

Task-Switch (Cognitive)



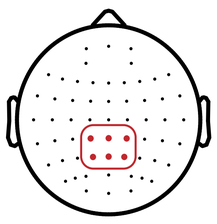


Experiment 2a & 2b

Button-Pressing (Physical)

EPSS-Limb from Meng et al., 2024

ERP

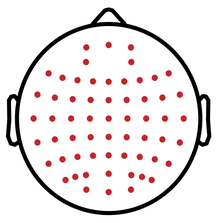


✓ **ERP waveforms**

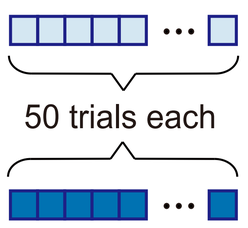
✓ **Topographic maps**

ROI : centro-parietal

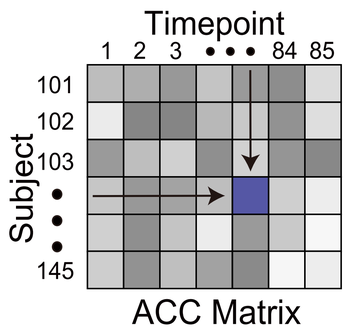
Decoding



all 60 channels



4-fold cross validation



**cluster-based permutation test with Monte Carlo simulations outlined by* Bae and Luck (2018)

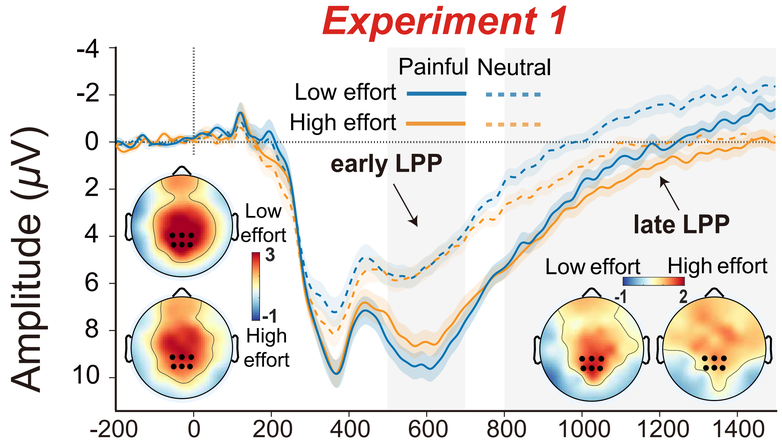
Samples

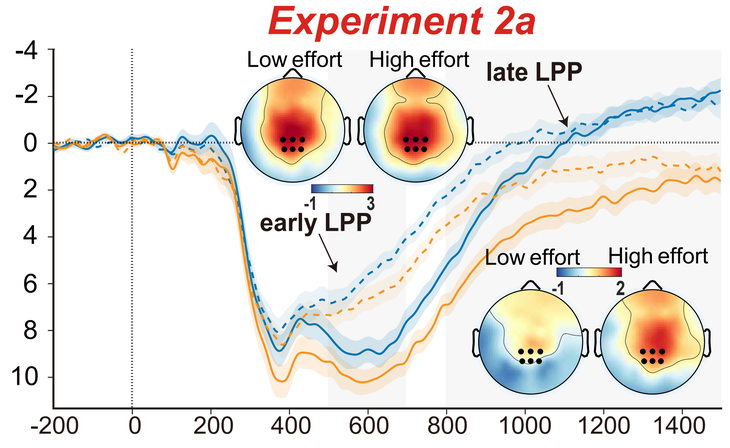
Experiment 1
- *N* = 45
- Gender: 27 female, 18 male

Experiment 2a & 2b
- *N* = 40 each
- Gender: 20 female, 20 male

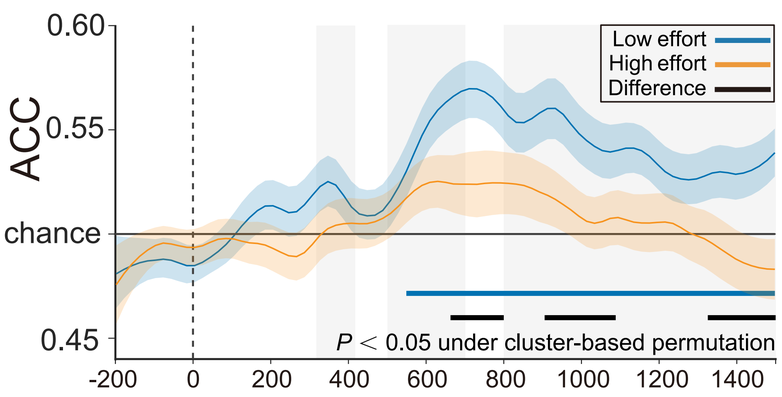
Results

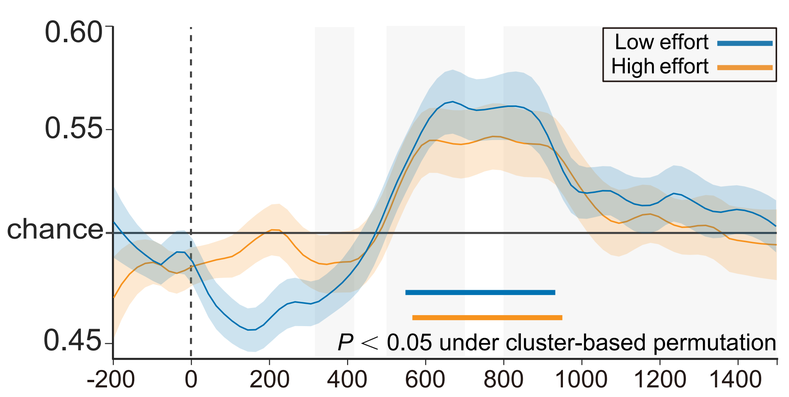
ERP





Decoding





Conclusion

(1) Cognitive effort diminishes empathic responses because of the enhanced avoidance motivation

(2) Physical effort induces a carry-over effect on ERP components but irrespective of the empathic processing

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