When differences matter: rTMS/fMRI reveals how differences in dispositional empathy translate to distinct neural underpinnings of self-other distinction in empathy

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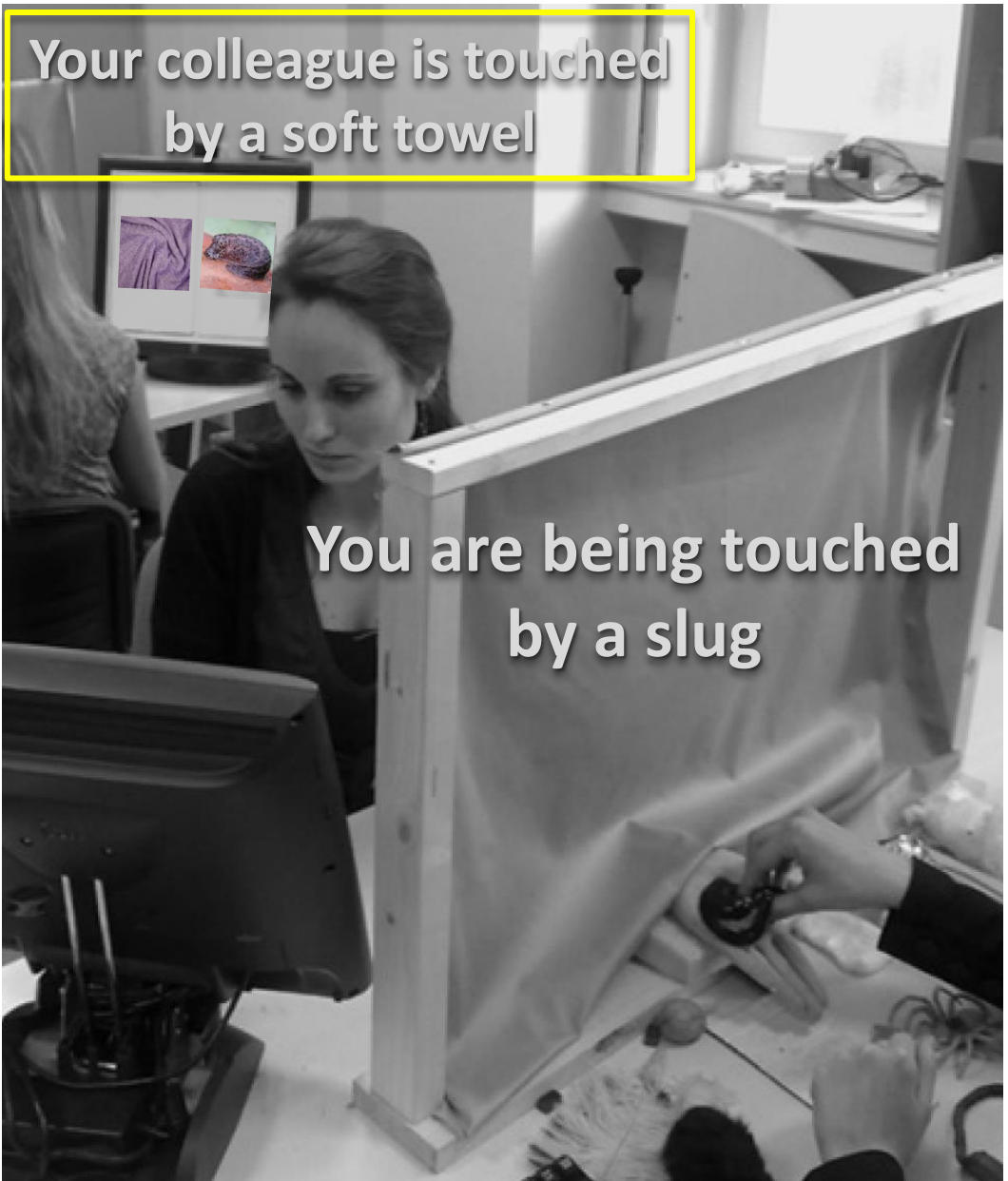
Empathy situation 1 = neutral personal feelings

Empathy situation 2 = similar feelings

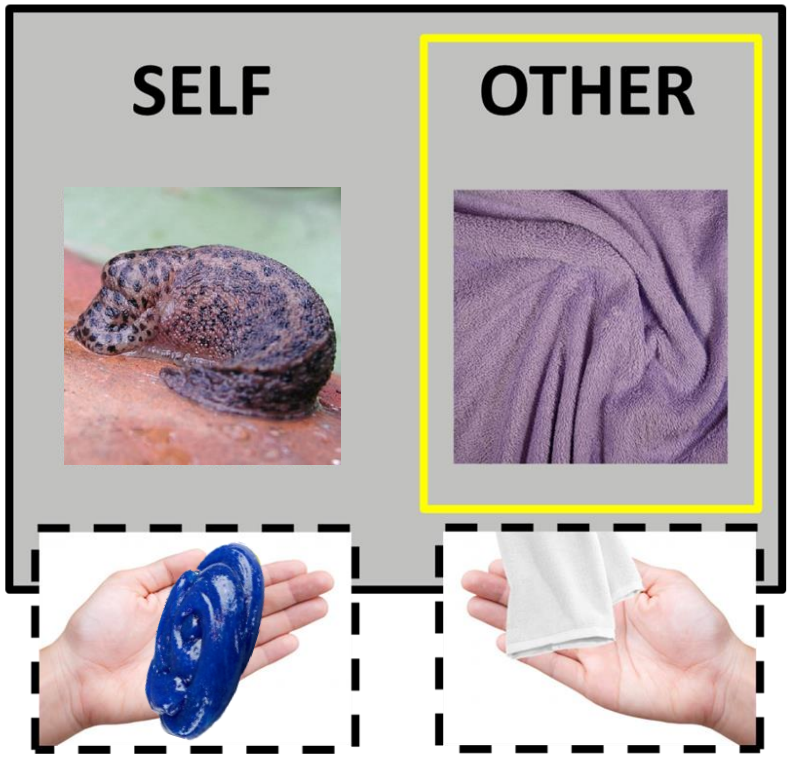
Empathy situation 3 = conflicting feelings

➔ SOMETIMES YOU NEED TO OVERCOME YOUR PERSONAL FEELINGS… thanks to SELF-OTHER DISTINCTION

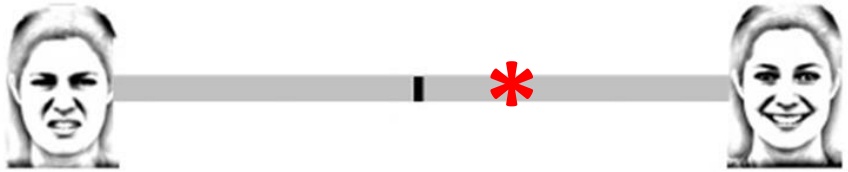
Self-other distinction (SOD) in lab



How does your colleague feel ?



Conflicting emotions condition



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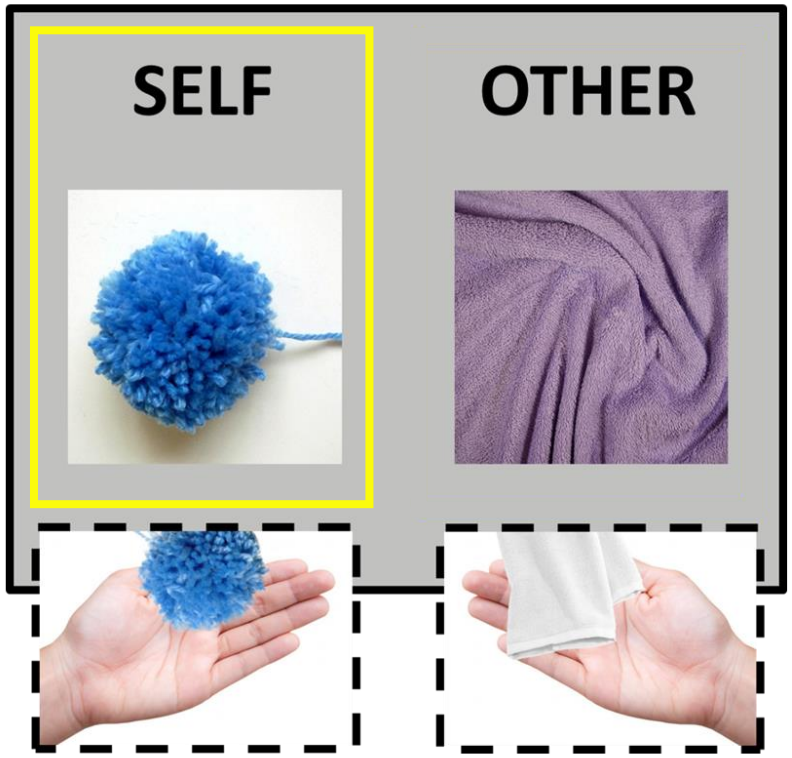
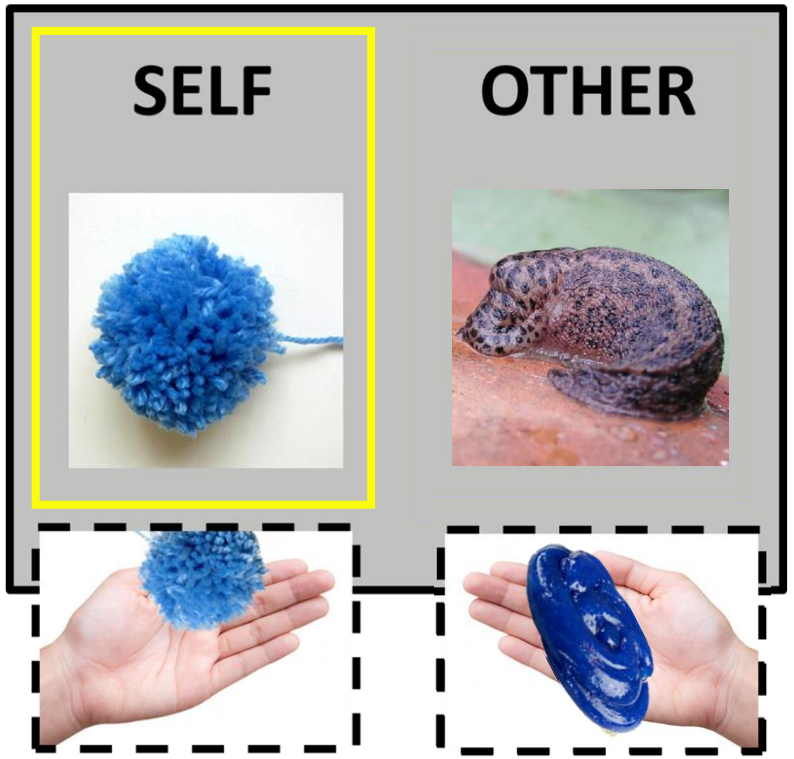
Egocentric SOD bias

Self-other distinction (SOD) in lab

How do YOU feel ?



vs.



Similar emotions condition

<u>Conflicting</u> emotions condition

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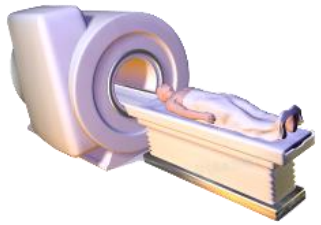
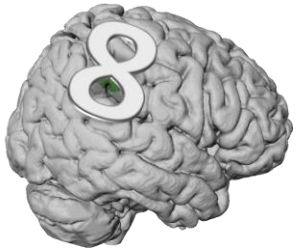
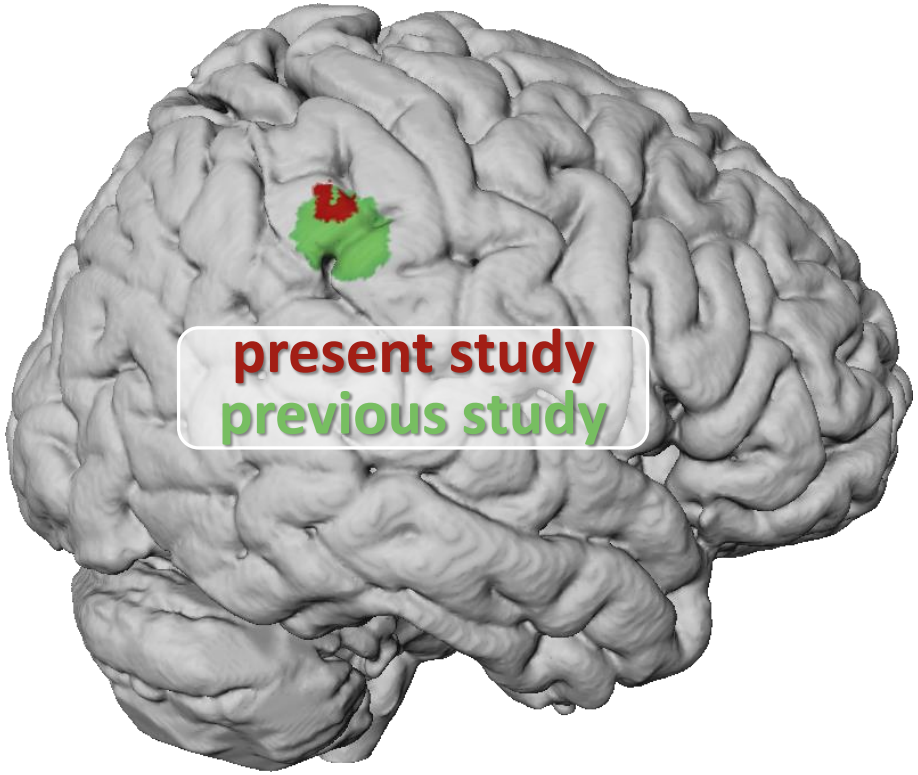
Altercentric SOD bias

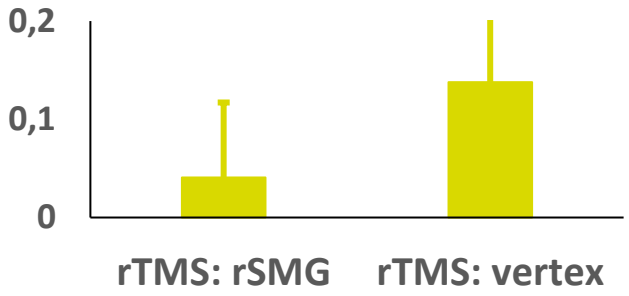




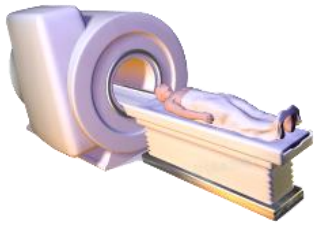
Right supramarginal gyrus (rSMG) is more active during conflicting feelings



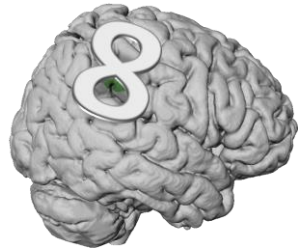
Impact of brain stimulation: SOD bias tends to decrease



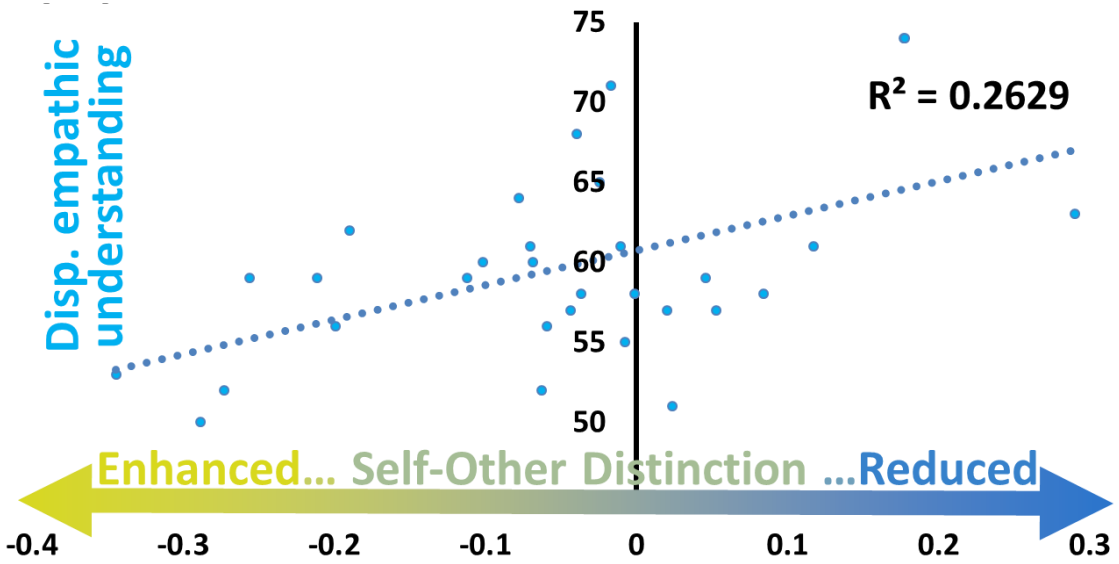
p **= .069**



Effect of individual differences in dispositional empathy

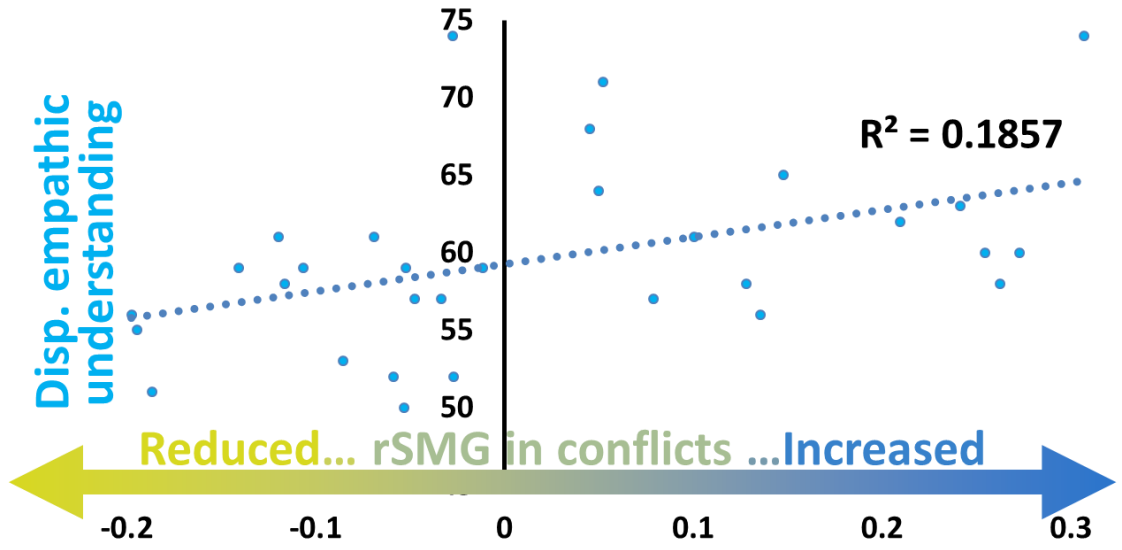


Effect on SOD performance:
Low dispositional empathic understanding predicts enhanced SOD performance



➔ *"bads getting good & goods getting bad"*

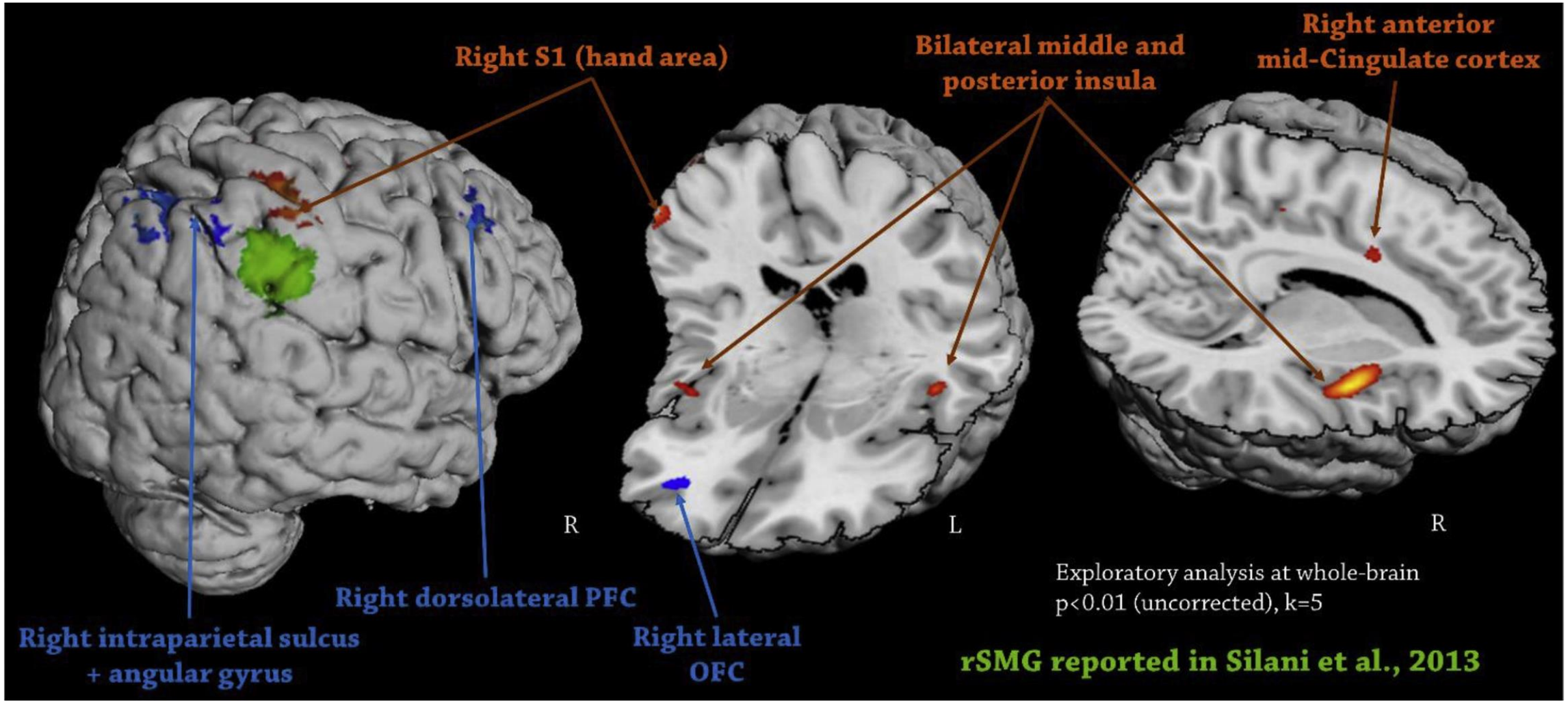
Effect on rSMG activity:
Low dispositional empathic understanding predicts reduced rSMG signal in Self-Other conflicts



➔ *"bads getting good need less rSMG & goods getting bad need more rSMG"*

Enhanced self-other distinction

Reduced self-other distinction



Bukowski et al. 2020, *Cortex*.

Discussion

- rSMG contributes to Self-other Distinction
- rTMS effects are modulated by dispositional empathic understanding both at behavioral and brain levels
- Getting better associated with “affective cognitive control” network
- Getting worse associated with “basic (passive) empathy” network

➔ Evidence for a brain-behavior-personality interplay in SOD

➔ Evidence of variability in impact of brain stimulation

THANKS

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SCAN-Unit (Vienna)

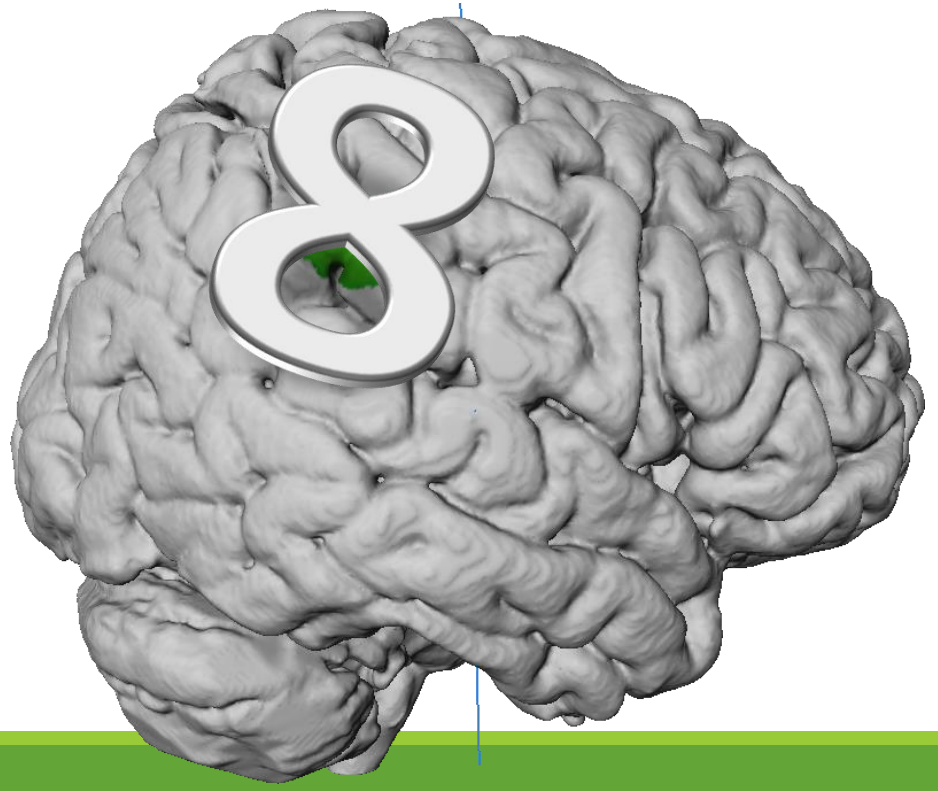
& NeuroMatch!

Interested in my work?
→ henrykbukowski.com

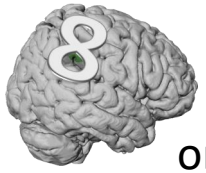
PRESENT STUDY

Combined offline fMRI-rTMS study, within-subject design (N=31)

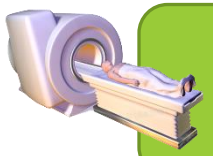
repeated **T**ranscranianal **M**agnetic **S**timulation:
continuous **t**heta **b**urst **s**tim (cTBS: 600 stim in 40 sec)



Brain anatomy (T1)
Motor task
Empathy practice



Minimal motor threshold
rTMS - cTBS
on rSMG or Vertex (control site)



Empathy block 1 (5-25 min)
Empathy block 2 (30-50 min)

x 2 sessions (1 week apart)

Self-other distinction

allows to tease apart self-experienced feelings from those of another person

How do I feel ?

slight pleasure

How does he feel ?

slight disgust