Tracking Hidden Objects with Efficient Physical Prediction

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Introduction

Tracking & predicting motion of objects over time is consistent with continuously updated posterior predictive distribution of noisy physical simulations

Path Filters

(1) How can people make predictions efficiently? (2) Can we explain inter-trial dynamics?

Task

Trials
- Predict “red” or “green” goal
- Hold button for duration of prediction
- Switching / abstaining allowed
- Ball moves unseen under grey occluders

Methods
- N = 38
- 400 trials / participant
  - 100 no occlusion (fitting)
  - 300 with occlusion (test)

Results

1) Captures when & which goal decision

2) Outperforms sampling from posterior predictions

3) Captures trial difficulty

4) Captures switch pattern

Discussion

- Path filters explain predictions and inter-trial dynamics better than continuous simulations
- Suggests people efficiently make predictions by updating prior predictions rather than starting fresh
- Explains some but not all inter-trial dynamics