Mass naturally affects judgments of stability in the real world. 

Hypothesis

People perceive the world and reason about the past or future using a rich, probabilistic knowledge of physics approximating Newtonian physics.

Last year: “Observer perceives geometric, kinematic, & (possibly) mass/density/etc. state of current scene under uncertainty.”

This year: Mass!

Experiment 1: Mass-Sensitive Stability Predictions

Methods
- 10 participants
- 10 ‘example’ trials
- 20 practice trials
- 384 experiment trials
- 10:1 mass ratio
- 384 experiment trials
- 10 participants

Decision Will it fall?

1. Observer perceives geometric, kinematic, & physical state of current scene under uncertainty.
2. Reasons about possible future states through Newtonian dynamics under gravity/solidity/inertia/mass/etc.
3. Decides about future states by comparing observed and predicted future states.

Experiment 2: Mass-Sensitive Direction Predictions

Methods “In what direction will this tower fall?”

* 20 samples per stimulus
* Two parameters - perceptual uncertainty - mass ratio
* Stability predicate: how many blocks ‘fell’
* Direction predicate: direction of the average position of the heavy blocks that ‘fell’

Model simulations
* 20 samples per stimulus

Discussion

* people are sensitive to mass when judging tower stability and fall direction
* simulation-based model explains human judgments
* heuristics unable to account for variability in human judgments

Can people infer mass, too?

direct perception of mass through kinematics vs. perceptual heuristics (1-D, few objects)

Sanborn, Mansinghka, & Griffiths (2009)
Bayesian inference of mass (1-D, 2 objects)

Given that this tower fell, which color is heavier?

These are stable towers. Which color is heavier?