PUBLIC PERCEPTIONS OF EXPERT DISAGREEMENT

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Expert Disagreement

- Expert disputes are common within many scientific and forecasting domains.
  - Climate Change
  - Health
  - Economic
  - Socio-political
- Important to understand public reactions to publicized expert disputes
  - Help to design better communication strategies

Why do Experts Disagree?

- Expert consensus is a necessary feature of expertise itself (Einhorn, 1974)

- From this traditional perspective disagreement is result of:
  - Incompetence (i.e., they are not experts) or
  - Intentional or unintentional bias due to ideology, worldviews, or private interests (Hammond, 1996).

Why do Experts Disagree?

- Disagreement is part of the normal scientific process (Shanteau, 2000).

- Alternative perspective that disagreements are expected even among the most competent and unbiased experts.
  - Ill-structured, complex, dynamic, uncertain, and evolving nature of real-world problems.
  - Experts think about these problems differently (Mumpower & Stewart, 1996).

Lay Perceptions of Expert Disagreement

- Lay public have virtually no way of knowing the actual causes or magnitude of expert disagreements (Collins & Evans, 2007).

- *This doesn't mean that the public will withhold judgment when confronted with expert disputes.*

Lay Perceptions of Expert Disagreement

Possible Inferences of the Lay Public About Expert Disagreements

Causal Inference	***Description***: Experts disagree because . . .
1. Too much complexity in domain	. . . making predictions is very difficult in complex, chaotic systems with a large number of diverse interrelated components.
2. Too much randomness in domain	. . . making predictions is very difficult in domains where events have a lot of fundamental unpredictability or "randomness".
3. Experts lack knowledge	. . . they have not yet acquired enough scientific knowledge about the causes of the event.
4. Experts are incompetent	. . . they are incompetent and are not really "experts" at all.
5. Experts are biased	. . . one or more experts are intentionally or unintentionally biasing their conclusions due to ideology, worldviews, or private interests.
6. Experts are unwilling to admit uncertainty	. . . they are not willing to admit uncertainty and are providing simplistic overly precise forecasts.

Previous Work on Lay Perceptions

- Disagreement about environmental, health & safety risks (Johnson and Slovic, 1998; Johnson, 2003).
  - Self-interest
  - Expert incompetence
  - Lack of scientific knowledge

- Finnish interview study on disagreements about risks of food additives (Kajanne & Pirttilä-Backman, 1999).
  - Difficulty in attaining scientific information (low education group)
  - Bias or self-interest (high educated group)
  - Incompetence and knowledge differences

The present study

- We use a psychometric approach (Slovic, 1987) to examine public perceptions of expert disagreement across a diverse sample of forecasting topics.

- Examine education/cognitive ability and knowledge about the topic as possible moderators of these perceptions.

Dieckmann, N. F., Gregory, R., Johnson, B., Mayorga, M., Han, P. K. J., & Slovic, P. (in press). Public perceptions of expert disagreement: Expert bias and incompetence or a complex and random world? *Public Understanding of Science.*

Topics

- We generated 56 different forecast topics, 8 topics for each of 7 domains.

- Within each domain we varied
  - Time horizon - Short (6 months), Medium (5 years), Long (15 years), and Very long (50 years).
  - Binary (event will happen or not) versus continuous forecast.

Example Forecast Topics

- Health
  - “Whether heart disease will still be the leading cause of death 15 years from now.”
- Politics
  - “Whether the Affordable Care Act (Obamacare) will still be law 5 years from now.”
- Terrorism
  - “Whether terrorists will succeed in downing a commercial airliner in the next 6 months.”
- Climate Change
  - “The average sea level rise along U.S. coasts 15 years from now.”

Example Forecasts

- Economics
  - “Whether the value of the Dow Jones stock market index will be above 20,000 5 years from now.”
- Crime
  - “The violent crime rate (per 1000 citizens) in the U.S. 50 years from now.”
- Environment
  - “Whether laws protecting endangered species in the United States will be significantly weakened by Congress within the next 6 months.”

Sample & Procedure

- Participants (N=342) were recruited from an online subject panel.
  - 57% Female
  - Median age 45 yrs/old (range 22-76)
  - 26% high school of less, 31% some college or vocational school, 27% college, and 16% advanced degrees
- Each participant was presented with 7 randomly selected forecast topics, one from each domain.

Ratings

- Outcome
  - Perceived expert disagreement (3 items)
- Predictors
  - Irreducible complexity (1 item)
  - Irreducible randomness (1 item)
  - Expert knowledge (2 items)
  - Expert bias from ideology, worldviews, or private interests (2 items)
  - Expert competence (2 items)
  - Expert willingness of admit uncertainty (2 items)
- Other measures
  - Numeracy and IQ measures.
  - Self-reported knowledge of each forecast topic rated.

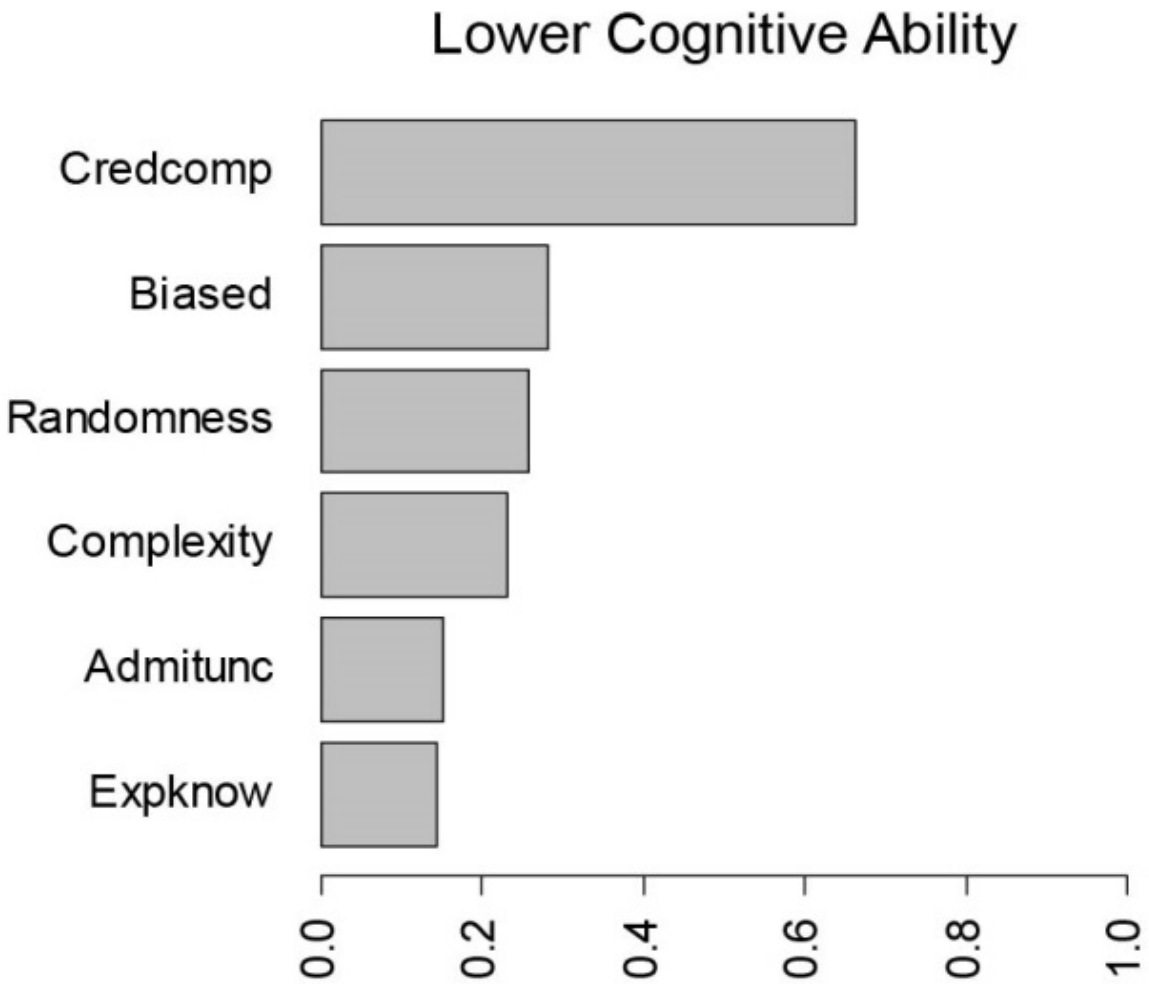
Analytic Approach

- Regression Modeling
  - Calculate mean on each measure for each forecast topic and did analysis at forecast level.
  - Primary outcome was perceived expert disagreement
- Model selection
  - Used information criteria (BIC) to determine best fitting regression models
  - glmulti package for the R statistical computing environment (Calgano & Mazancourt, 2010)

Variability in Perceived Disagreement

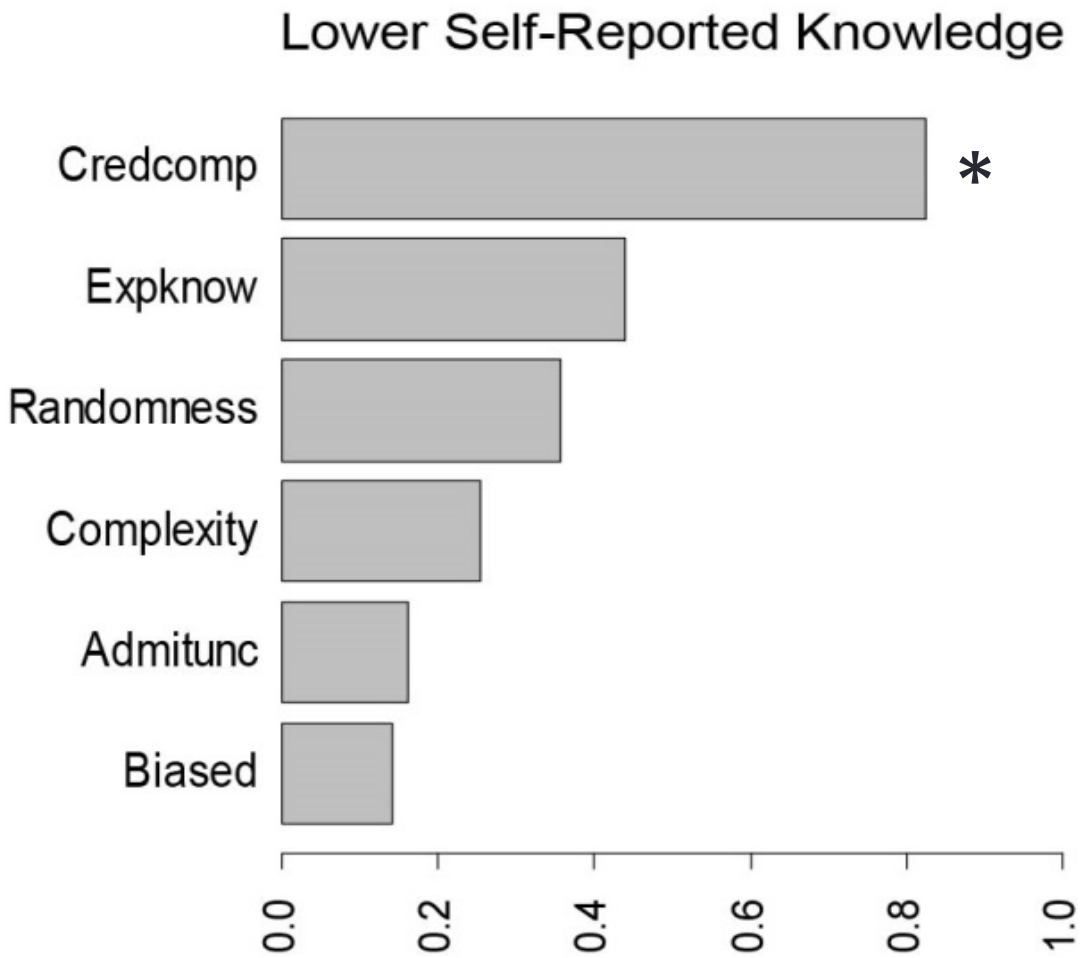
- Average expected disagreement ratings varied greatly across forecast topics.
  - Variance not explained by time horizon.
  - Domain not a strong predictor although forecasts in the health domain tended to elicit lower ratings of expected disagreement.
- Most interpretable regression models were those stratified by education and self-reported knowledge.

Predictors of Disagreement



*** Predictor included in best fitting model**

Predictors of Disagreement



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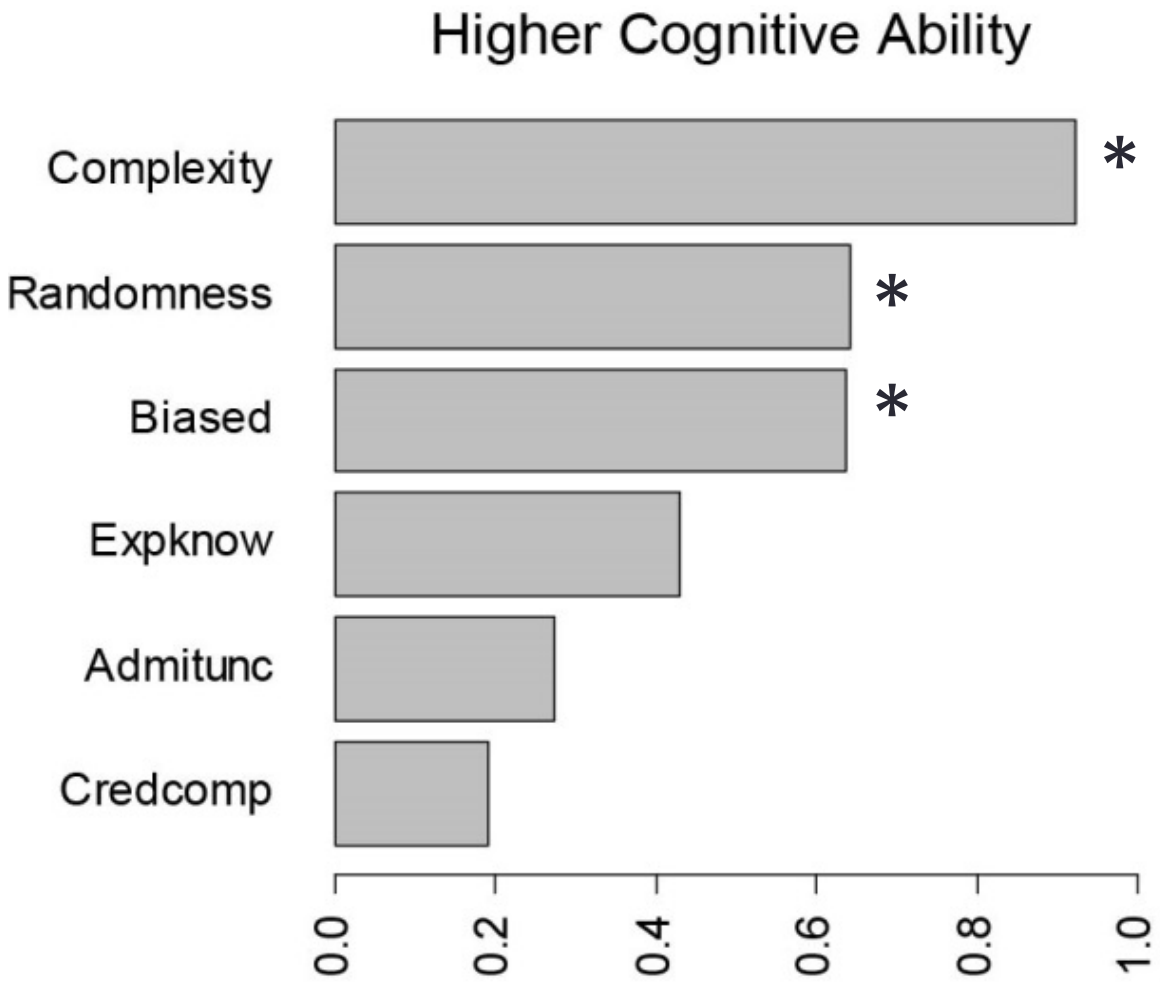
Predictors of Disagreement



*** Predictor included in best fitting model**

Predictors of Disagreement

*** Predictor included in best fitting model**

Conclusions

- People lower in education and self-reported knowledge appear to most strongly attribute expert disputes to expert incompetence.

- This may relate to a more simple view of science as objective and certain, where any disagreement must be an indication of faulty experts.

Conclusions

- People with the highest self-reported knowledge about a forecast topic appeared to overwhelmingly attribute disputes to bias.

- This implies a more sophisticated view of science as being socially constructed and thus (for better or worse) subject to influence from financial or ideological interests.

Conclusions

- The natural causes (complexity/uncertainty) strongly predicted levels of disagreement for only the most educated, cognitively able participants, outweighing even their co-attribution of expert bias.

- This suggests a view of science integrating inherent complexity and randomness and the socially constructed nature of scientific claims.

Open Questions

- When/how do people perceive disagreement at the individual issue level?
  - Issue of conflict
  - Multiplicity
  - Evidence heterogeneity
  - Temporal inconsistency

Carpenter, D. M., Geryk, L. L., Chen, A., Nagler, R., Dieckmann, N. F., & Han, P. K. J. (in press). Conflicting health information and its implications for patient care. *Health Expectations*.

Open Questions

- How does perceived cause (e.g., incompetence) of disagreement affect judgment and decision making?
  - Ignore information or seek more information (Elstad, et al., 2012)
  - Weight information less or only use information that confirms prior beliefs (Tversky et al., 1988; Han et al., 2013)
  - Decision paralysis (Samuelson, et al., 1988)
  - Lower behavioral intentions (Nagler, 2014)
  - Increase anxiety and heighten risk perceptions (Pollack, et al., 2004; Han et al., 2006)

Open Questions

- How can we “nudge” people to be more accepting of disagreement as a natural part of science?
  - Perhaps embed simple epistemological education within communications to reinforce concepts like randomness, complexity and limitations in our ability to know.
  - May also suggest a need for audience segmentation—i.e., use of different interventions for different segments of lay society.

Thank you!

Funding for this work was provided by the National Science Foundation: #0925008 and #1231231.