Agent Based Feedback Models of a “Sense of Should”

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Introduction

• Behavior regulates physiology through the environment, and organisms that regulate their physiology effectively survive. [1,2]
• Control theory defines mathematical frameworks built around self-regulation (e.g., negative feedback control). [3,4,5]
• An open question in social behavior is how social norms exert a regulatory effect on people’s behavior. People feel social pressure to conform to others’ expectations—i.e., a “sense of should” [6]
• How then do expectations shape social behavior?
• Negative feedback control can go beyond traditional (e.g., game theoretic) approaches in explaining social dynamics.

Methodology

We built a python-based framework to explore control-based dynamics in social settings (i.e., a social sandbox).

In simple control, agents can:
• Sense and compress sensory signals from the environment (plant).
• Compare compressed signals to a reference.
• Reduce error by updating the reference.
• Reduce error by controlling the environment (plant) through behavior.

In social control, the environment (plant) is another agent who can perform the same set of control-based actions.

References

1. Ross Ashby W. The brain as regulator. Nature 1960;186:413. https://doi.org/10.1038/186413a0