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The Effects of Climate Science Literacy and Cultural Polarization Around Climate Change Risk Perception

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Introduction

This project examines two competing theories related to low risk perception of climate change in the United States among the general public.

Science Comprehension Theory
1. The public form risk perceptions of climate change based on sound scientific information.
2. The public lack sound scientific information about climate change.
3. Bounded rationality (limits to technical reasoning capacity) forces the public to rely on heuristics like cultural worldviews (e.g. conservative or liberal values) to assess the risks of climate change.

Therefore to align the public’s risk perception of climate change with scientists’ empirical predictions, the public need better climate science information and better cognitive skills to decrease reliance on their cultural worldviews when evaluating risk.

Cultural Cognition Theory
1. The public primarily form risk perceptions of climate change based on the worldviews of groups with which they most strongly identify, not sound scientific information.
2. Cultural worldviews are not heuristic devices, but deeply ingrained ways people fit in society that cannot be easily overcome by increasing knowledge or technical reasoning ability.

Therefore more scientific information will not convince the unconverted, in fact, it will actually make the problem worse, as more advanced scientific literacy and technical reasoning will lead to a greater ability (at a subconscious level) to judge and deflect potential threats to their worldviews.

Recently published evidence supports the cultural cognition thesis, but general science literacy (GSL) was used as a measure. Other current studies have found evidence that climate science literacy (CSL) increases risk perception across the general public, especially knowledge related to the causes of climate change.

Research Question: Which theory better explains people’s risk perceptions around climate change?

Hypotheses:
1. Climate Science Literacy (CSL) will be positively correlated with risk perception across all worldviews.
2. CSL will be positively correlated with risk perception among both Hierarchical Individuals (those who generally have the lowest risk perception of climate change), and Egalitarian Communicators (those who generally have the highest risk perception of climate change).
3. CSL specifically related to the causes of climate change will have a stronger correlation with risk perception than both the CSL combined measure and any other CSL subgroup.

Results: Correlations and Regressions

Figure 1 While the combined measure of CSL was not significantly correlated with risk (not pictured, r(109)=.159, R²= .025, p=.096, two tailed), the correlation between the section of the CSL test dealing with the causes of climate change and risk (above) was statistically significant, (r(109)=.402, R²= .161, p=.000, two tailed). Even when controlling for cultural worldviews, CSL causes explained more variance (R²= .387, p=.000) than either the Hierarchy (R²= .222, p=.134) or the Individualism (R²= .134, p=.013) scale. Confidence intervals reflect the 0.95 level of confidence.

Figure 2 CSL causes and risk perception showed a strong positive correlation among HIs, R²= .805, R²= .65, p=.001 (two tailed). Confidence intervals reflect the 0.95 level of confidence.

Figure 3 CSL causes and risk perception showed a strong positive correlation among ECs, R²= .663, R²= .45, p=.001 (two tailed). Confidence intervals reflect the 0.95 level of confidence.

Table 1: Means for Dependent and Predictor Variables

<table>
<thead>
<tr>
<th>Worldview</th>
<th>Mean Score (combined)</th>
<th>Mean Score HI</th>
<th>Mean Score EC</th>
</tr>
</thead>
<tbody>
<tr>
<td>GSL (out of 7)</td>
<td>5.3 (76%)</td>
<td>5.7 (81%)</td>
<td>5.6 (80%)</td>
</tr>
<tr>
<td>CSL (out of 32)</td>
<td>18.2 (57%)</td>
<td>21.66 (66%)</td>
<td>17 (53%)</td>
</tr>
<tr>
<td>CSL Causes (out of 8)</td>
<td>4.8 (60%)</td>
<td>4.9 (61%)</td>
<td>4.8 (60%)</td>
</tr>
<tr>
<td>Risk (out of 10)</td>
<td>7.5</td>
<td>9.2</td>
<td>7.8</td>
</tr>
</tbody>
</table>

Discussion and Conclusions

For both Hierarchical Individualists (HIs) and Egalitarian Communicators (ECs):
- Climate science literacy (CSL) related to the causes of climate change most strongly predicted risk.
- HIs: r=.805, R²=.65, p=.001
- ECs: r=.663, R²=.45, p=.001
- The combined measure of CSL predicted greater risk perception also, but the effect was not as strong.

For the entire sample population:
- The combined measure of CSL did not predict greater risk perception.
- CSL associated with the causes of climate change did predict greater risk perception, but the effect was not as strong as with HIs and ECs individually.

In support of the Cultural Cognition Theory:
- Mean risk perception around climate change was lower for HIs than ECs.
- Hypothesis 1 was not supported: there was no correlation between combined CSL and risk.

In support of the Science Comprehension Theory:
- Hypothesis 2 and 3 were supported: more knowledge about climate change (especially its causes) predicted greater concern about climate change for HIs and ECs.
- Cultural polarization around climate change decreased as knowledge about the causes of climate change increased, suggesting that worldviews are not as deeply ingrained as the cultural cognition theory would suggest and act more like heuristics in the place of scientific climate information.

Further Study:
- US representative population sample needed with mean risk scores closer to Kahn, 2012.
- What is the causal link between CSL causes and risk perception around climate change?
- What other variables influence the interaction between CSL causes and risk?

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Selected References