



A Functional Neuroimaging Investigation of Moral Foundations Theory



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BACKGROUND

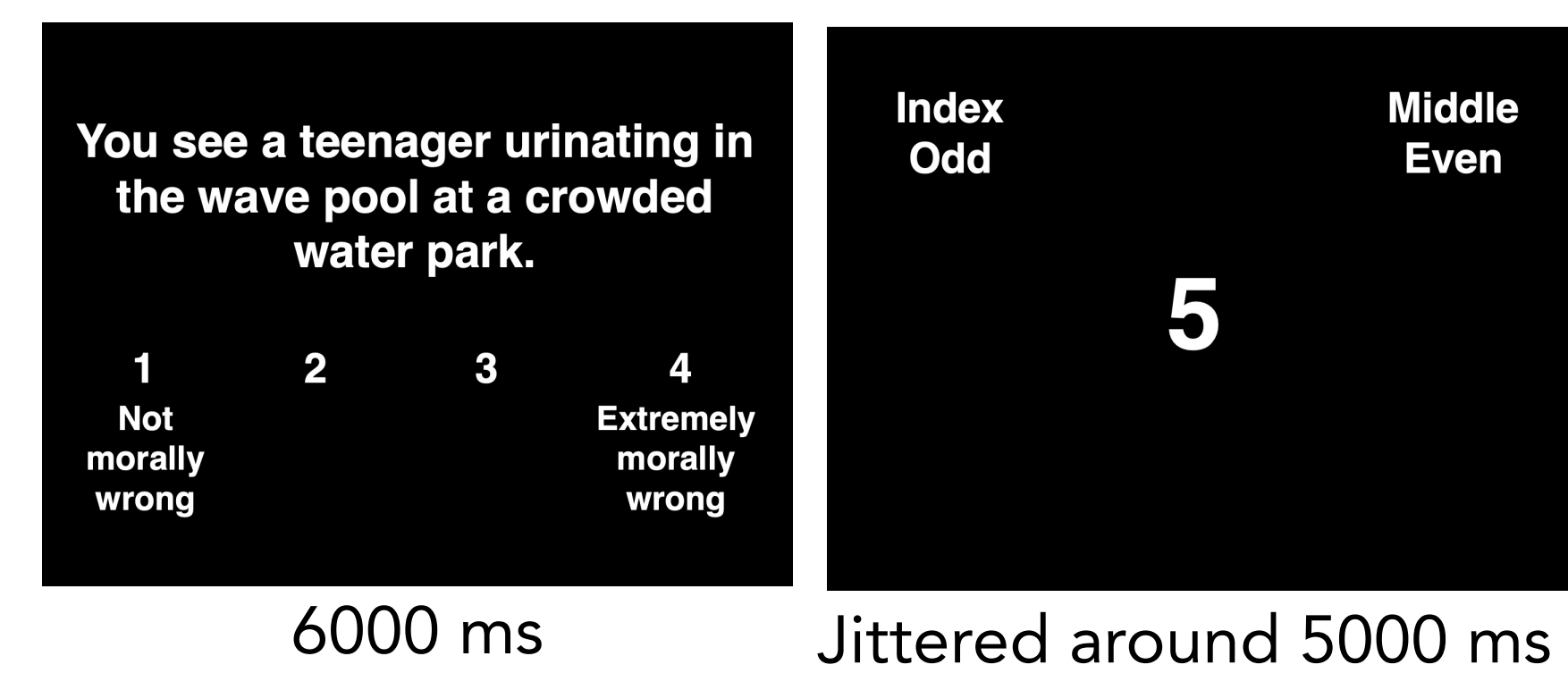
Moral Foundations Theory (MFT) posits that human morality is comprised of distinct psychological systems that are innately prepared and elaborated upon via cultural learning.¹

The foundations—*care (physical and emotional), fairness, loyalty, purity, authority, liberty*—can be organized into superordinate categories that emphasize the value of individuals (individualizing: *care and fairness*) vs. the value of group unity (binding: *loyalty, purity, authority*).²

We use functional neuroimaging to investigate whether neural activity during moral judgments reflects the structure of MFT.

STUDY DESIGN

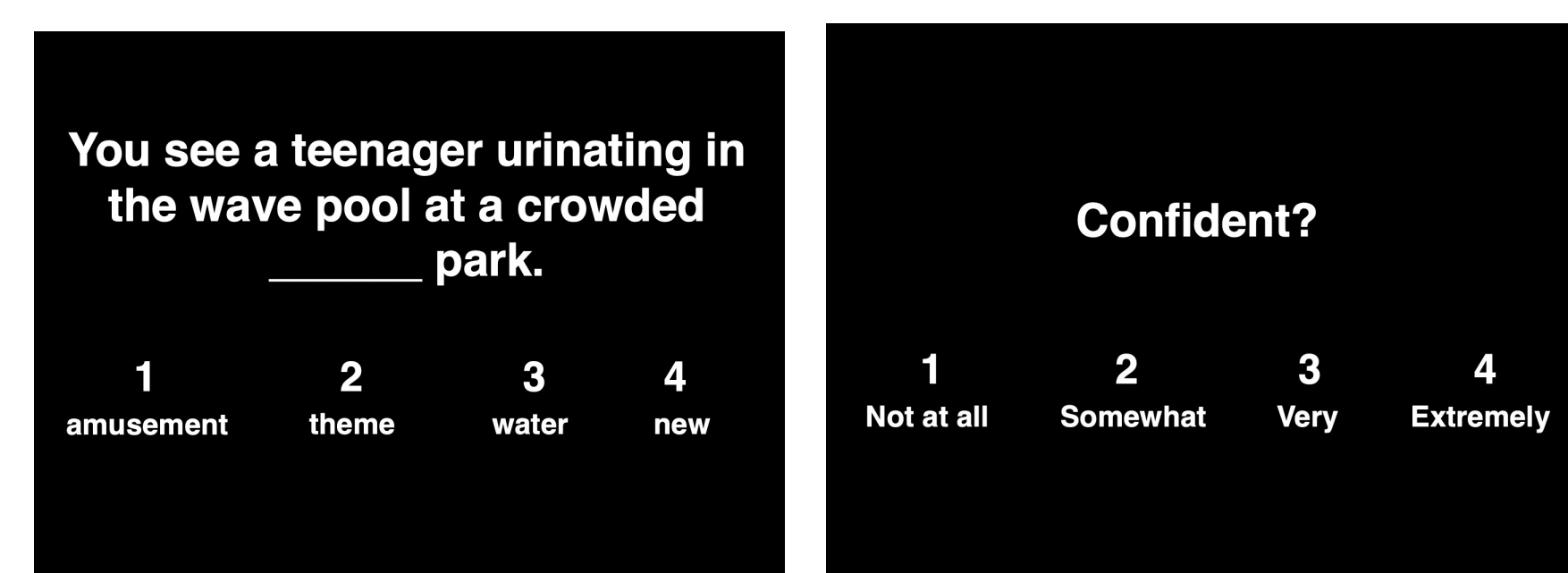
27 healthy, right-handed adults (14 male; age=24.65 (4.21) years) judged the Moral Foundations Vignettes³ while in the scanner.



- 120 vignettes
- 15 per foundation
- Incidental encoding
- Even/odd active baseline between trials
- TR = 2000 ms

6000 ms Jittered around 5000 ms

Recognition memory and confidence were tested after scanning.



- All 120 vignettes from encoding
- 7-8 lures per foundation
- 183 memory & confidence trials

Self-paced Self-paced

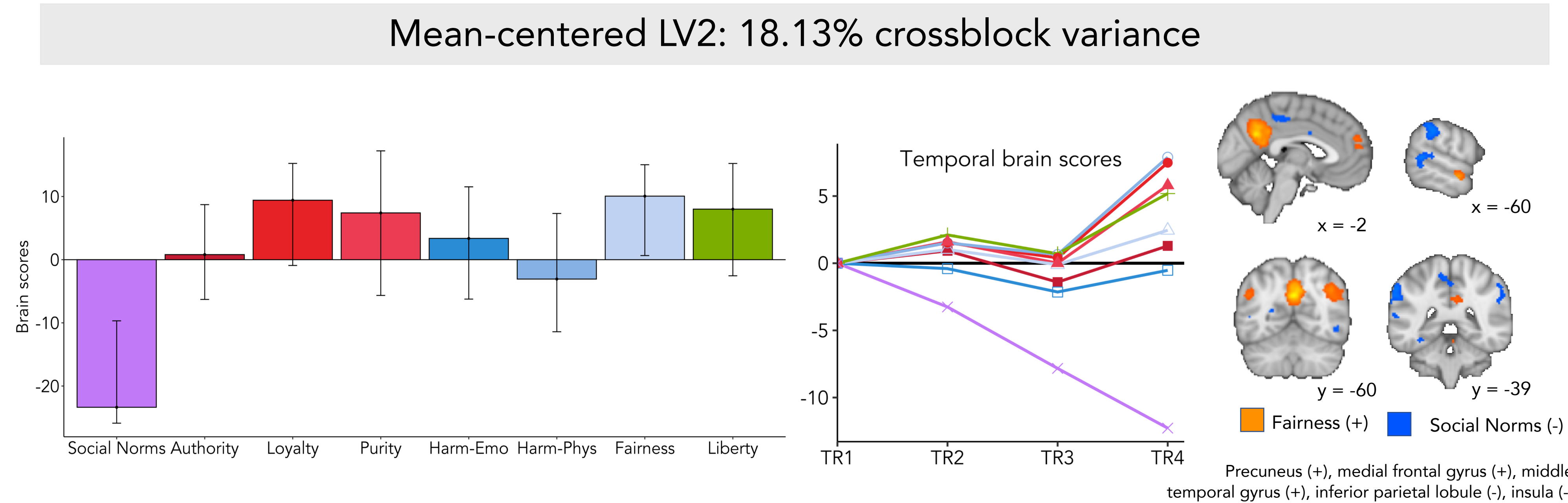
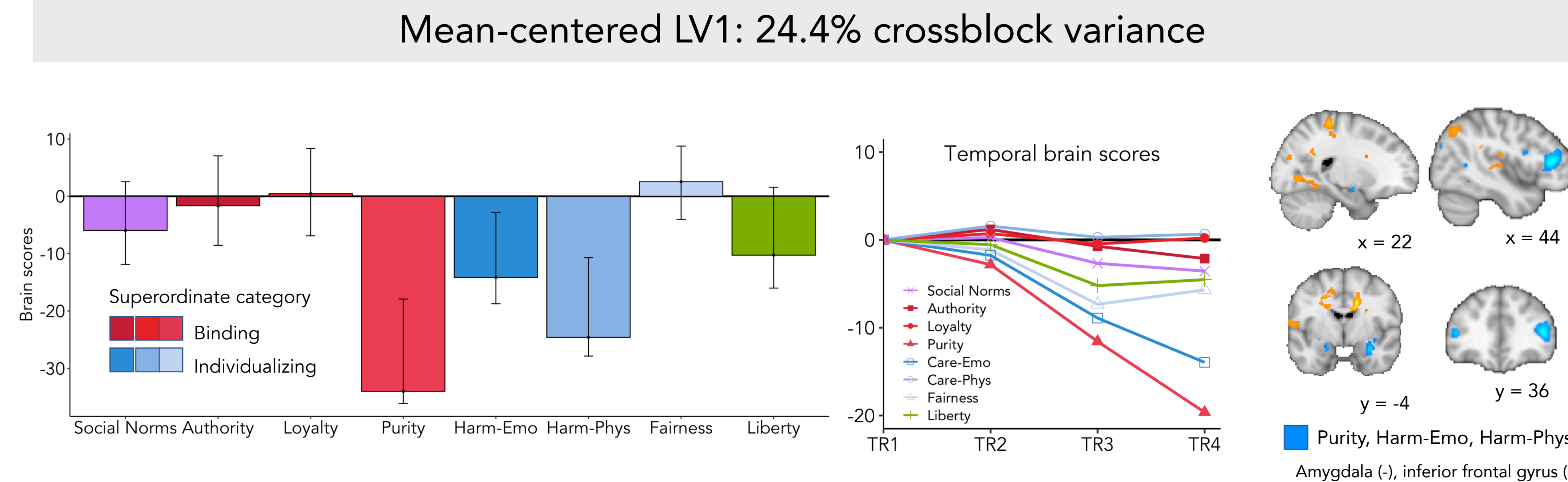
Post-test surveys: IRI (trait-empathy levels), emotional reactions to vignettes (anger, amusement, sadness, contempt, disgust, fear).

References:

- Haidt, J., & Graham, J. (2007). When Morality Opposes Justice: Conservatives Have Moral Intuitions Liberals May Not Recognize. *Social Justice Research* (20), 98-116.
- Graham, J., Haidt, J., & Nosek, B. A. (2009). Liberals and conservatives rely on different sets of moral foundations. *Journal of Personality and Social Psychology*, 96(5), 1029-1046.
- Clifford, S., Iyengar, V., Cabeza, R., & Sinnott-Armstrong, W. (2015). Moral foundations vignettes: a standardized stimulus database of scenarios based on moral foundations theory. *Behavior Research Methods*, 47(4), 1178-1198.
- TBD

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SPATIOTEMPORAL PARTIAL LEAST SQUARES



A non-rotated PLS analysis contrasting binding, individualizing, and liberty superordinate foundations failed to reach significance ($p < .519$). Another non-rotated analysis that included liberty with binding foundations⁴ also failed to reach significance ($p < .353$). A third non-rotated analysis contrasting social norms to all of the other foundations trended toward significance ($p < .059$).

Neurally-derived superordinate structure: emotion/empathy, binding, fairness, social norms

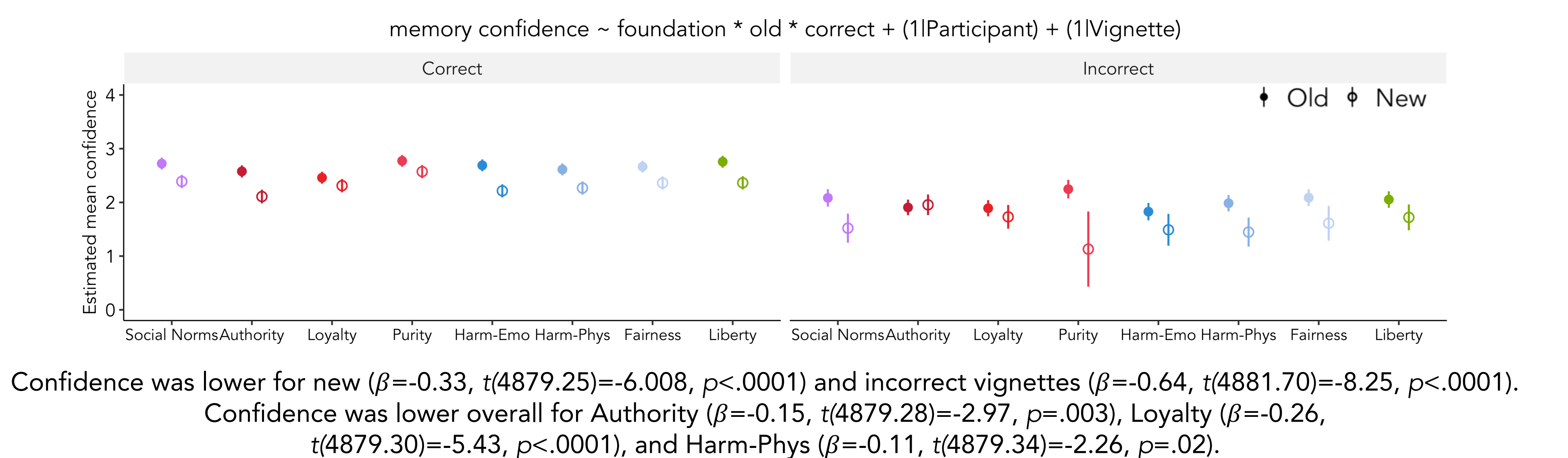
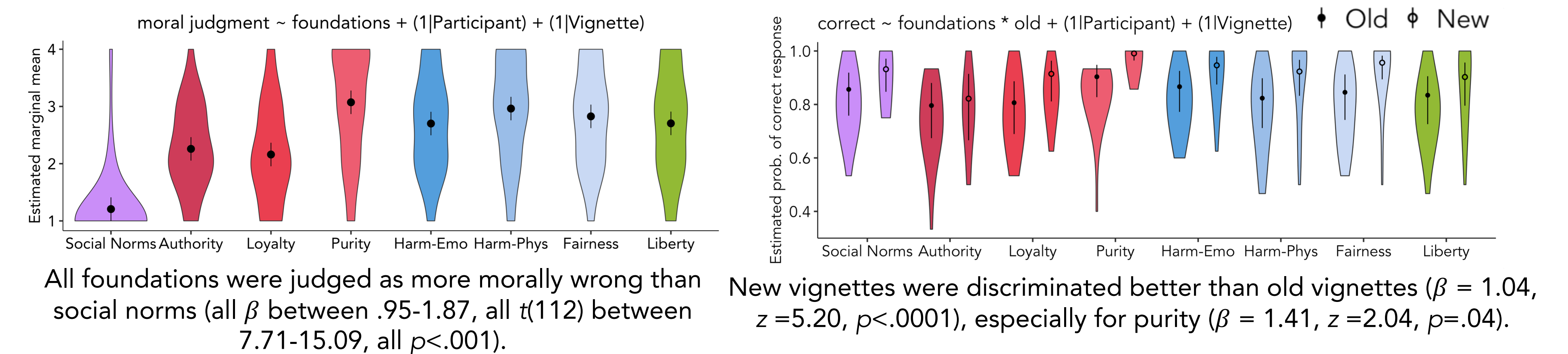
SUMMARY

Brain activity reflects neither the superordinate- nor foundation-level structure posited by MFT.

Neural data suggests restructuring superordinate categories with respect to emotional and empathic arousal, binding violations, fairness, and social norms. This superordinate structure results in better mixed model fits for moral judgments and memory for moral transgressions.

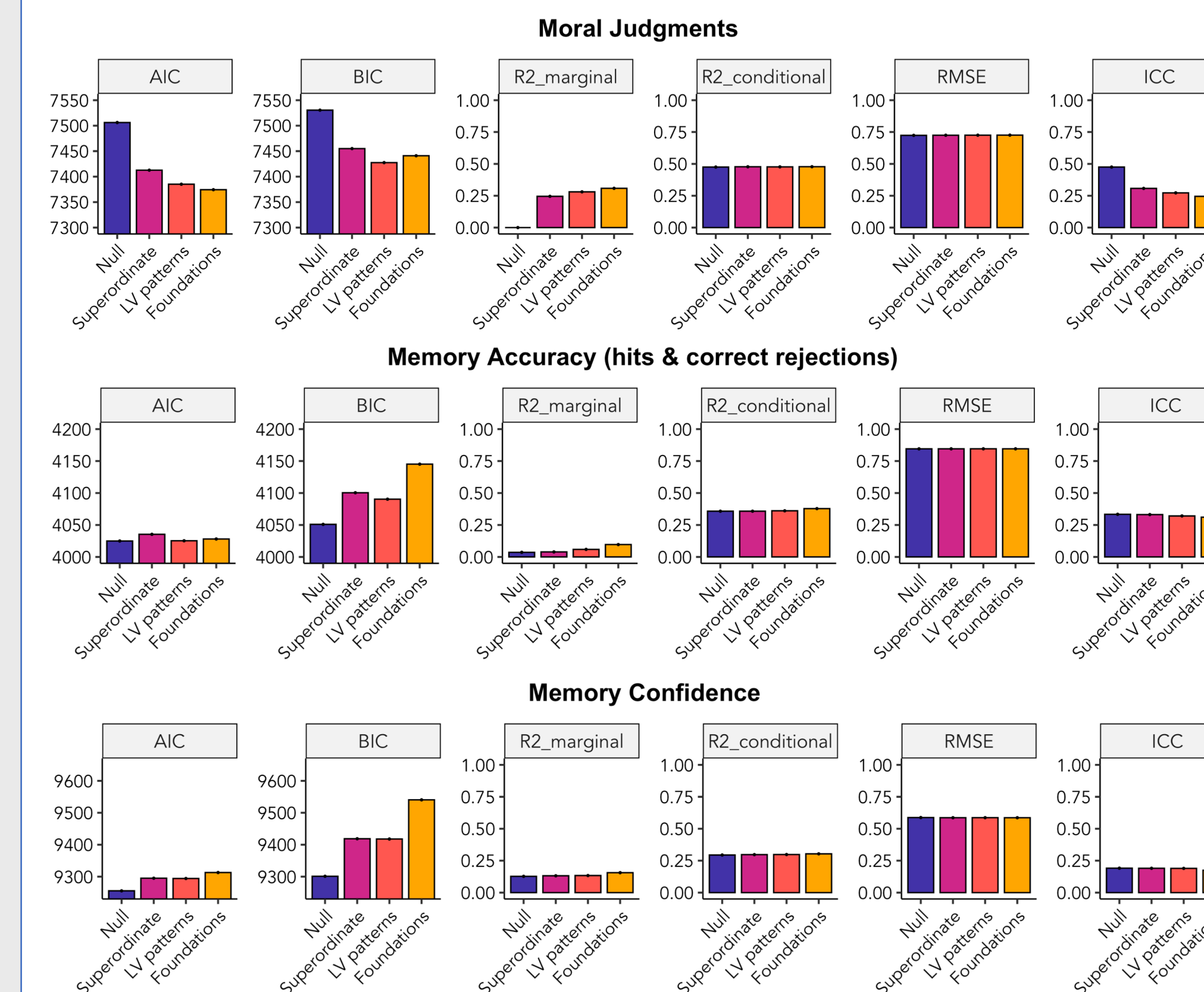
Adding trait-empathy and emotional reactions to moral transgressions results in better mixed model fits for moral judgments and memory accuracy than just including the foundations.

BEHAVIOR



Superordinate Comparisons

- Global intercept
- Foundations
- Traditional Superordinate Structure: Individualizing/Binding
- Neurally-derived Superordinate Structure: Emotion/Binding



Emotion & Empathy Comparisons

- Global intercept
- Foundations
- Foundations + Emotions + Empathy
- Foundations * Emotions + Foundations * Empathy

