# 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 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. Bias | ↓ | ↑ |
| 5. Error | ↓ | ↑ |
| 6. 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

[Insert GitHub link here]

[Insert OSF link here]

## Methods

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

**Single estimate**

A single parameter estimate (5%)

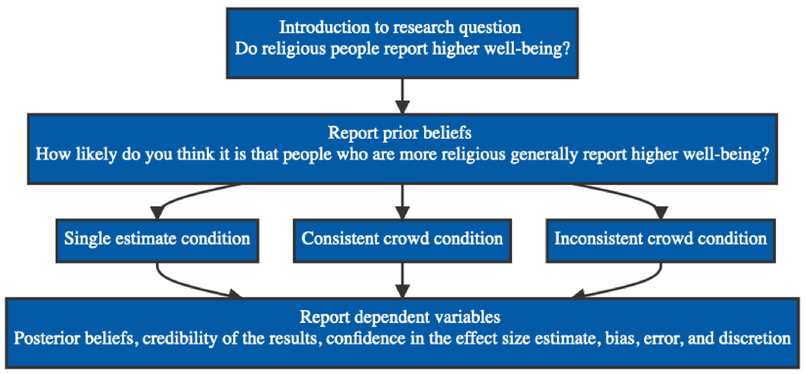
**Consistent crowd**

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

**Inconsistent crowd**

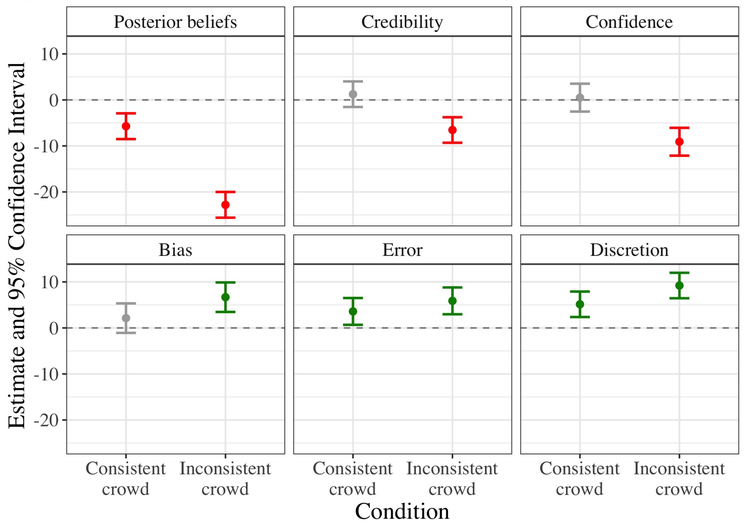
Multiple crowd estimates: high variance, low consensus (M = 5%)

### 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...

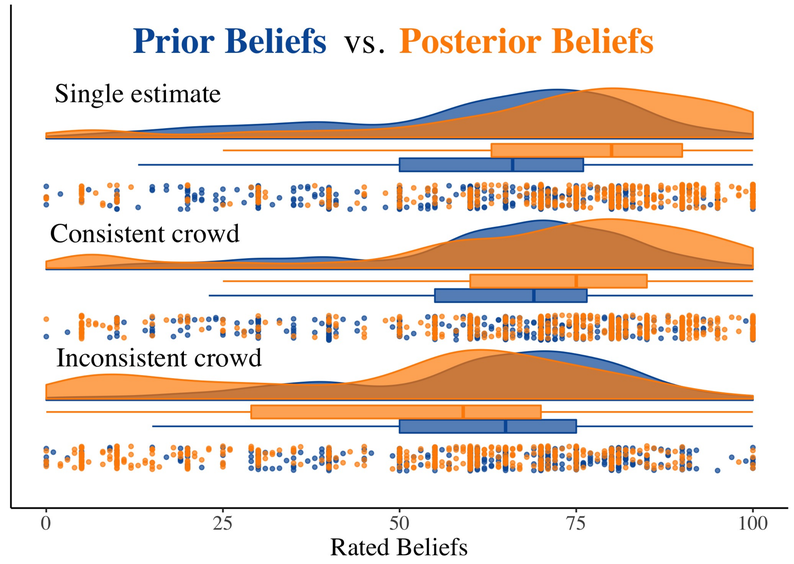
- ? Credibility of the results
- ? Confidence in the average estimate
- ? Ratings of bias

### 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**