Neurocomputational mechanisms of learning on social networks

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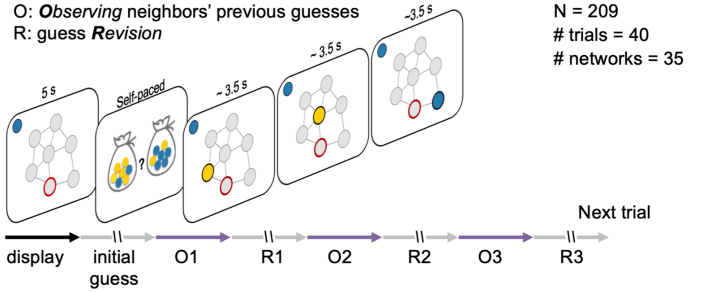
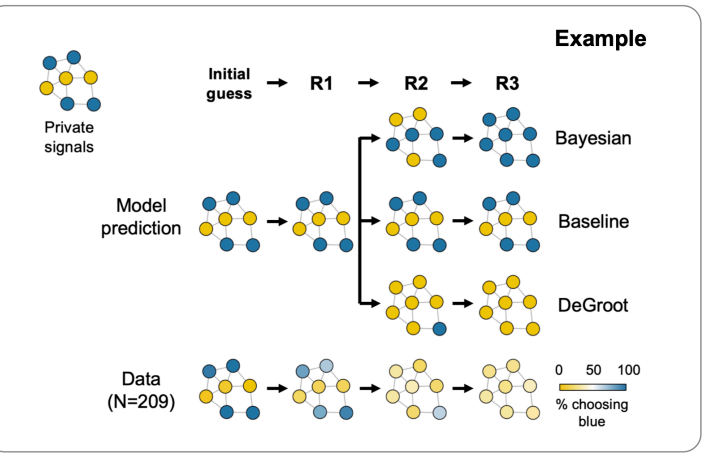
Introduction

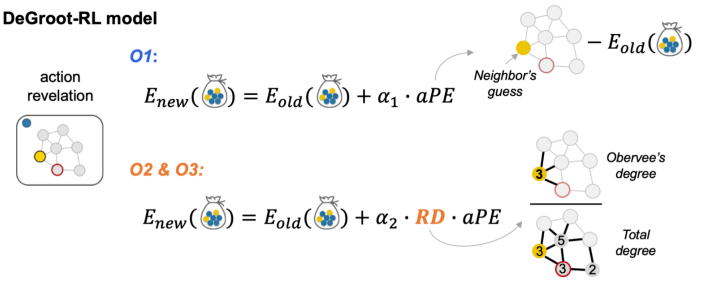
Many social species are embedded in social networks, including our own. The structure of networks plays an important modulatory role in decision-making, ranging from foraging to finding a partner. However, it remains largely unknown how social network structures are represented in the brain and integrated with other information to guide decisions. Here, we combine model-based fMRI with a lab experiment on a variety of small, static, and stylized social networks to investigate the neurocognitive mechanisms by which subjects learn from observing actions of others embedded on the same network.

Experimental paradigm

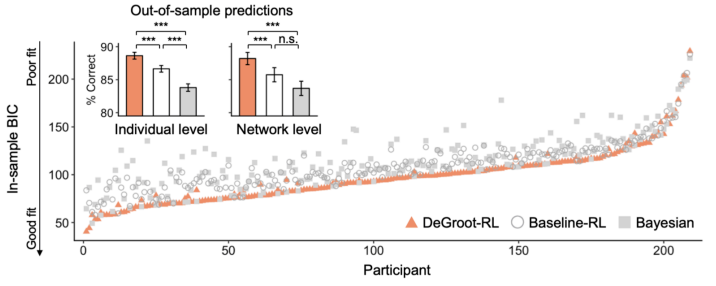


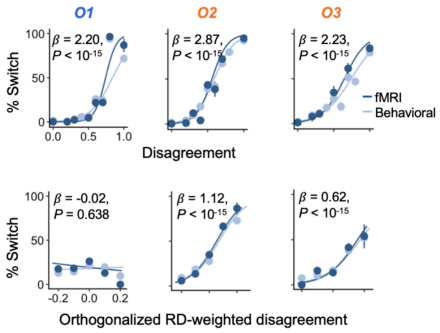


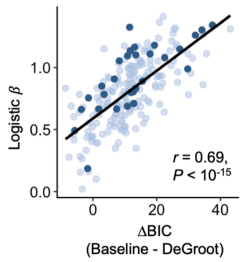
Computational models



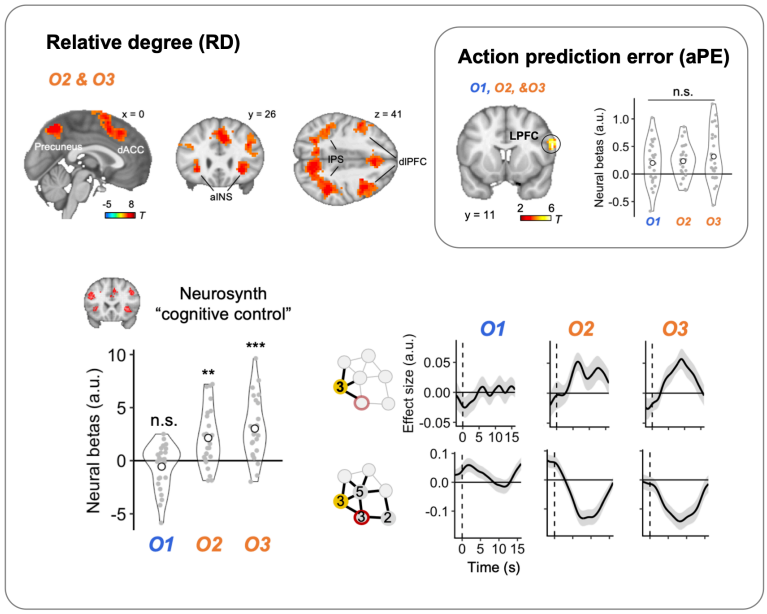
Behavioral results (N = 209)

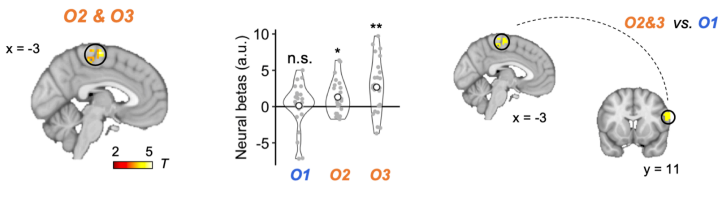






Neural results (N = 25)





Discussion

These results suggest that learning in complex, interrelated social environments can be realized by means similar to the well-established RL mechanism. Such learning is constrained to decisions of well-connected individuals who have richer sources of information, likely through signals in the frontoparietal control network. More broadly, by connecting tools and ideas from social network literature and those of neuroeconomics, our study opens a new avenue for incorporating formal descriptions of complex interpersonal relationships into the investigation of neural substrates of a range of behaviors constrained by or interacting with social environment.

References

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