Awareness of cognitive biases, perceptions of public audiences, and the effectiveness and moral propriety of communicative strategies.

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Background. Calls for scientists to adopt novel communicative strategies such as 'framing', in order to improve communication with the general public, have been met with reluctance.[1,2] It is desirable to know how best to focus training so as foster the appropriate use of communication strategies.

Research Questions. We used survey data to determine whether scientists' judgments of the **propriety** of particular acts of communication could be better influenced by changing 1) their awareness of **cognitive biases** likely to characterize a public audience, 2) their other perceptions of **public audiences**, 3) their judgments of the **effectiveness** of particular communication strategies, such as framing, or 4) their **communicative norms**.

Results. Our analysis supports the influence of **communicative norms** on judgments of **propriety** (Models 1 and 2), and supports the hypotheses that **communicative norms**, **awareness** of **cognitive biases**, and **perceptions of public audiences** indirectly influence judgments of the **effectiveness** of communication strategies (Models 1 and 3). But our analysis does ***not*** support the hypotheses that judgments about **effectiveness**, awareness of **cognitive biases** or perceptions of **public audiences** directly influence judgments of **propriety** (Models 1 and 2).

Conclusions. Assuming that moral judgments affect behavior, we find that interventions directed to change communicative norms may potentially modify communicative behavior, while interventions directed to change judgments of effectiveness, perceptions of public audiences or awareness of cognitive biases are less likely to produce such changes. For example, changing beliefs about the degree to which it is permissible to accommodate the non-scientific values of an values of an audience and to advocate for acceptance of findings, as opposed to policy recommendations, is likely to influence the degree to which scientists judge it permissible to engage in framing, simplification, and analogies in their communications with the general public.

Survey Design.

63-item on-line survey of 987 faculty and graduate students in the physical, biological and social sciences at 3 state universities. 111 subjects completed the survey.

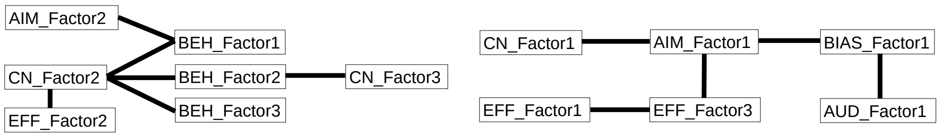
Survey questions requested demographic information, and responses on a seven point Likert-type scale to questions in seven domains:

- Awareness of **cognitive bias** (7 **BIAS** instruments);
- The **aims** of scientific communication (6 **AIM** instruments)
- Beliefs about the **effectiveness** of communication strategies in generating understanding of, acceptance of and interest in scientific results (14 **EFF** instruments).
- Beliefs about **communicative norms** (9 **CN** instruments);
- Perceptions of the attitudes and competencies characteristic of **public audiences** (9 **AUD** instruments);
- The degree to which the subject's implicit **moral theory** is more generally deontic or consequentialist (5 **MT** instruments).
- The propriety of particular acts of communication (11 **BEH** instruments), employing four communication strategies (simplification by omission, use of analogy, framing, and accommodation).

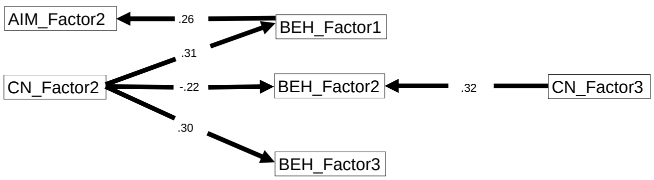
Data Analysis.

- Missing values were imputed using a regression model.
- The TETRAD IV FCI algorithm was used to cluster instruments within domains.[3]
- Exploratory factor analysis was done in SPSS. Factors with Eigenvalues greater than or equal to 1 were constructed.
- The TETRAD IV PC algorithm was used to find an equivalence class of causal structures over the factor variables.
- TETRAD analyses were repeated on the local structures (directly connected variables only) governing BEH and EFF factors to test for stability.
- Alternative parameterized models over the factor variables, consistent with the edges in the inferred local structure, were then constructed and tested by χ^2.

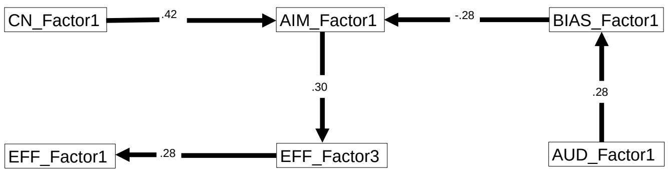
Model 1: **Global Structure**. Factor variables MT_Factor1, BIAS_Factor2, AUD_Factor2, and EFF_Factor4 omitted because not causally connected to outcomes of interest.



Model 2: **Local Structure over BEH Factors** (judgments of appropriateness). χ^2 p=.57.



Model 3: **Local Structure over EFF Factors** (judgments of effectiveness), EFF_Factor4 omitted. χ^2 p=.4.



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