

# Hindsight bias: Empirical evidence for Hedden's hypothesis

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## Evidence

Within-subject designs

Clinton impeachment before and after

Between-subjects (informed vs. uninformed subjects) designs.

Eg Tetlock2005;  
Fischhoff on trivia questions.

Empirical trends (from meta-analyses):

**Relevance.** Personal relevance/valence don't increase hindsight bias.

**Expertise.** Expertise is not well-correlated with hindsight bias.

**Trivia.** People exhibit greater hindsight bias for trivia questions.

## Formalization

Let  $X$  be a variable for your height.

A function from states to numbers.

Let  $X_a$  be a constant for your actual height.

A number.

E.g.  $X_a = x$ . When height is uncertain, you don't know that  $X = x$ .

Likewise:

Let  $P$  be a *variable* for your prior probability function.

Let  $P_a$  be a constant for your actual prior distribution.

E.g.  $P_a = \delta$ . When prior is ambiguous, you don't know that  $P = \delta$

**Hindsight bias:** When you learn  $q$ , updating from  $P_a$  to  $P_a^+ = P_a(\cdot|q)$ , that raises your expectation for your prior credence in  $q$ ,  $P(q)$ .

$$\mathbb{E}_{P_a}(P(q)) < \mathbb{E}_{P_a^+}(P(q))$$

## Existing Theories

*Motivated reasoning.* People want to make themselves look good.

*Selective-recall and sense-making.* Knowing  $q$  strengthens associative connections to  $q$ -supporting evidence and memories.

*Bayesianism + higher-order uncertainty.* You're unsure what your prior  $P(q)$  was; since you trust it, learning  $q$  increases your estimate for  $P(q)$ .

**Fact.**  $P_a$  exhibits HB given  $q$  iff  $P_a$  thinks  $P(q)$  and  $q$  are correlated.

Formally:  $\mathbb{E}_{P_a}(P(q)) < \mathbb{E}_{P_a}(P(q)|q)$  iff  $cov_{P_a}(P(q), q) > 0$ .

$$cov_{P_a}(P(q), q) = \mathbb{E}_{P_a}(P(q) \cdot \mathbb{1}(q)) - \mathbb{E}_{P_a}(P(q)) \cdot \mathbb{E}_{P_a}(\mathbb{1}(q))$$

## Predictions

i) Bayesian theory can explain Expertise

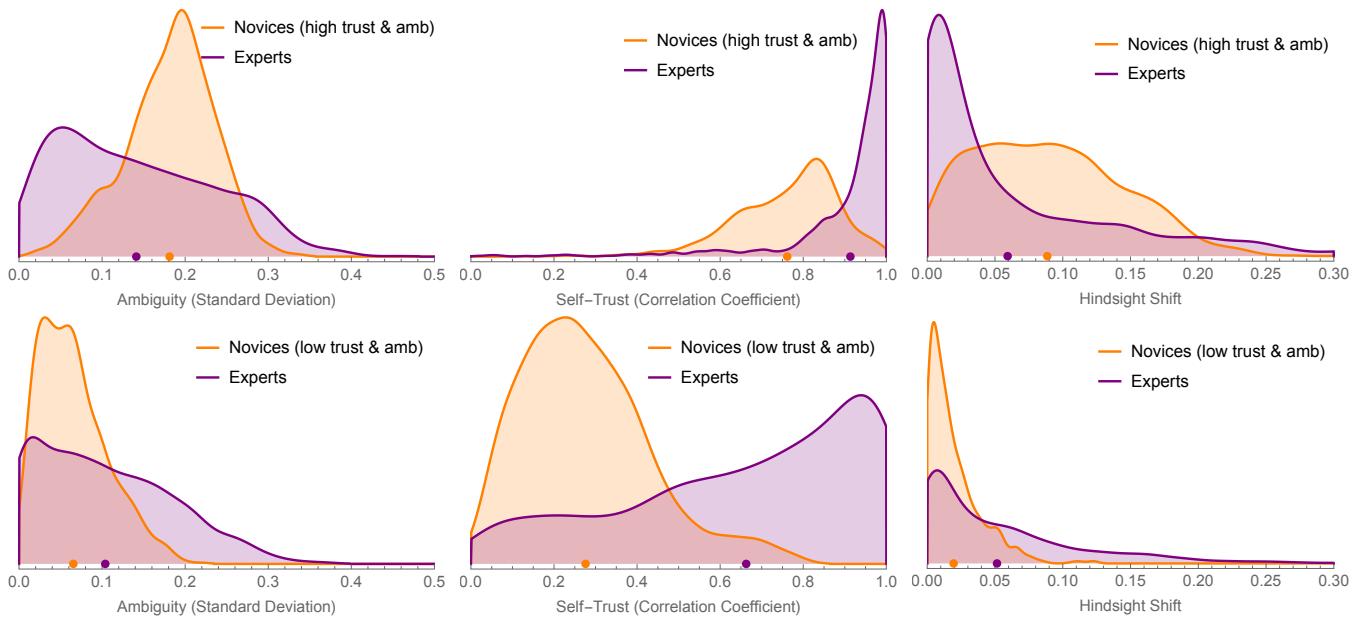
Expertise will *decrease ambiguity* but *increase self-trust*. Depending on which effect predominates, can decrease or increase HB.

When novices have hi ambiguity and trust, expertise will decrease HB.

social prediction?

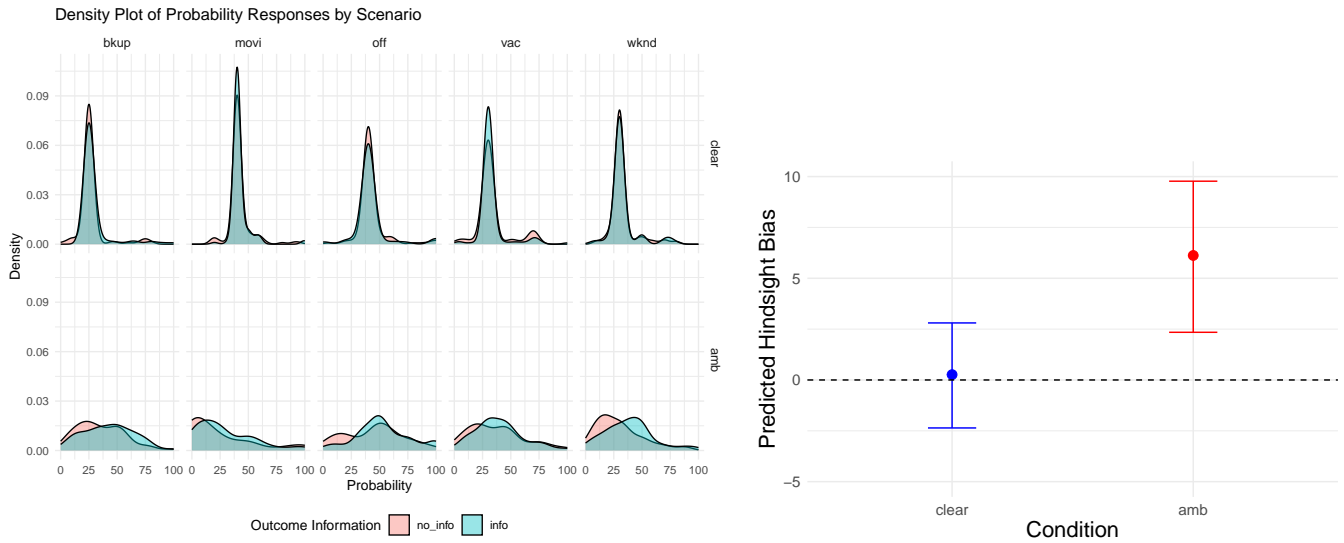
When novices have lo ambiguity and trust, expertise will increase HB.

chess novices



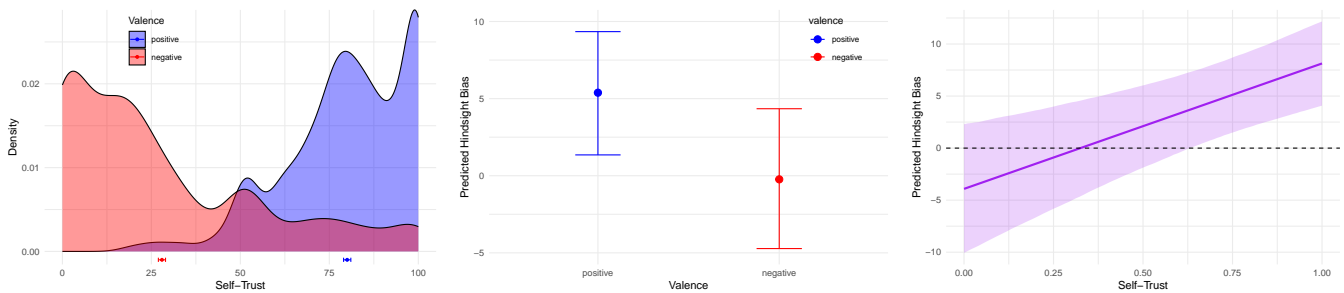
ii) Bayesianism predicts that inducing clarity will remove HB

Experiment 1, between-subjects



iii) Bayesianism predicts that reducing self-trust should reduce HB

Experiment 3, self-trust



Q: How else could we explain these findings?