Lay Perceptions of Scientific Findings: Swayed by the Crowd?

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Introduction

Every day, important scientific findings are rejected at large. From man-made climate change to the safety and efficacy of Covid-19 vaccinations, **science skepticism** has run rampant among lay consumers in modern society (Hornsey & Fielding, 2017). To **increase public faith in science**, some have proposed the use of **crowd science** (Silberzahn et al., 2018; Uhlmann et al., 2019).

We explore the effects of scientific findings emerging from a **crowd** of researchers (vs. a typical research collaboration) on **lay perceptions of scientific findings**. In line with **social norm theory** (Miller & Prentice, 2016), we expect that observing **consensus** among a crowd (the **consistent crowd** condition) will – compared to the conclusion of a single scientist (the **single estimate** condition) – increase conformity in opinion. Drawing from work on **intuitive statistics** (Gigerenzer & Murray, 2015), we also expect laypeople to intuitively accord to the logic of the **wisdom of crowds**: the ability of an **aggregate of multiple estimates** (rather than a single estimate) to **reduce noise** stemming from individual bias or error (Schweinsberg et al., 2021).

In contrast, when crowd estimates show low consensus and high variance (the **inconsistent crowd** condition), we predict that observers will be less swayed and more likely to **attribute** the findings to **bias** and **error**. In addition, due to the difficulty of lay reasoning about variation (Ben-Zvi & Garfield, 1999), we predict an **aversion to variability**: i.e., we expect that observing variable estimates will decrease lay **confidence** in the precise average parameter estimate in both crowd conditions.

Hypotheses

Table 1: *Predicted differences with the single estimate condition*

Measure	Consistent crowd	Inconsistent crowd
1. Posterior beliefs in the phenomenon	↑	↓
2. Credibility of the results	↑	↓
3. Confidence in the precise estimate	↓	↓
4. Scientific bias	↓	↑
5. Scientific error	↓	↑
6. Scientific discretion	No prediction	No prediction

Note. We regress each outcome on **prior beliefs** and **condition** (with the **single estimate condition** as the **reference category**). When laypeople observe multiple consistent (inconsistent) estimates from a crowd, we expect – compared to a single estimate and controlling for prior beliefs – higher (lower) **posterior beliefs** and **credibility** of the results, lower **confidence** in the precise average parameter estimate, and lower (higher) ratings of **bias** and **error**.

Open Science: Preregistration, survey, data, and code available at

github.com/shilaan/many-analysts

osf.io/vedb4

Methods

We ran an experiment (N = 1,498; UK/US Prolific) with **three conditions**

Single estimate

A single parameter estimate (5%)

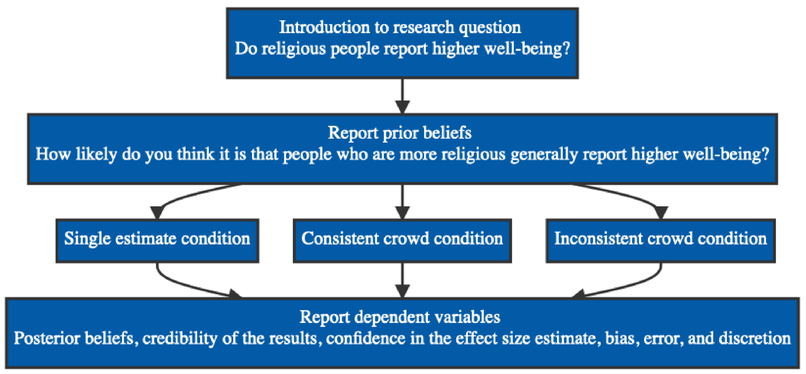
Consistent crowd

Multiple crowd estimates: low variance, high consensus (M = 5%)

Inconsistent crowd

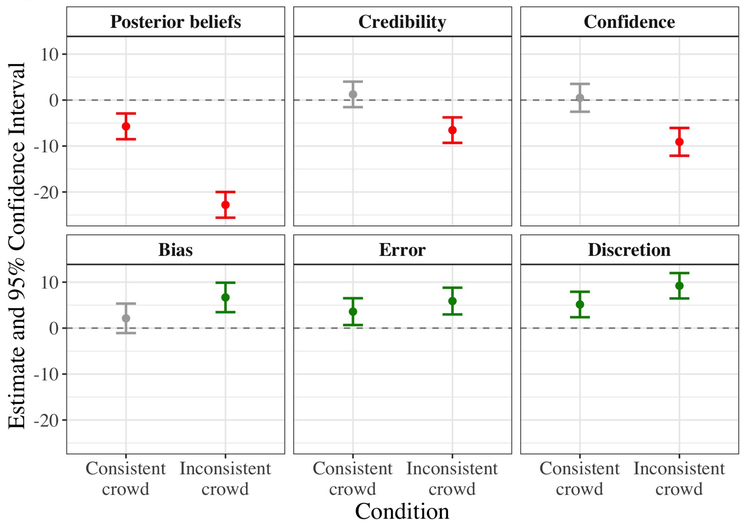
Multiple crowd estimates: high variance, low consensus (M = 5%)

Experimental Design



Results

Figure 1: *Estimates of differences with the single estimate condition*



In line with our hypotheses, lay consumers of **inconsistent crowd estimates** (vs. a single estimate)...

- ↓ Have lower posterior beliefs about the reported phenomenon
- ↓ Find the results less credible
- ↓ Have less confidence in the average estimate of 5%
- ↑ Are more likely to attribute the average estimate (5%) to bias
- ↑ Are more likely to attribute the average estimate (5%) to error

Contrary to our hypotheses, lay consumers of **consistent crowd estimates** (vs. a single estimate)...

- ↓ Have lower posterior beliefs about the reported phenomenon
- ↑ Are more likely to attribute the average estimate (5%) to error

We found **no significant effects** for lay consumers of **consistent crowd estimates** (vs. a single estimate) on...

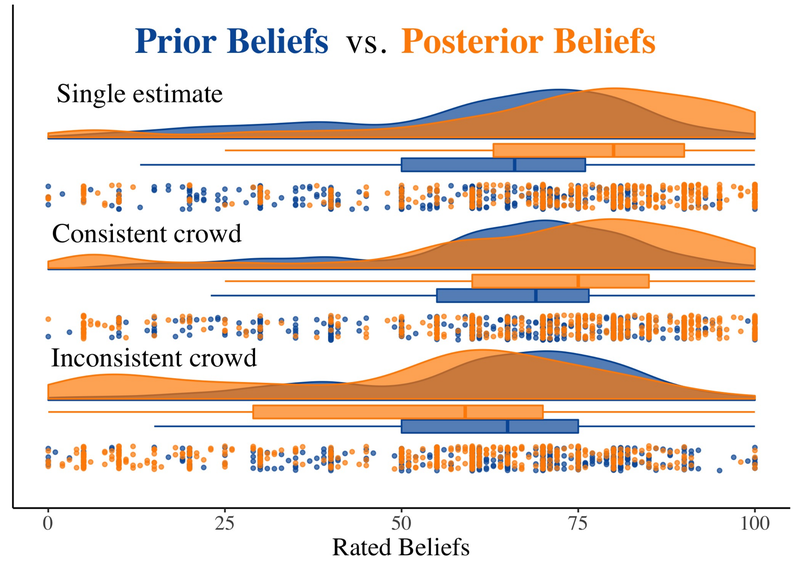
- ? Credibility of the results
- ? Confidence in the average estimate
- ? Ratings of bias

Exploratory results

For the additional **exploratory measure**, lay consumers of consistent and inconsistent **crowd estimates**...

- ↑ Perceive greater discretion (i.e., idiosyncratic choices)

Figure 2: *Distribution of prior and posterior beliefs by condition*



In terms of **belief updating**, Figure 2 shows a positive difference within the consistent crowd condition (pre vs. post M_d = 4.75 [2.55,6.95]), but less so than for the single estimate condition (M_d = 11.66 [9.66,13.66]). As expected, we find negative belief updating in the inconsistent crowd condition (M_d = -11.45 [-13.75,-9.16]).

Conclusion

Compared to providing a single estimate, we find no evidence that crowd estimates improve lay perceptions of scientific findings

Future directions

- ? Does **variability aversion** explain the findings?
- Perceptions of **scientists**
- **Science communication** and **communicating uncertainty**