Improving the U.S. Public’s Understanding of Climate Change

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The Central Questions

1. Why is it that, while scientific evidence has accumulated to document global climate change and scientific opinion has solidified about its existence and causes, U.S. public opinion has not, and has instead become more polarized?

2. What can be done?
Three Answers to Question #1

- Climate change is inherently difficult to understand
- People’s usual ways of gaining understanding mislead them
- The society is engaged in a struggle to shape the frames and mental models people use to understand the phenomena

Scientists’ understanding (some key elements)

- Earth is warming
- Most of the recent warming is anthropogenic
- Global warming is associated with a broad spectrum of other climate changes
- These changes pose risks for a wide range of human and environmental systems
- The impacts will continue for many decades or centuries
- Key uncertainties remain (climate sensitivity, specific events, catastrophic potentials)

U.S. Public Understanding (compared to scientific understanding)

- Acceptance of scientific consensus has fluctuated over time
- Acceptance of existence of anthropogenic climate change is less prevalent than among scientists
- It is also less prevalent than among many other national publics
Why have understandings not converged?

1. CC is difficult to understand

- Changes are invisible
- Perceived as spatially and temporally distant
- A few drivers (fossil fuel consumption) can cause a multiplicity of hazards
- Reducing emissions will not quickly “clear the air”
- Climate history is a poor guide to the future
- Impacts might occur anywhere through complex causality
- Impacts depend on social change as well as climate change
Why have understandings not converged?

2. People’s usual ways of gaining understanding mislead them

*Reliance on personal experience* is problematic:

- Climate signal is not detectable against noise
- Over-weighting of recent, memorable events
- Belief in climate change affected by local weather
- Preferences for certainty and for concrete representations of uncertainty
Why have understandings not converged?

2. People’s usual ways of gaining understanding mislead them

Reliance on simple, (and often inappropriate) mental models

- “Ozone hole”
- Pollution model (the air will clear)

Cognition driven by affect, values, worldviews

- Framing and labeling
- Fundamental values and worldviews
Why have understandings not converged?

3. Struggle to “frame” climate change

Reliance on secondary sources (mediated understanding)

- Reliance on trusted information sources
- Mass media coverage routines (dramatic framing, reporting “breaking news”, two-sided stories)
- Competing frames (Pandora’s box, continuing uncertainty justifying delay; scientific bias narrative)

Denialist movement

- Well funded
- Effectively applies psychological knowledge (familiar risks, norm activation, using confusion with weather)

Effects of struggle over framing
What can scientists and educators do to improve public understanding?

**Basic outlook and strategy**

1. Treat this as a research question
2. The task is education, not persuasion ("non-persuasive communication,” Fischhoff, 2007).

- The problem is not knowledge deficit, but inappropriate mental models
- Understand people’s current mental models
- Identify appropriate mental models for nonspecialists
- Think in terms of learning progressions
Roles and actions for scientists and educators

- **Roles:** Characterize the risks; show how risk profiles are changing; assess consequences of response options
- **Provide specific content for appropriate mental models** (climate change is not a single hazard, personal experience is a poor guide, system has long time lags, etc.)
- **Engage in decision support efforts**
- **Conduct research to identify most important mental model elements, effective learning paths, etc.**
Attributes of appropriate mental models

- Content consistent with state of science
- Recognition of continuing uncertainty (avoiding the error of 1990)
- Framing in terms of risk management, implying action strategies:
  - Reduce the causes of hazards
  - Reduce the costs of catastrophes
  - Spread risk, diversify portfolios
  - Improve understanding
- Better metaphors for contemplating action
A possible metaphor: Identifying and treating disease

- Earth as the patient
- Humanity as the responsible party
- Scientists as the doctors

The problem: Does Earth have the disease, "anthropogenic climate change"? If so, what do we do?
**Elaborating the medical metaphor**

- **Diagnosis:** Scientists observe the planet, develop and test diagnostic hypotheses, and seek to avoid Type I and Type II errors. Findings: The disease is present; the causes are known.

- **Prognosis:** The disease is known to be progressive and will get worse without treatment. We don’t know how much worse and want to avoid over-or under-estimating seriousness.

- **Treatment:** We can treat the causes (mitigation), treat the symptoms (adaptation), wait for more information. Need to avoid both under-treatment and serious side effects (cures worse than the disease). No option is risk free, but postponing treatment increases the risks.
Comments on the medical metaphor

- It is intended to characterize the problem as one of risk management
- and to be consistent with the state of science
- It does not prescribe treatment, but recognizes that judgments will differ
- It opens space for considering iterative decision making
- It makes clear the different roles of scientists and decision makers
- There may be more effective metaphors for doing these things; that’s a matter for research
Educational approaches may not work on everyone: Other routes to improved understanding

- Climate-driven catastrophes causing teachable moments
- Leadership by elites (e.g., corporations, national security establishments) changing the balance of media coverage
- Engagement of people in practical decisions (build on decision support processes)
Some source materials


National Research Council, *America’s Climate Choices*. Final report to be released April 12. See also the panel reports released in 2010, especially *Advancing the Science of Climate Change* and *Informing Responses to Climate Change*.