

Causal judgments in complex situations

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Background

How do we decide if something caused an outcome to happen?

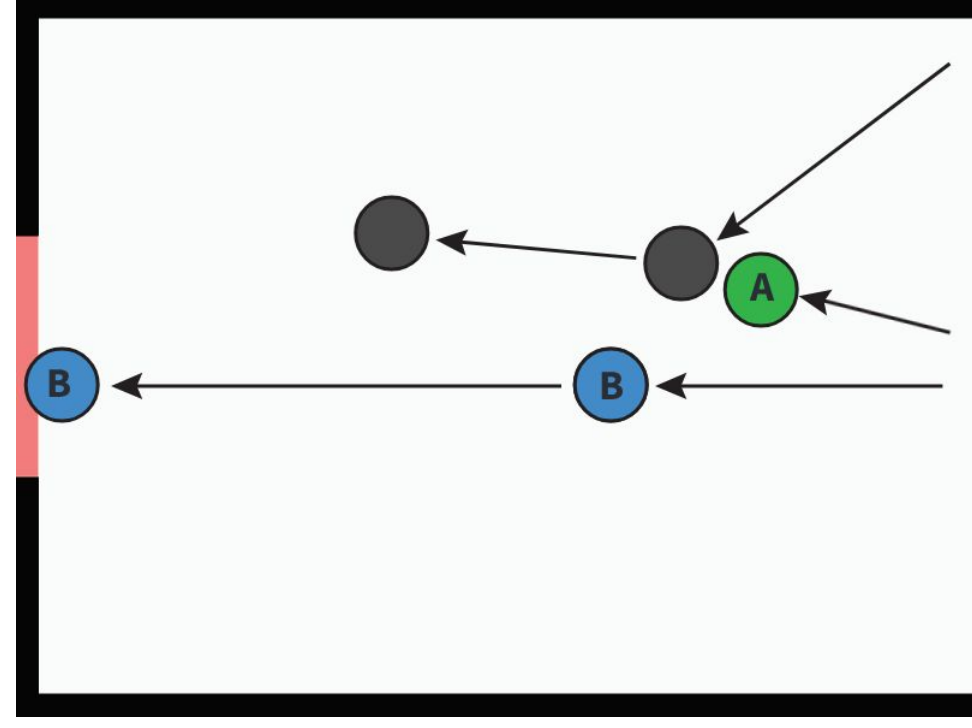
The Counterfactual Simulation Model proposes that we consider two causal aspects:

Whether-causation: Would the outcome have occurred without the candidate cause?

counterfactual intervention:
remove

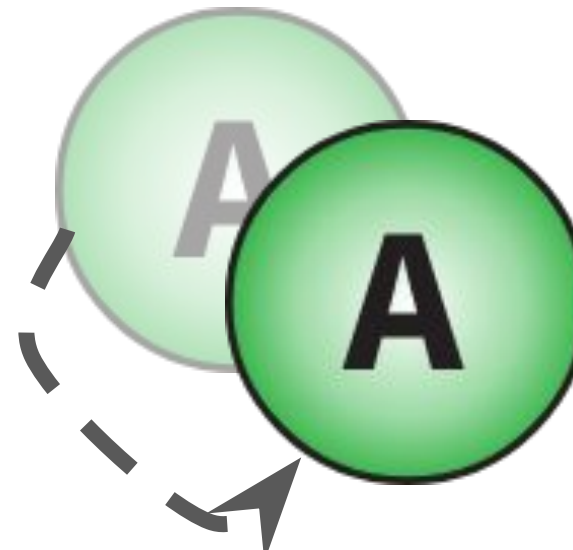


measure:
probabilistic
[0, 1]

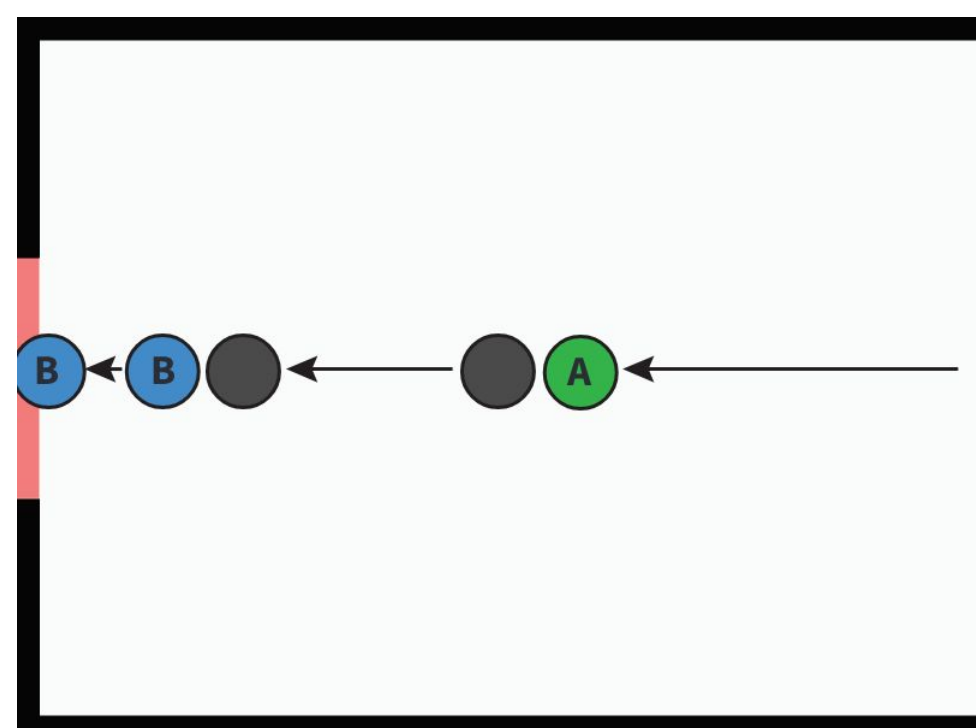


How-causation: Did the candidate cause affect how the outcome occurred?

counterfactual intervention:
perturb



measure:
deterministic
{0, 1}



The model has been tested on simple scenarios with 2 or 3 balls.

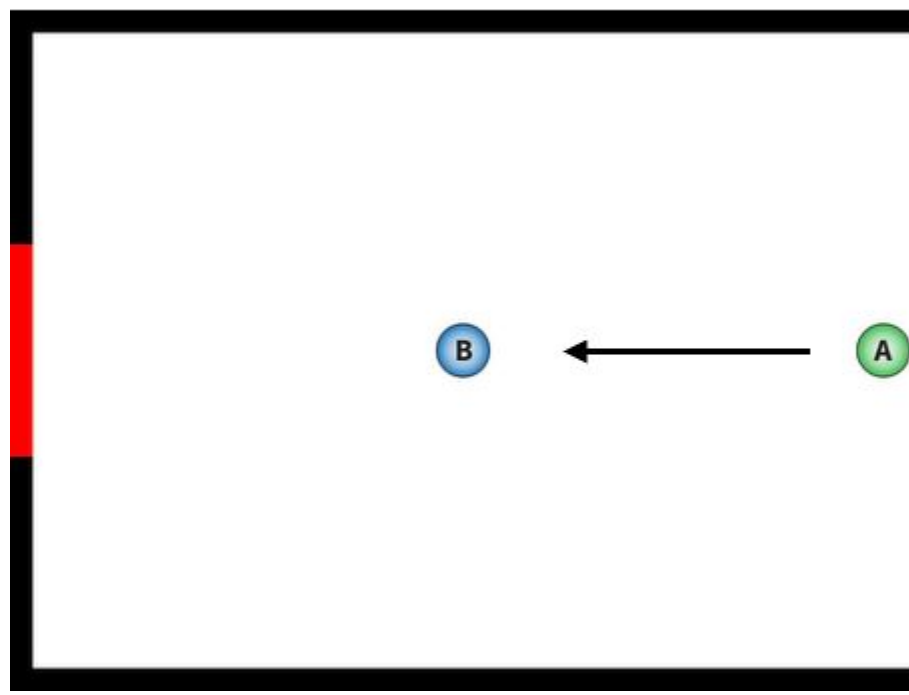
Here we test if the model applies to more complex situations featuring up to 12 balls.

Experiments

Participants watched billiard ball videos and then made either **whether**, **how**, or **causal** judgments

- **Ball A** = candidate cause
- **Ball B** = target, goes through gate

Causal-explanation group also asked:
How did you make your judgment?
What factors did you consider?

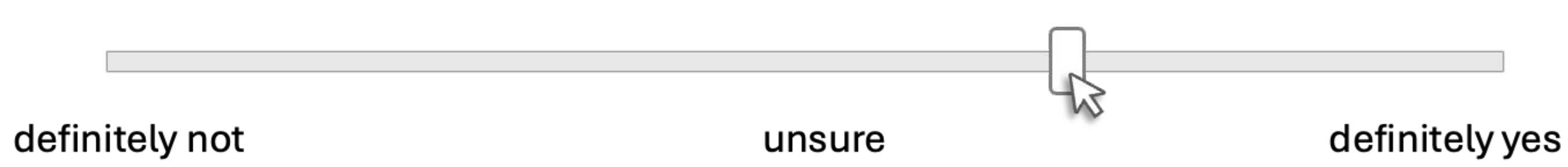


2 balls

Whether: Would Ball B have gone through the gate if Ball A had not been there?

How: Did Ball A influence how Ball B went through the gate?

Causal: Did Ball A cause Ball B to go through the gate?

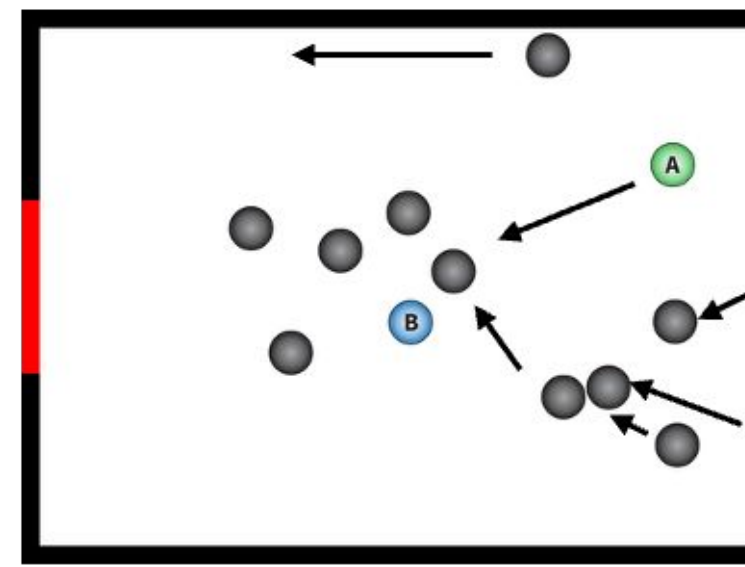
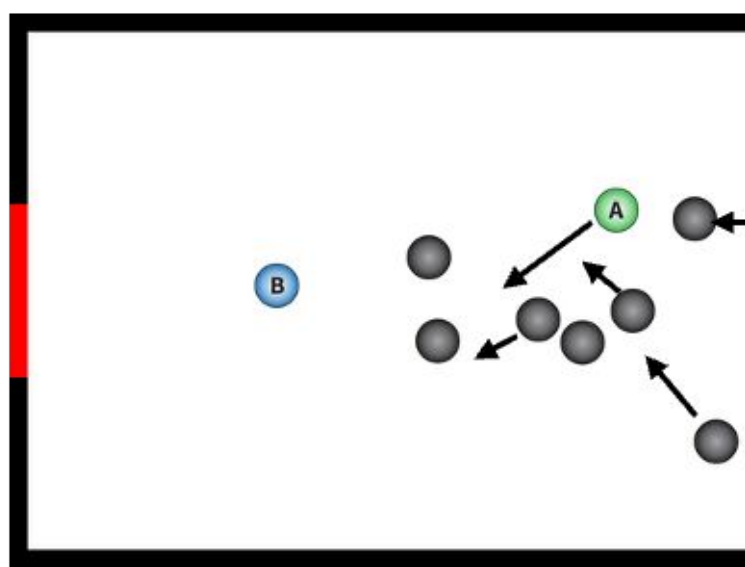
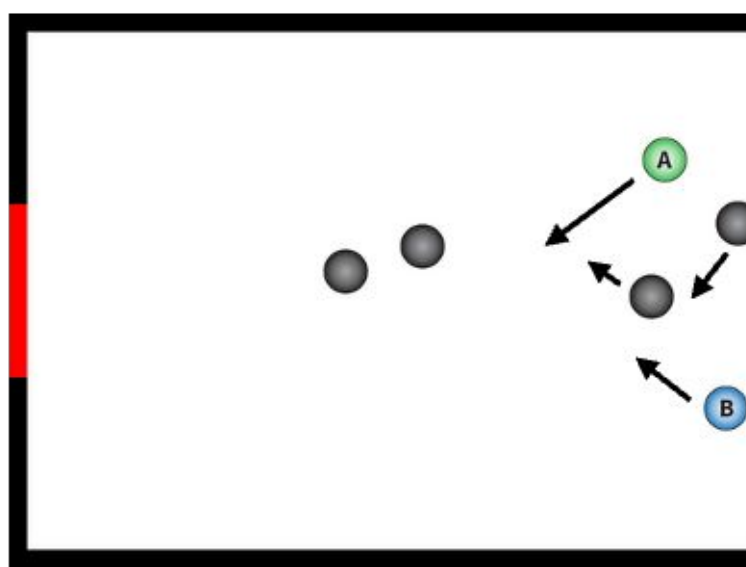
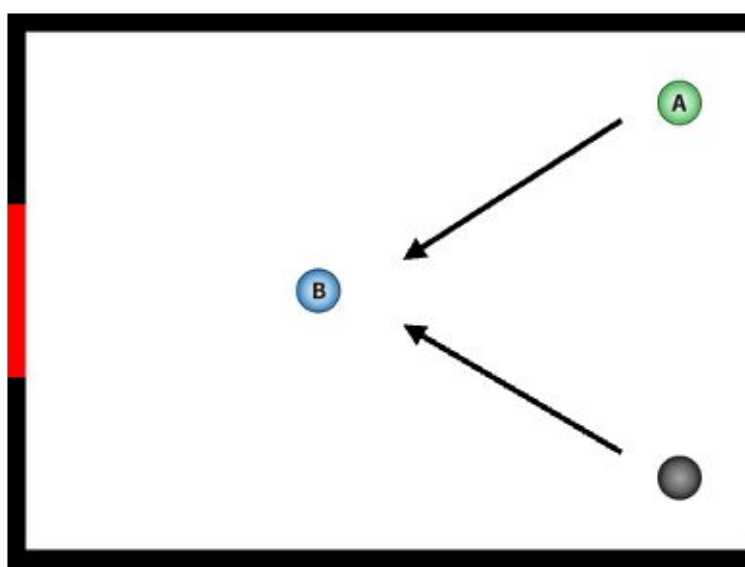
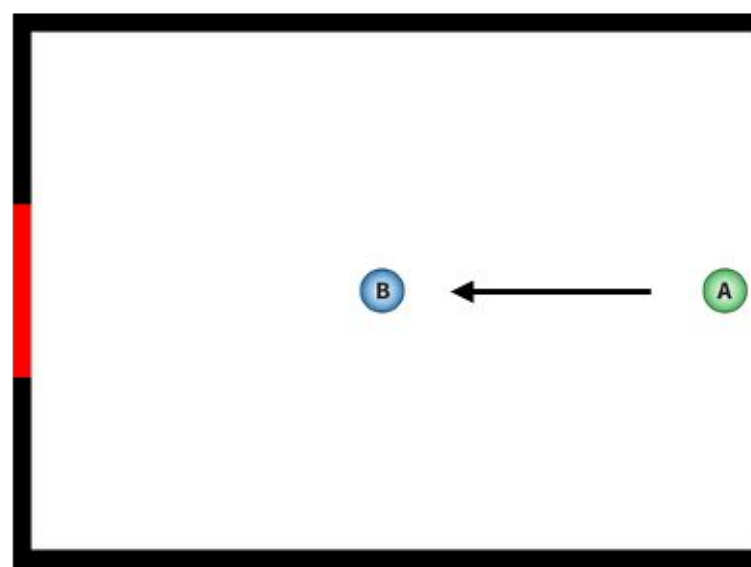


3 balls

6 balls

9 balls

12 balls



Results

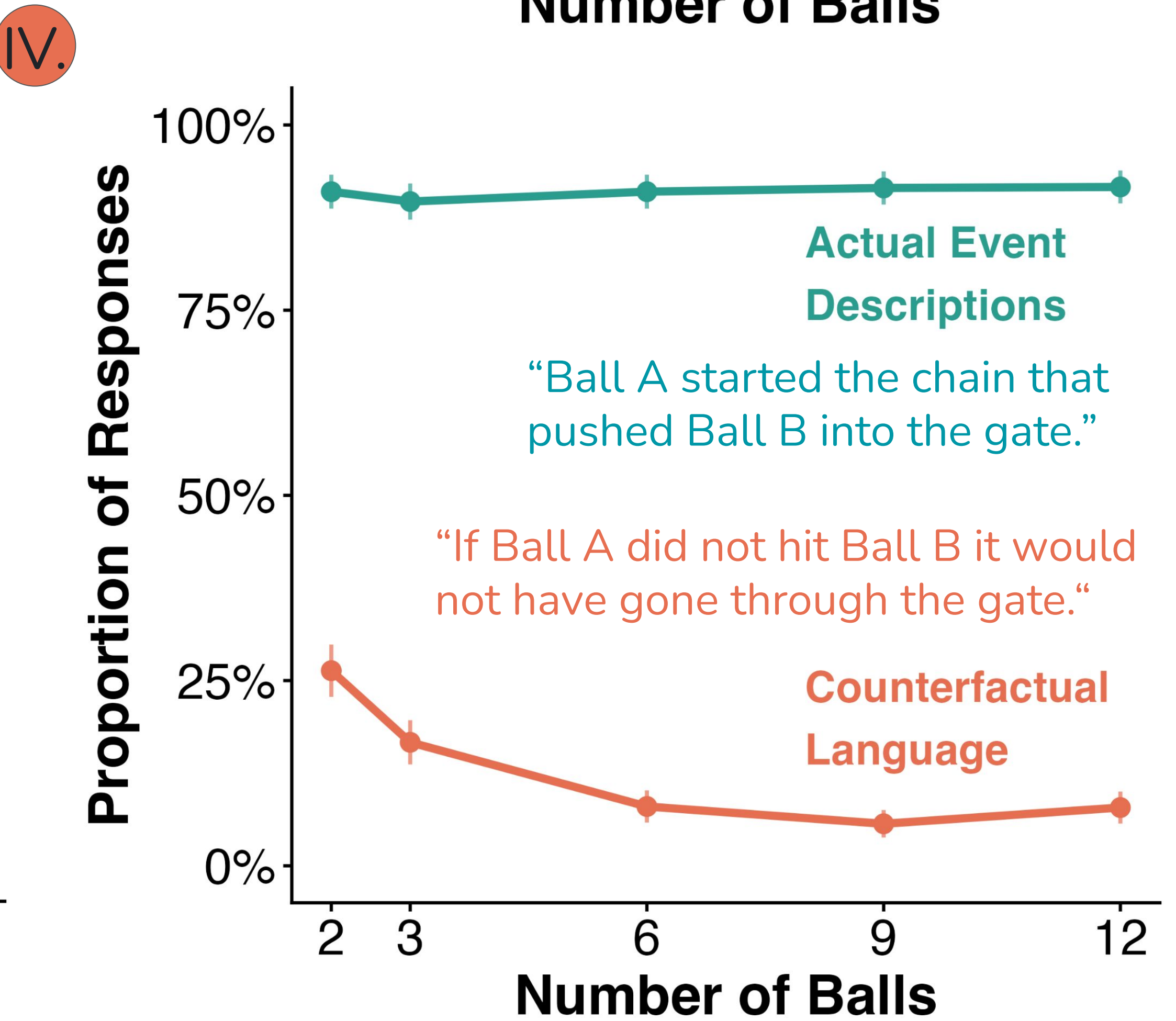
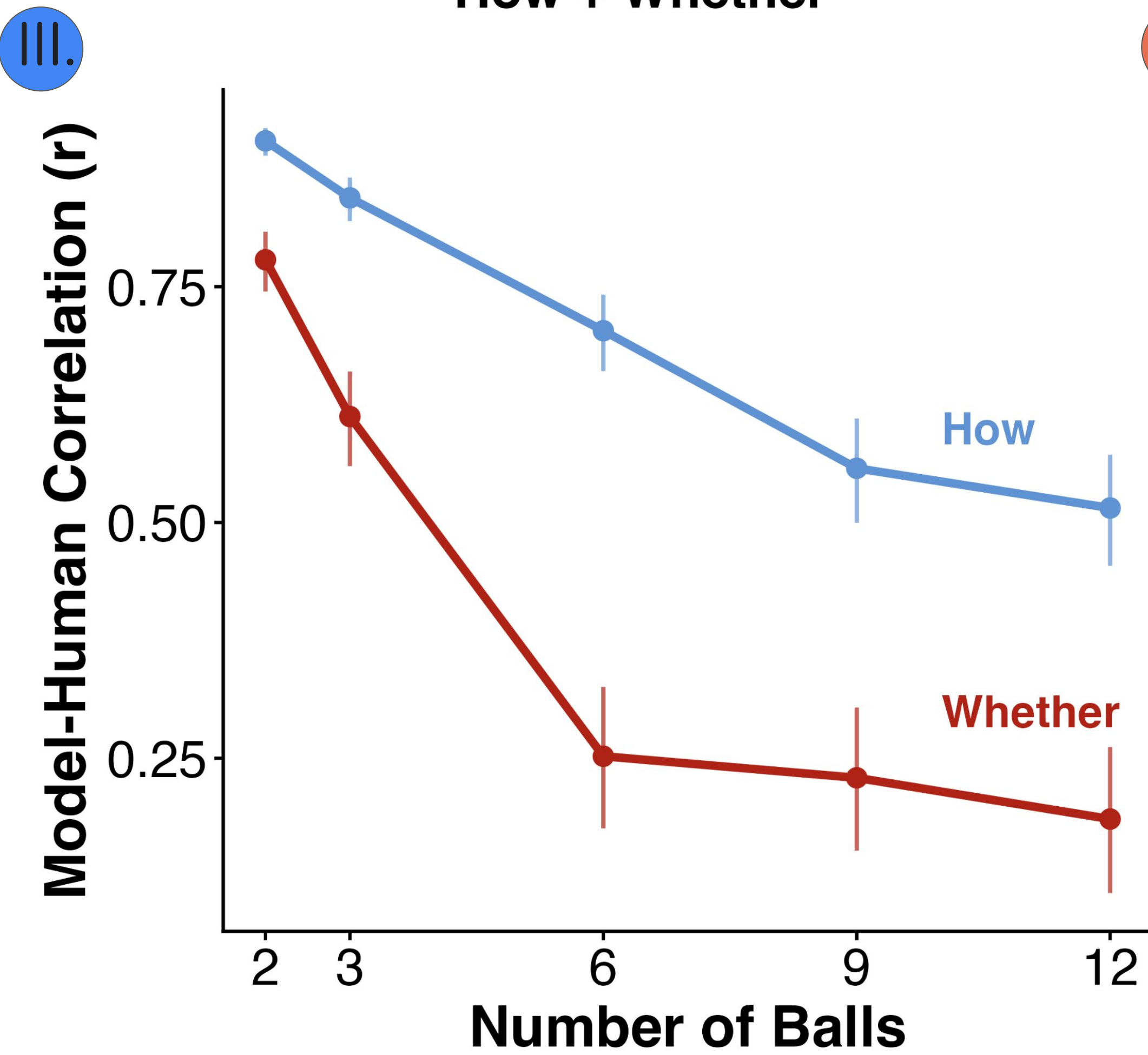
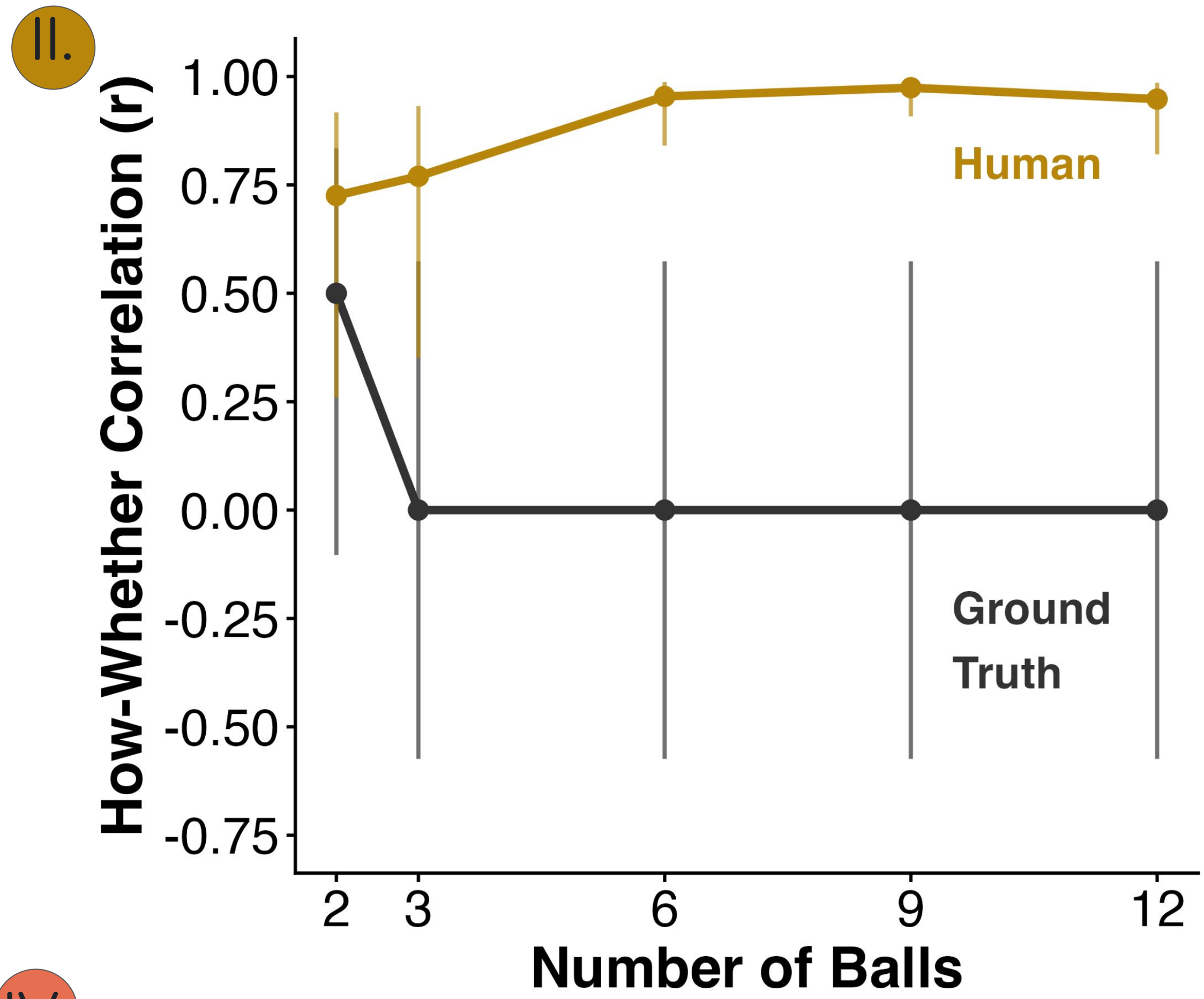
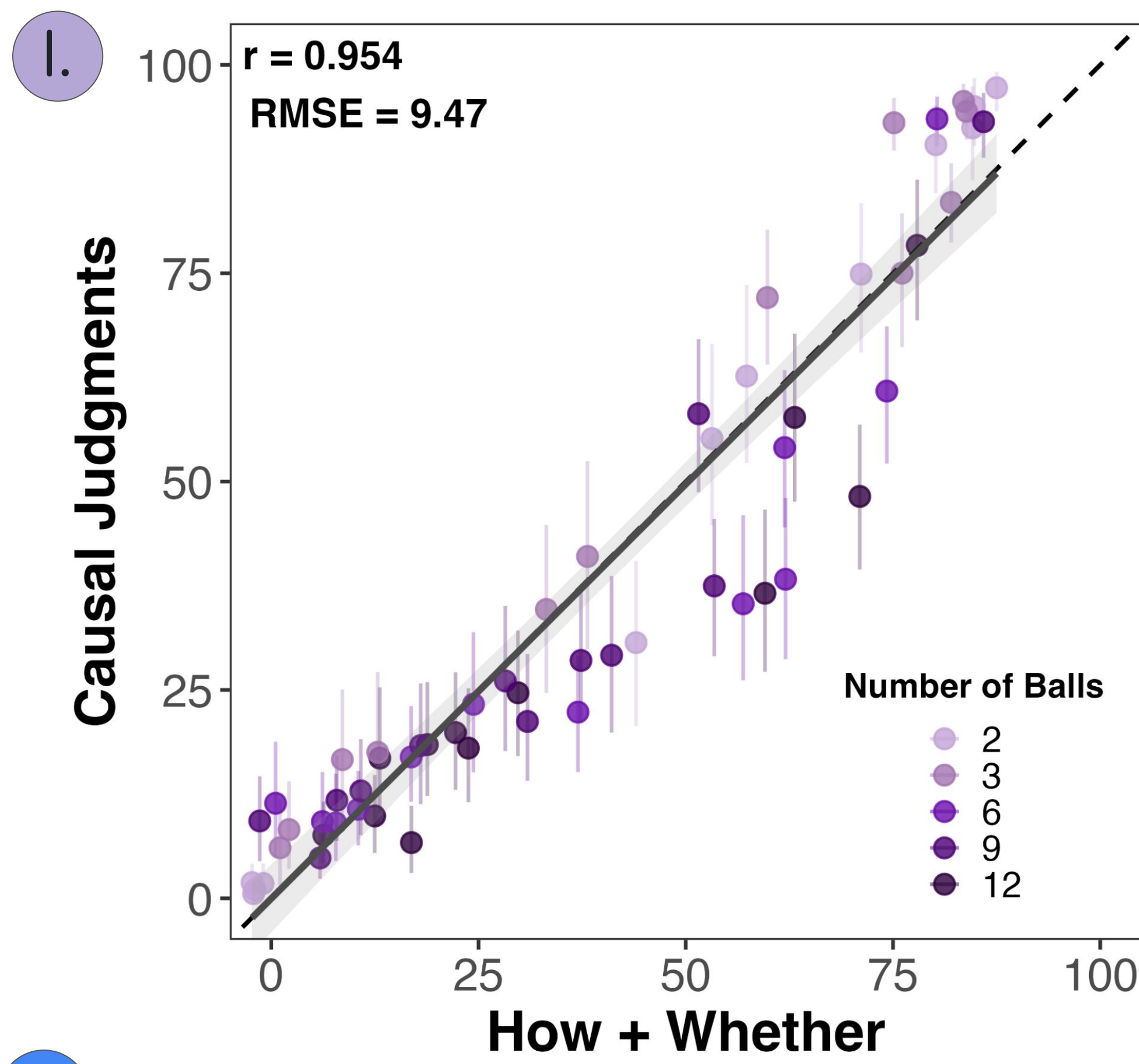
As complexity increases...

I. both how- and whether-aspects predict causal judgments.

II. people's how- and whether-judgments become increasingly correlated, even when how- and whether- are not correlated in the ground truth.

III. people's how- and whether-judgments diverge from model predictions; whether-judgments diverge more rapidly than how-judgments.

IV. people became less likely to explain their causal judgments in counterfactual language, and more likely to describe what actually happened.



Takeaway

- Whether- and how- judgments continue to predict causal judgments even in complex scenarios
- People's judgments increasingly diverge from model predictions as complexity increases
- Their explanations also reflect their reduced reliance on counterfactual thinking
- In complex scenarios, people may rely on tracking "how" to judge "whether" something was a cause

Poster PDF

