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Decline, Adopt, or Compromise: A New Model of Advice Taking

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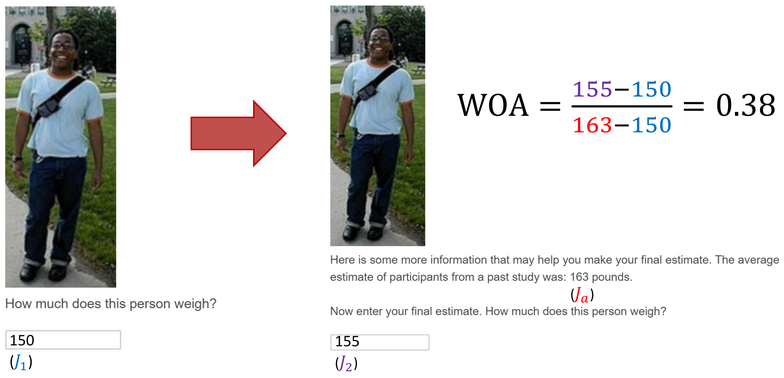
Himmelstein, M. (2022). Decline, adopt or compromise? A dual hurdle model for advice utilization. *Journal of Mathematical Psychology, 110*, 102695.

Introduction: Judge Advisor Systems

- Judge Advisor Systems study **advice utilization**
- Judge's belief (J_1) is elicited, they are offered advice (J_a) , then allowed to revise (J_2)
- Weight of advice (WOA) is: $\text{WOA} = \frac{J_2 - J_1}{J_a - J_1}$
- Implies J_2 is a weighted average of J_1 and J_a

$$J_2 = \text{WOA}(J_a) + (1 - \text{WOA})(J_1)$$



$$\text{WOA} = \frac{155 - 150}{163 - 150} = 0.38$$

Egocentric Discounting Bias

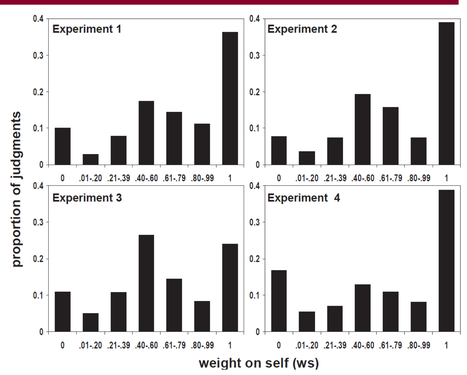
Mean **WOA** is commonly in the range of **0.2 to 0.3** (Harvey & Fischer, 1997; Soll & Larrick, 1999, 2009; Yaniv & Kleinberger, 2000)

Conclusion: People weigh their priors more heavily than advice

Choosers vs. Averagers

Soll and Larrick (2009) pointed out that the distribution of WOA is typically **trimodal**.

- Mode 1: WOA = 0
- Mode 2: 0 < WOA < 1
- Mode 3: WOA = 1



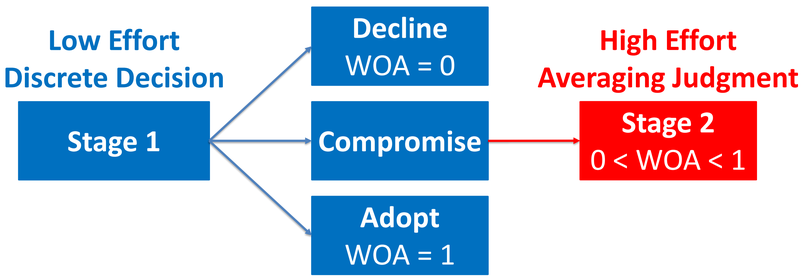
Conclusion: Some people **choose** between their priors and advice, while others **average**

Note: $ws = 1 - WOA$

This implies an alternative account of egocentrism. Mean WOA tends to be heavily influenced by cases where WOA = 0

How should we approach this problem theoretically and computationally?

Theoretical Model: Two Stage Process



Computational Approach: Dual Hurdle Model

$$WOA_i = \begin{cases} = 0 \; with \; P_{i,decline} = \eta_{1i} \\ = 1 \; with \; P_{i,adopt} = \eta_{2i} \\ = avg_i \; with \; P_{i,compr} = 1 - \eta_{1i} - \eta_{2i} \end{cases}$$

$$avg_i \sim Beta(a = \phi_i \mu_i, b = \phi_i(1 - \mu_i))$$

$$\left.\begin{aligned} \eta_{1i} &= \frac{e^{\beta_1 x_i}}{1 + e^{\beta_1 x_i} + e^{\beta_2 x_i}} \\ \eta_{2i} &= \frac{e^{\beta_2 x_i}}{1 + e^{\beta_1 x_i} + e^{\beta_2 x_i}} \end{aligned}\right\} \textit{Multinomial Logistic Regression}$$

$$\left.\begin{aligned} \mu_i &= \frac{1}{1 + e^{-\beta_3 x_i}} = expectation \; of \; Beta \; dist. \\ \phi_i &= e^{\beta_4 x_i} = precision \; of \; Beta \; dist. \end{aligned}\right\} \textit{Beta Regression}$$

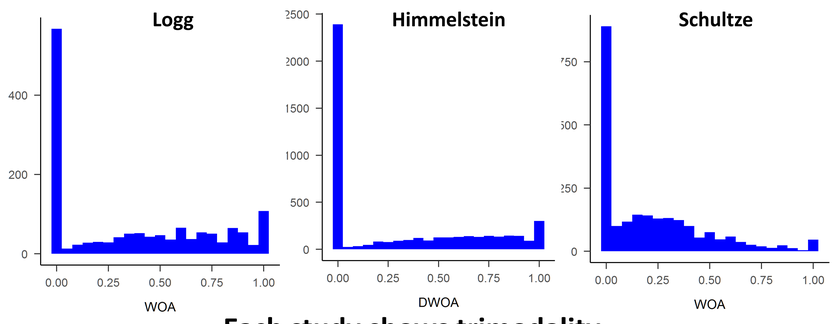
- Each $\boldsymbol{\beta_k x_i}$ represents effects of **predictors** (e.g. distance between advice and prior belief).
- **Multinomial logistic regression** models probabilities of the different **Stage 1 choices (decline, adopt, compromise)**
- **Beta regression** models **Stage 2 averaging judgments**
- Model allows us to study how predictor variables affect **both stages** of advice utilization separately

Validation

Reanalyzed advice taking studies on

- Algorithm appreciation (Logg et al., 2019)
- Judgmental forecasting (Himmelstein & Budescu, 2022)
- **Egocentric discounting (Schultze et al., 2015)**

Distributions of WOA

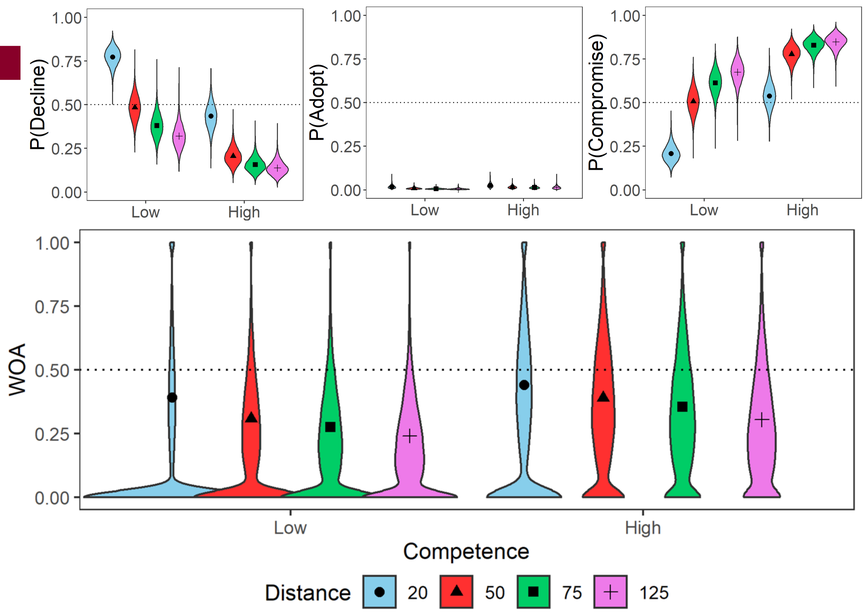


Each study shows trimodality

Schultze et al. (2015) Egocentric Discounting

- **Task**: estimate distances between European capital cities
- Varied absolute **distance** between J_1 and J_a
- Also manipulated **advisor competence**
- Found **curvilinear relationship** between distance and WOA
- Advice that was **too similar** or **too different** was discounted

Results and Insights from Dual Hurdle Model



- Top panels show **posterior predictive distribution (PPD)** of **Stage 1 Probabilities** for **advisor competence** and **distance**
  - Points are **posterior means**
- Bottom panel shows **PPD of WOA**
  - Points are **posterior means in averaging judgment**
- **Low effort decision to decline (Stage 1) drives discounting of low distance advice**
- **High effort averaging judgment (Stage 2) drives egocentric discounting**

Key Benefit

Model can separate effects that occur during **low effort Stage 1 decision** from **high effort Stage 2 judgment**

Other Highlights and Conclusions

Logg et al. (2019)	Himmelstein & Budescu (2022)
• Algorithm appreciation was driven by **low effort Stage 1 decision**, not **high effort Stage 2 averaging judgment** • Lay and expert participants were both more likely to **adopt algorithmic advice** during **Stage 1 decision**	• Found evidence of algorithm appreciation for **long time horizon** previously undetected at **Stage 1** • Many effects involving belief-advice distance were clearly separable between **Stage 1** and **Stage 2**

Across all three studies, there was substantial evidence of individual differences in choosing (Stage 1) vs averaging (Stage 2) strategies