

# Effects of spatially-specific placebo analgesia on somatosensory responses during first-hand and empathy for pain

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## Introduction

- First-hand experience and empathy for pain rely on similar neural functions: shared representations account<sup>1</sup>
- Placebo analgesia reduces both one's own pain as well as empathy for pain<sup>2,3</sup>

## Research Gap

- Only reduction by placebo in affective, but not somatosensory brain areas<sup>2,3</sup>
- Mismatch might be due to specifics of experimental paradigm<sup>4-6</sup> using abstract cues and/or faces with painful expressions<sup>2,3</sup>

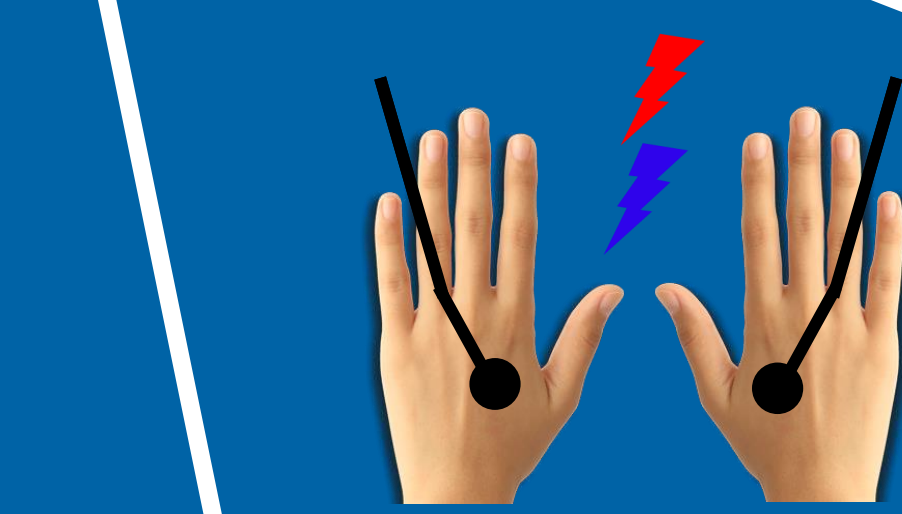
## Research Question

Does placebo analgesia modulate the sensory-discriminative component of empathy for pain?

## Methods

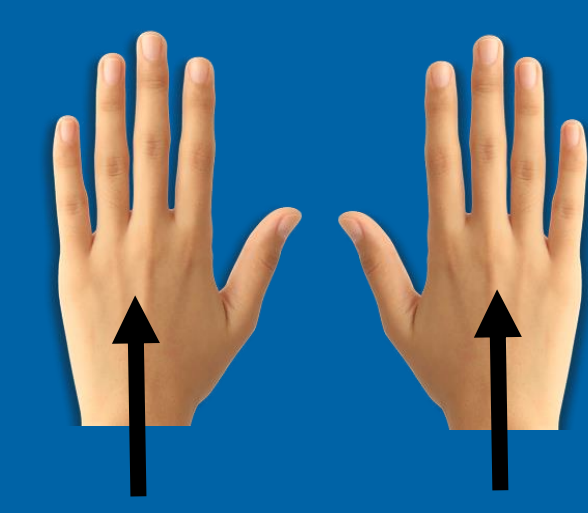
### Sample

- $N = 45$  (23 f) placebo analgesia responders (26% nonresponders)
- $M(SD)_{age} = 23.8(2.9)$ , age range = 19-31 years
- Strongly right-handed (Laterality Quotient<sup>7</sup> > 80)
- No doubts about study setup



High, medium and low pain

### Placebo analgesia induction



Control gel Placebo gel

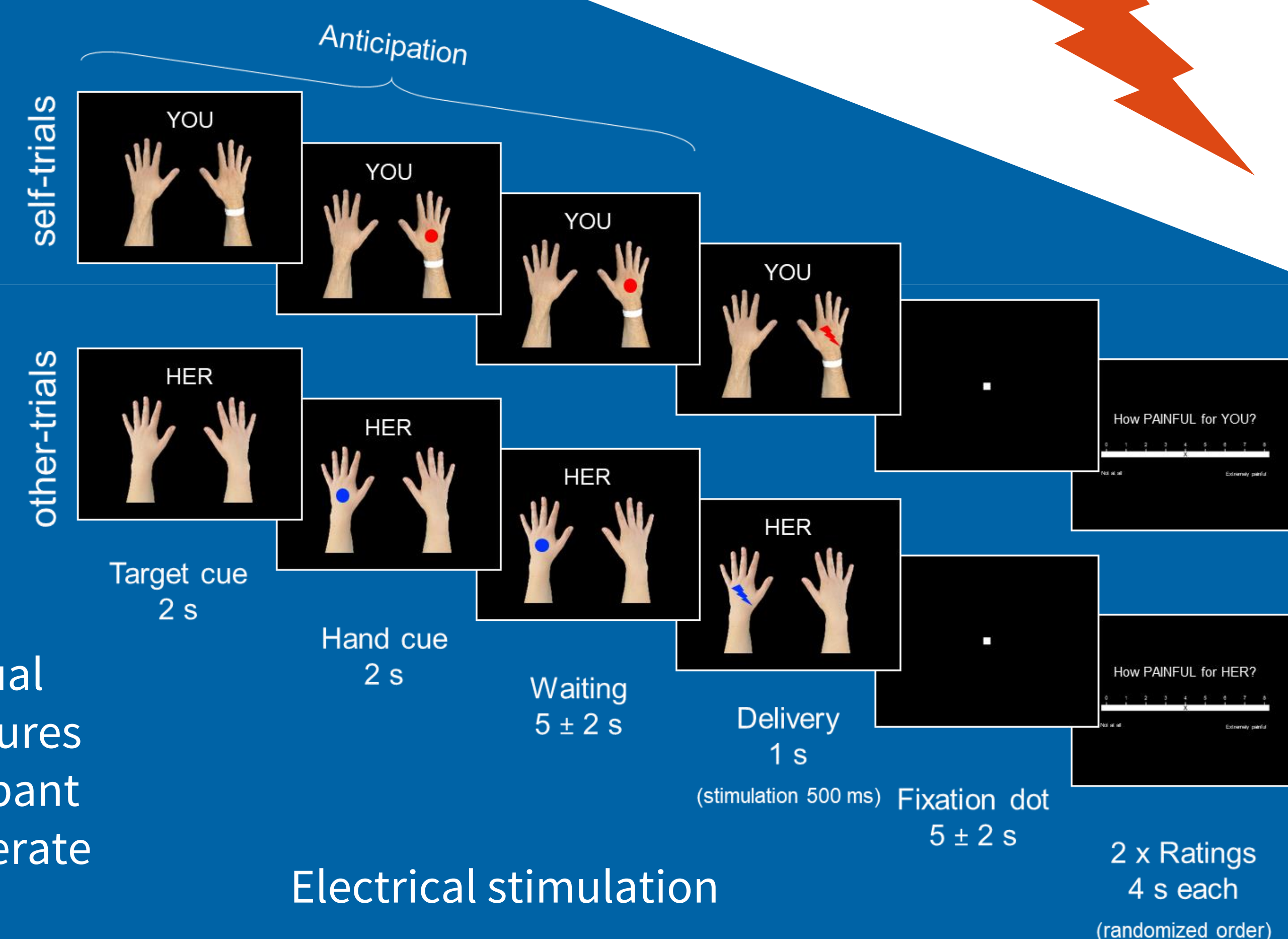
- Individual pain calibration for right & left hand
- Placebo cream application by study doctor



High pain Medium pain

- Classic conditioning procedure to amplify placebo effect

### Pain task

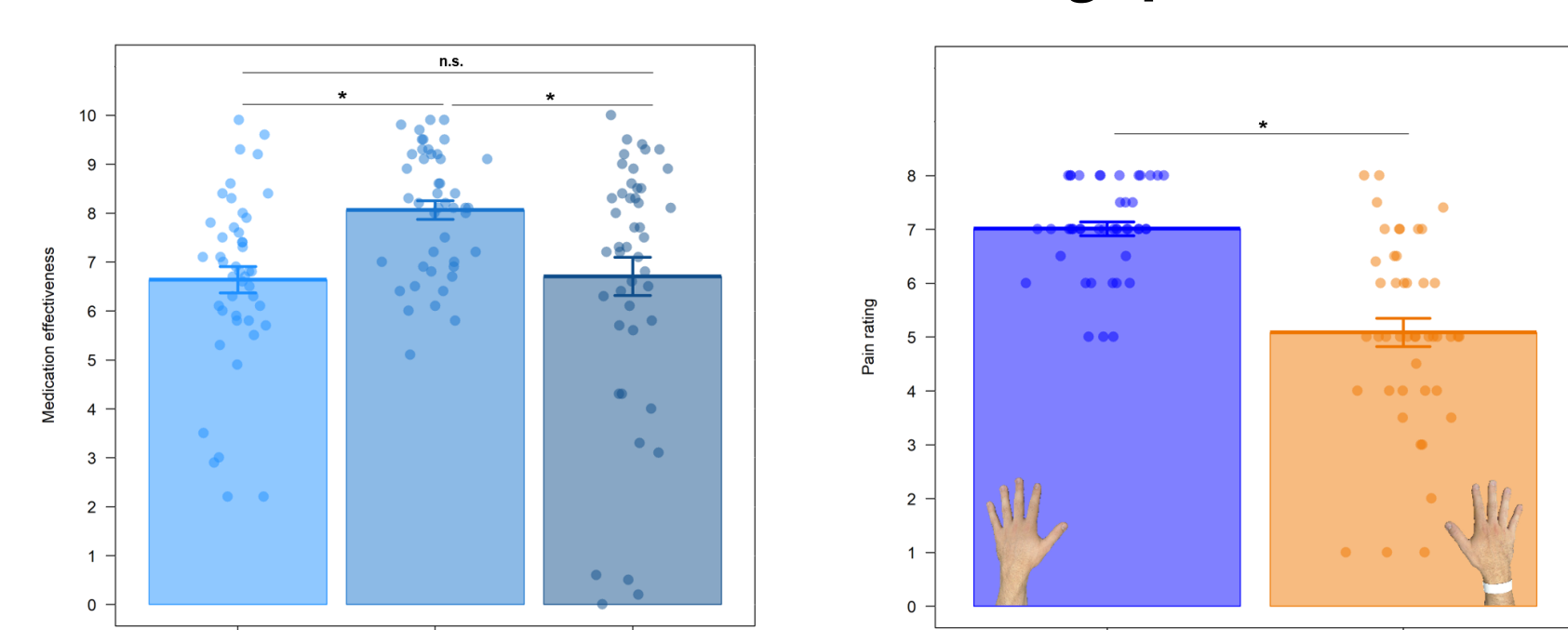


## Results

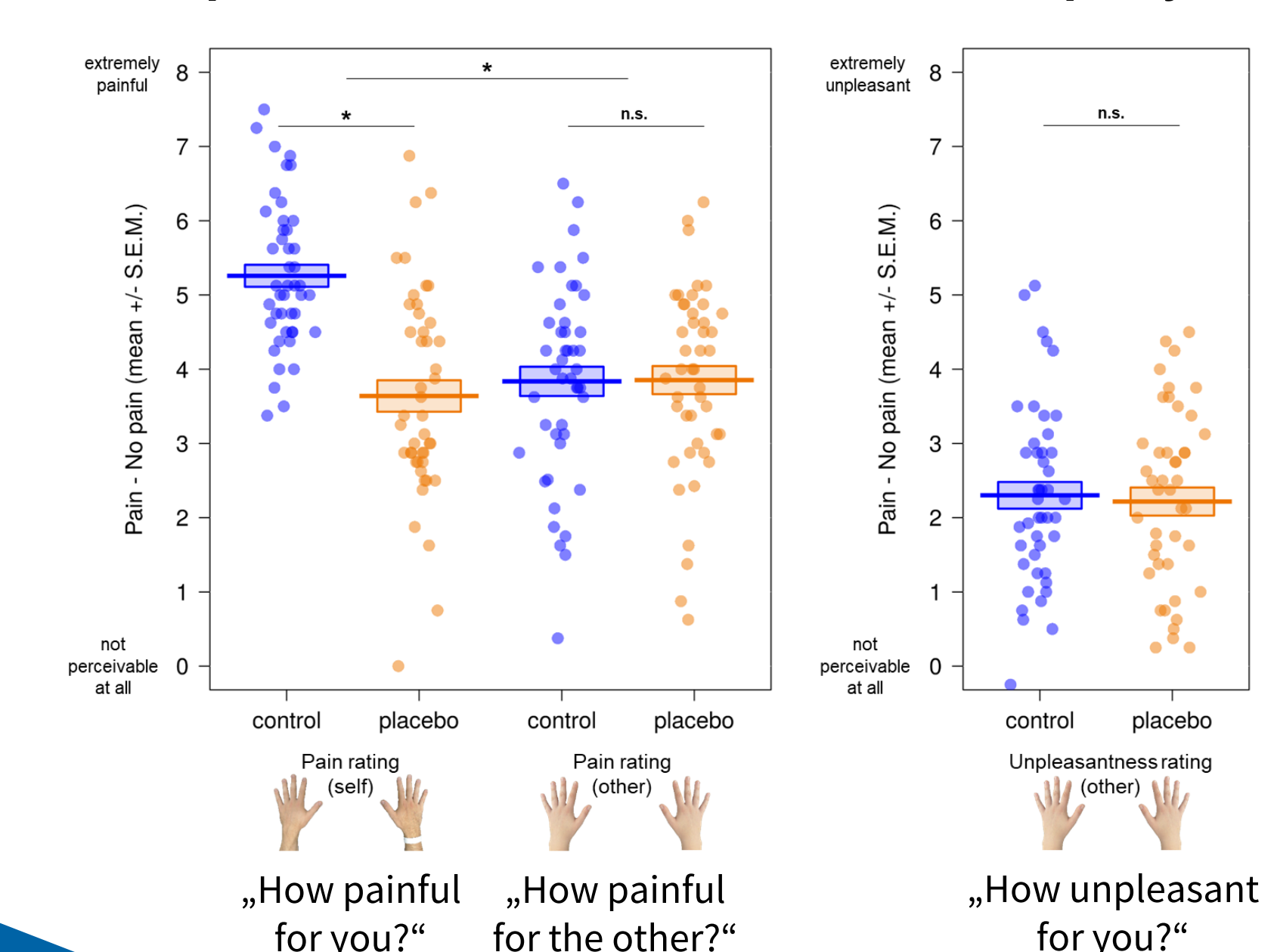
### Behavior

#### Strong belief in 'medication' effectiveness over the session

#### Self-reported difference in average pain after session

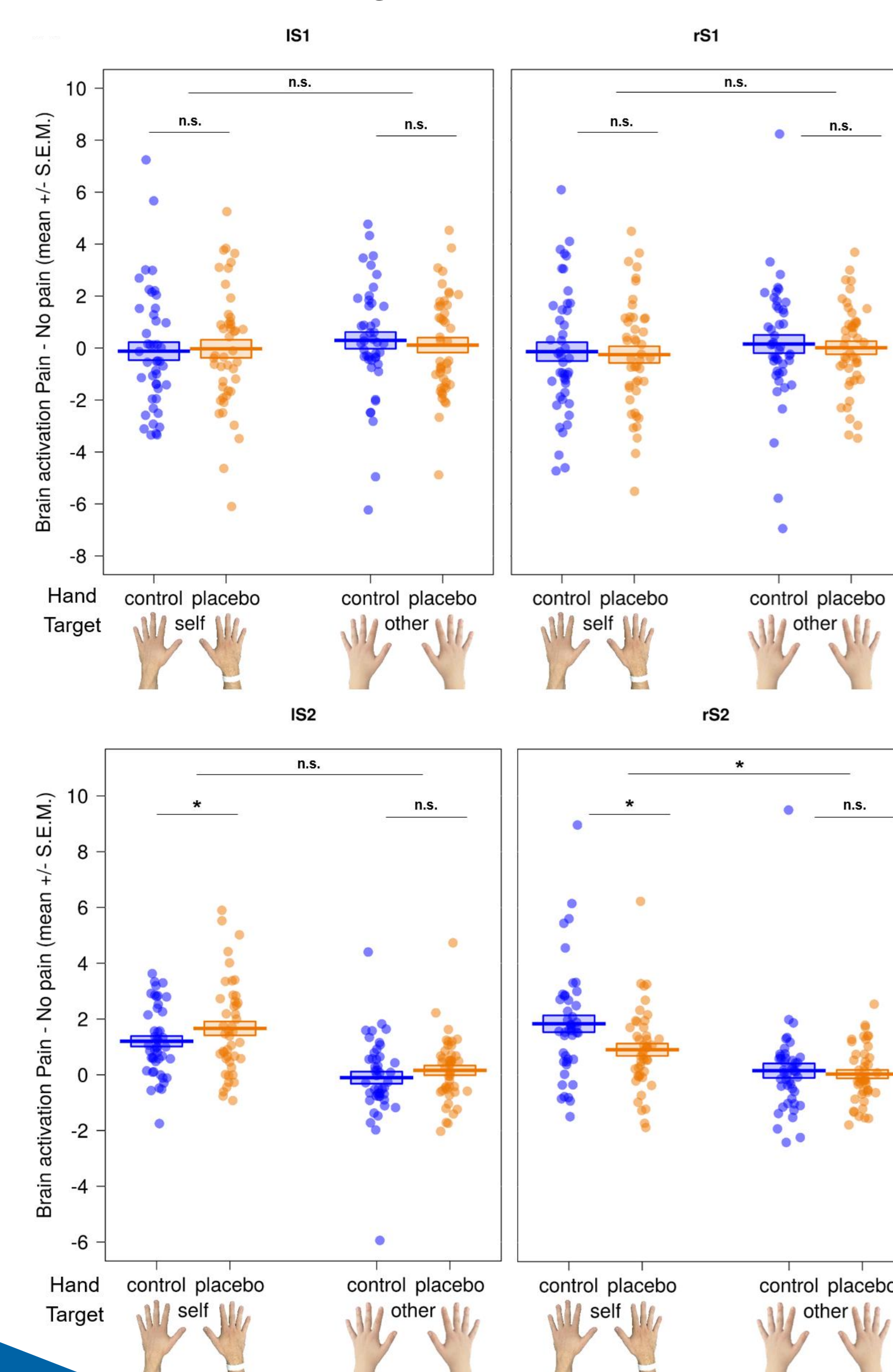


#### Significant difference between hands in first-hand in pain task but no localized transfer to empathy



### Brain

#### No modulation of somatosensory responses during empathy for pain

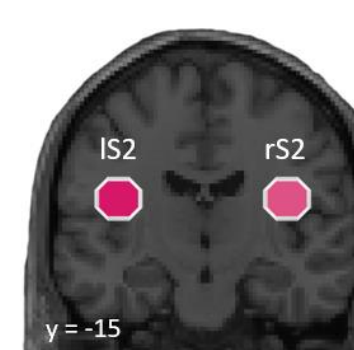
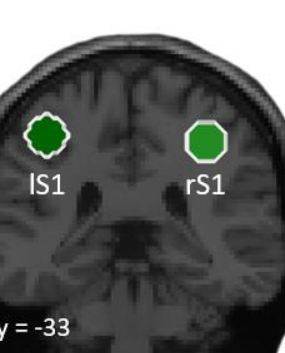


Individual hand pictures of participant or confederate

#### Electrical stimulation

- red square: painful
- blue square: not painful

16 shocks (8 rated) x 2 targets x 2 treatments x 2 intensities = 128 trials (two runs)



- First-hand placebo analgesia effect
- No transfer of this effect to somatosensory responses related to empathy for pain
- Matching results in behavior and brain

## Conclusion

Placebo analgesia does not modulate the sensory-discriminative component of pain empathy

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FWF W|W|T|F Der Wissenschaftsfonds

OSF Preregistration osf.io/uwzb5

Preprint tinyurl.com/yxqbwqhw

## References

- Lamm, et al. (2011)
- Rütgen et al. (2015, PNAS)
- Rütgen et al. (2015, JNeurosci)
- Benedetti et al. (2005)
- Wager & Atlas (2015)
- Keysers et al. (2010)
- Tran et al. (2014)
- Bingel et al. (2006)