From Seeing to Seeking:

Belief-based exploration in gamified environments

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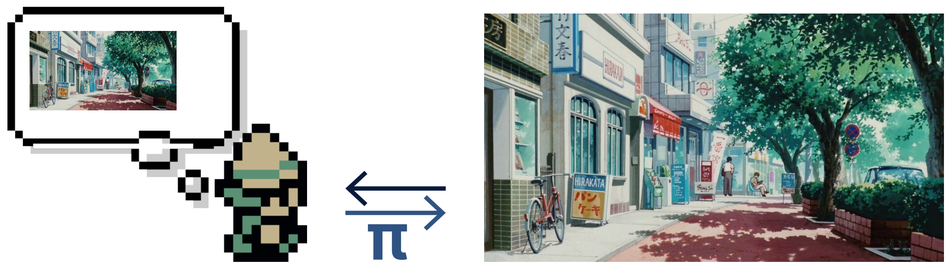
INTRODUCTION

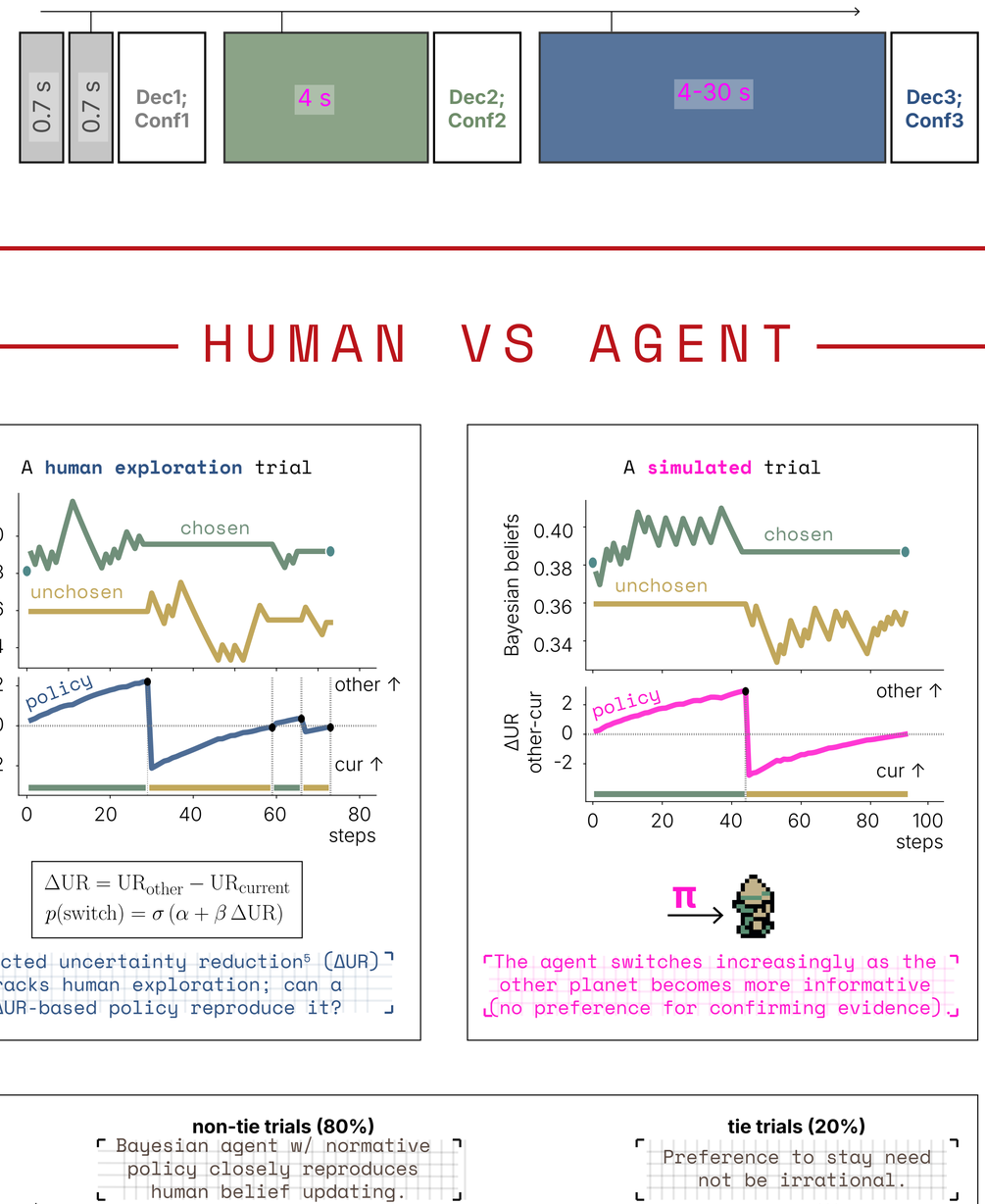
- Information seeking: a **policy** maps internal beliefs onto sampling actions
- **Biased belief updating**: greater weight to belief-confirming evidence[1–3]
- **Biased information sampling**: preference for belief-confirming evidence[4]
- But: previous work focused on re-sampling *familiar* evidence

RQ: How do prior beliefs shape the ***exploration of novel evidence*** – and subsequent belief updating – in partially observable, gamified environments?

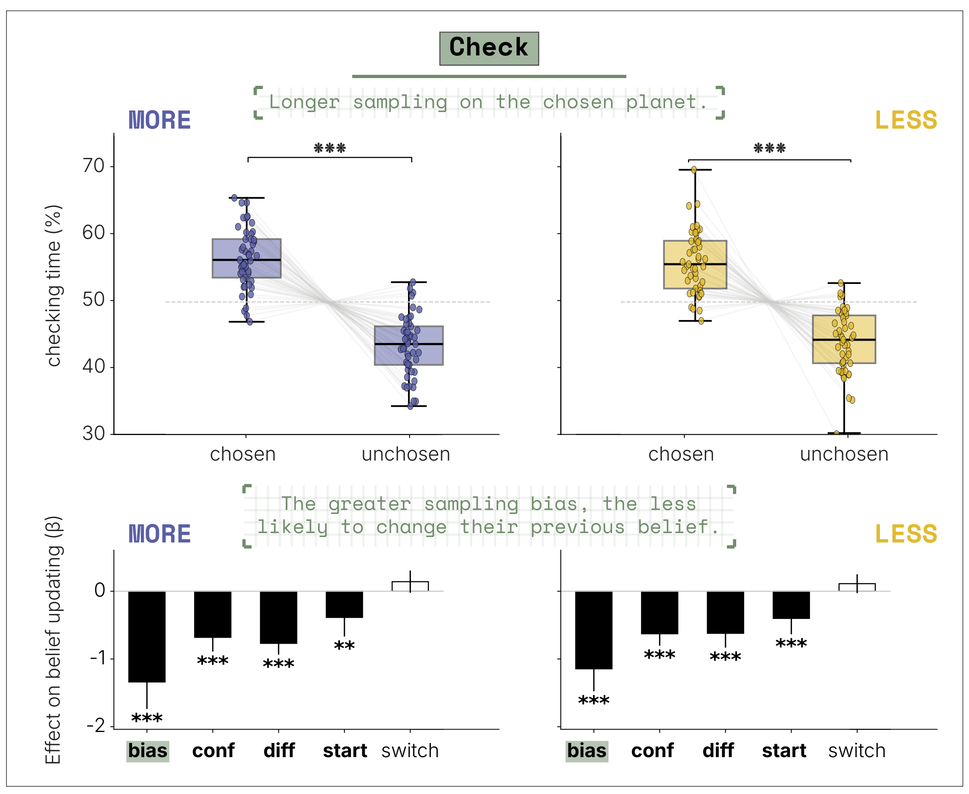


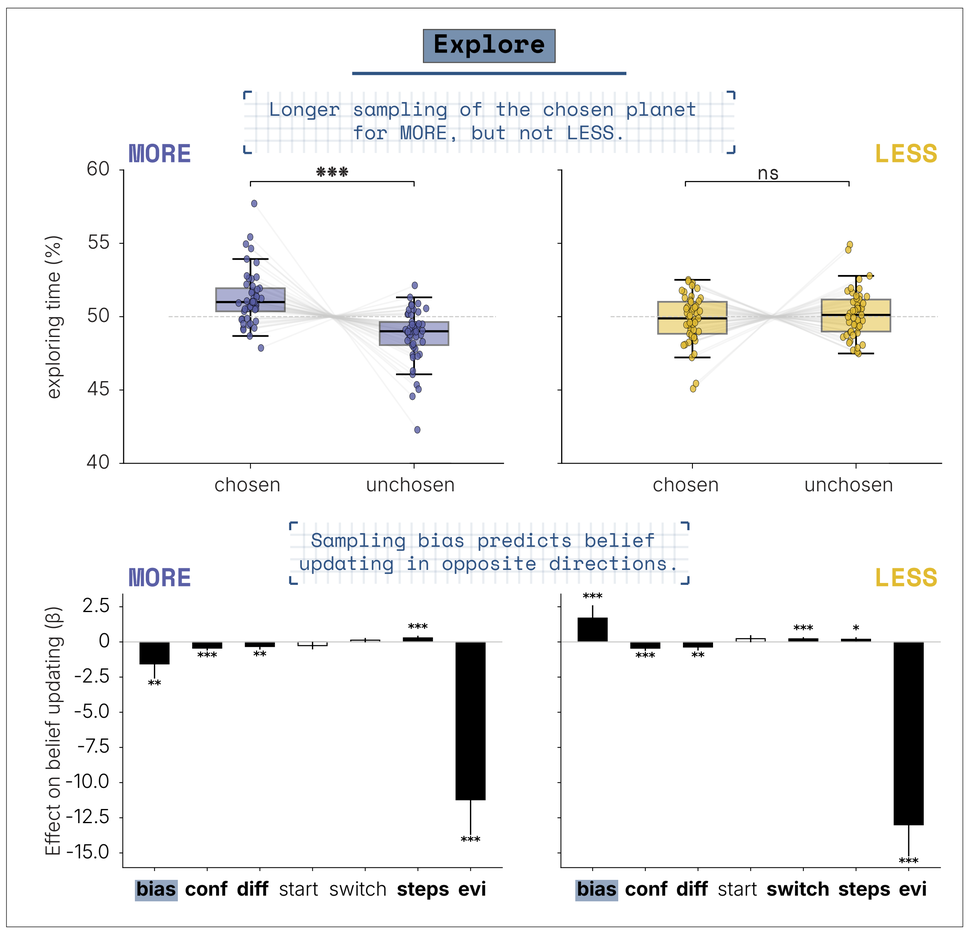
METHODS

- **N = 49 participants** • 4 blocks × 25 • alternating **more** / **less** blocks
- **Stone counts**: 30 vs. 22/ 28/ 30/ 32/ 38 stones (easy/ hard/ tie/ hard/ easy)
- **Task**: *Which of two planets has more (or less) stones?* (3 phases within a trial)

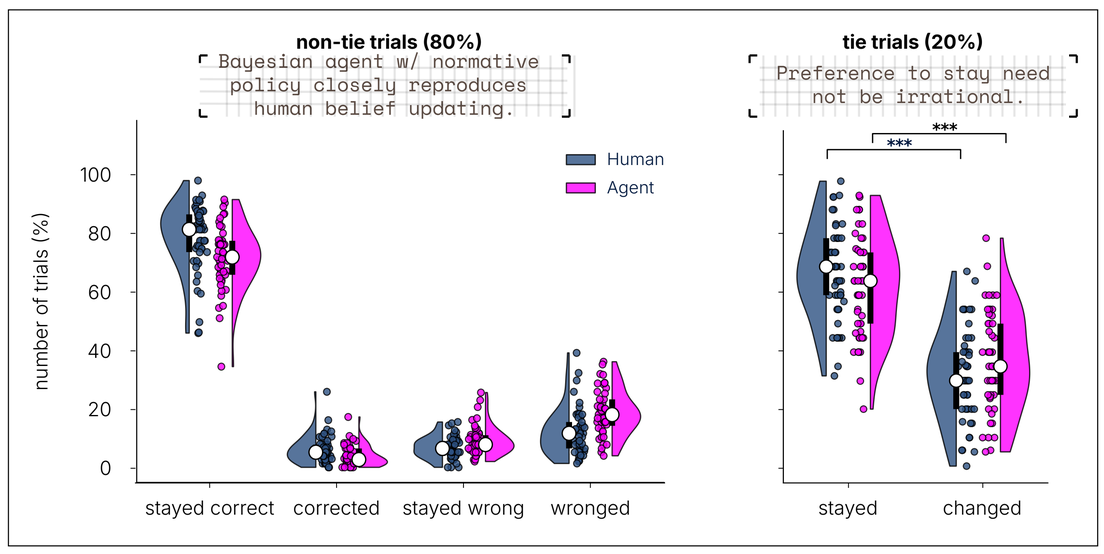


RESULTS · BEHAVIORAL





HUMAN VS AGENT



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CONCLUSIONS

- Prior beliefs bias exploration and subsequent belief updating
- Uncertainty reduction captures part, but not all, of human exploration
- Deep RL could learn human exploration policies directly from behavior
- Understanding exploration matters in an information-rich world

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