COGNITIVE PROCESSES AND JUDGMENTAL STRATEGIES IN BELIEF UPDATING

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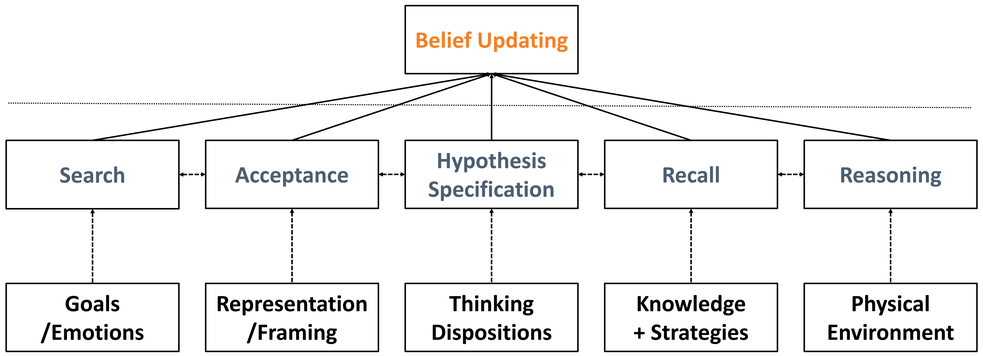
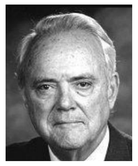
INTRODUCTION

- Sommer, Musolino, & Hemmer (2023) proposed a belief framework distinguishing **belief *updating*** from **evidence evaluation processes**
  - Updating is fast, unconscious, and approximately Bayesian



HYPOTHESIS & PREDICTIONS

- Edwards found less conservatism, relative to Bayesian updating, for *judgment* than for *aggregation*
  - The mechanism underlying this difference was never identified



"the major cause of conservatism is human **misaggregation** of the data… **[people] perceive each datum accurately and are well aware of its individual diagnostic meaning**, but are unable to combine its diagnostic meaning… with other data"

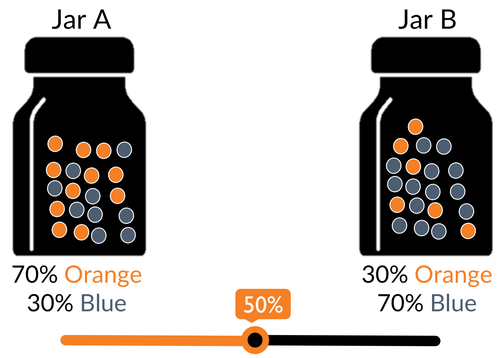
Conservatism in Human Information Processing (Edwards, 1968/1982)

Hypothesis: Updating = Judgment; Aggregation = Evidence Evaluation

- If so, the framework makes predictions:
  1. Updating should be fast
  2. Updating should be inaccessible to verbal report
  3. Updating should be approximately Bayesian

GOAL

- Can we experimentally dissociate updating and evidence evaluation?
  - Solution: a 60-year-old unsolved problem in JDM



- Suppose we flip a coin to draw from Jar A vs. B
  - Update p(drawing from Jar A | drawn marbles)

Aggregation (Simultaneous presentation)

8 orange & 4 blue

VS.

Judgment (Sequential presentation)

1 orange

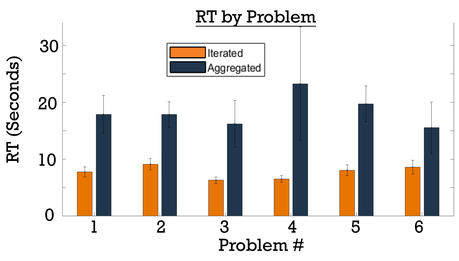
1 orange

1 blue …

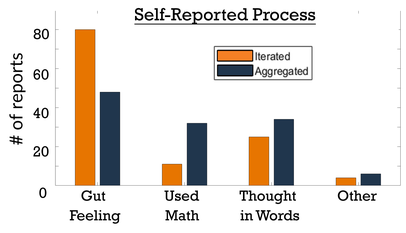
IS BELIEF UPDATING RATIONAL?

EXPERIMENTAL RESULTS

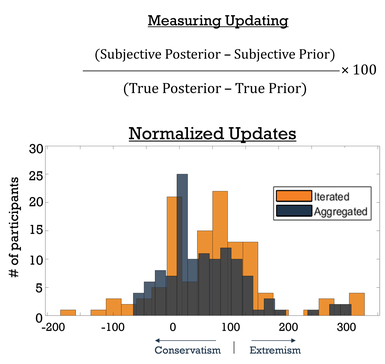
1. Updating is Fast

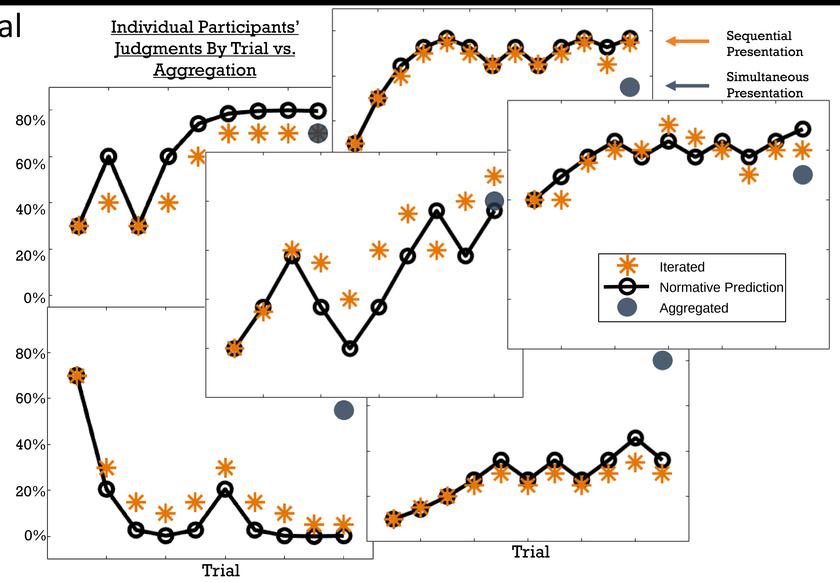


2. Updating is Inaccessible

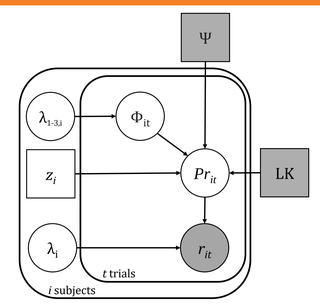


3. Updating is (often) ~Rational





MIXTURE MODEL



Five Judgment Strategies

$z_i \sim \text{Categorical}(1/5, 1/5, 1/5, 1/5, 1/5)$
$\Psi <- p(\text{H})$
$\Phi_1 \sim \text{Gaussian}(p(\text{D}|\text{H}) * p(\text{H}) / p(\text{D}|\text{H}) * p(\text{H}) + p(\text{D}|\sim\text{H}) * p(\sim\text{H}), \lambda_1)$
$\Phi_2 <- 0.5 * \Phi_1 + 0.5 * \Psi$
$\Phi_3 \sim \text{Gaussian}(\text{p(H)}, \lambda_2)$
$\Phi_4 \sim \text{Uniform}(0,100)$
$\Phi_5 \sim \text{Gaussian}(50, \lambda_3)$

$\lambda_{1\text{-}3} \sim \text{Gamma}(0.001, 0.001)$

(Preliminary) Strategy Classification