



## Communicating Climate Change: Local and National Engagement

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## The Deficit Model: Assumptions

- Public opposition is a matter of ignorance and/or irrational beliefs. Science literacy is the antidote.
- There was a point in the past when the public was knowledgeable about science and strongly supportive. Need to return to that point in the past.





## The Deficit Model: Assumptions

- Science compels decisions in policy debates, a matter of “sound science.”
- Strategy is to focus on formal science education and popular science outlets including magazines, documentaries, Web sites, and newspaper coverage.
- Science communication defined *as a process of transmission.*





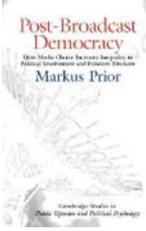

## Fully Informed Public vs. Miserly Public? Nothing Essentially Unique about Science Debates



### Too Many Choices? Availability Doesn't Equal Use



1985

### Too Many Choices? Availability Doesn't Equal Use



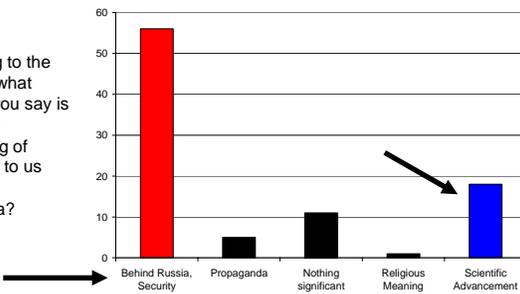
2009



### 1957: Is The Past That Different from Today? Perception is Reference Dependent



1957:  
Looking to the future, what would you say is the real meaning of Sputnik to us here in America?



Michael, D.N. (1960). The Beginning of the Space Age and Public Opinion. *Public Opinion Quarterly*, 573-582;

### 2008: Is The Past That Different from Today? Increasing Education, Low Science Literacy



Figure 1. Educational Attainment of the Population 25 Years and Over by Age: 1947 to 2003

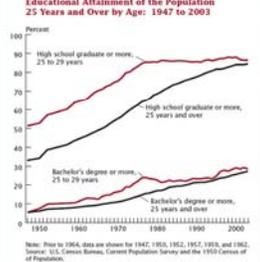
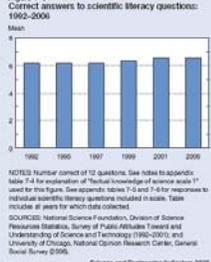


Figure 7-6. Correct answers to scientific literacy questions: 1992-2006



National Science Board (2008). Chapter 7: Public Attitudes about Science and Technology. *Science & Engineering Indicators*.

### Is The Past That Different from Today? Deep Public Optimism and Trust in Science



- More than 70% of all American adults believe that the benefits of scientific research outweigh the harmful results.
- More than 85% of Americans agree that "even if it brings no immediate benefits, scientific research that advances the frontiers of knowledge is necessary and should be supported by the federal government."
- On climate change, stem cell research, and food biotechnology, Americans believe scientists hold greater expertise, are less self interested, and should have greater say in decisions than industry leaders, elected officials, and/or religious leaders.
- Among institutions, only the military has greater trust than science.

Analysis of 2006 General Social Survey; National Science Board (2008). Chapter 7: Public Attitudes about Science and Technology. Science & Engineering Indicators.

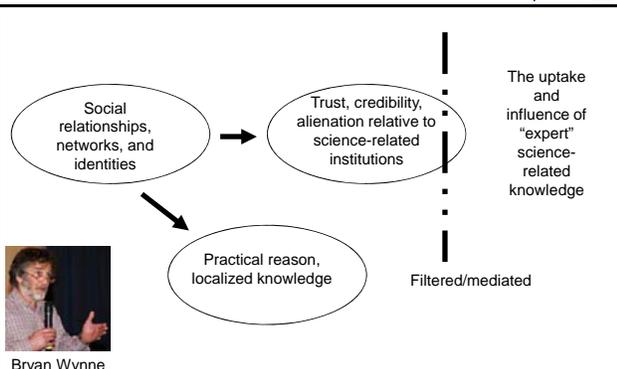
### So What About that "Rising Tide of Anti-Science?" Basic Principles to Consider



- 1. Science literacy has very little to do with public support, trust, perceptions, or deference to science.
- 2. Scientific organizations enjoy almost unrivaled respect, authority, and hold great communication capital but need to use it wisely and effectively.
- 3. Need to emphasize dialogue, participation in decision-making, common values and personal relevance rather than make it easy for people to re-interpret science in terms of conflict, complexity, or uncertainty.
- 4. When values not communicated, turns scientific evidence into just another political resource for competing interest groups.



### Early 1990s: A Paradigm Sheep? Social Identity, Trust, and Relationships Matter



### Wynne's Model: Common Criteria Used to Judge Experts & Institutions



- 1) Does expert knowledge work? Do predictions fail?
- 2) Do expert claims pay attention to other available knowledge?
- 3) Are experts open to criticism? Admission of errors, or oversights?
- 4) What are the social / institutional affiliations of experts? Historical track record of trustworthiness, affiliation with industry?
- 5) What issues overlap or connect to lay experience?



### The New Focus on Public Engagement: Building Relationships and Trust



- Two-way interaction between scientists and citizens.
- Participation in upstream development of research and technology
- Learn from localized understanding and knowledge.
- Increase citizen efficacy, trust, sense of involvement, and perceived fairness.

### Framing and Public Engagement



### Framing: Perception is Reference Dependent



A B C

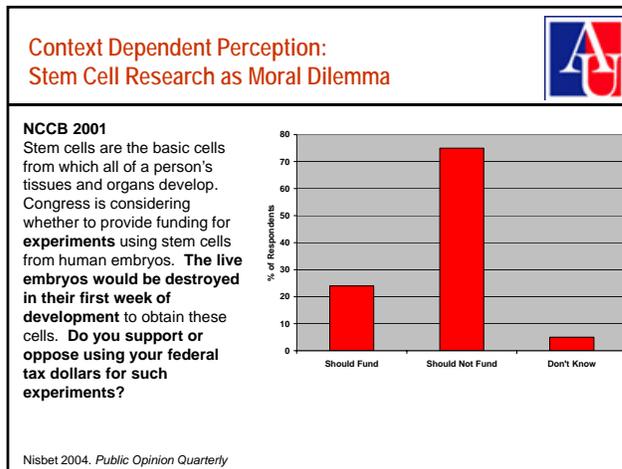
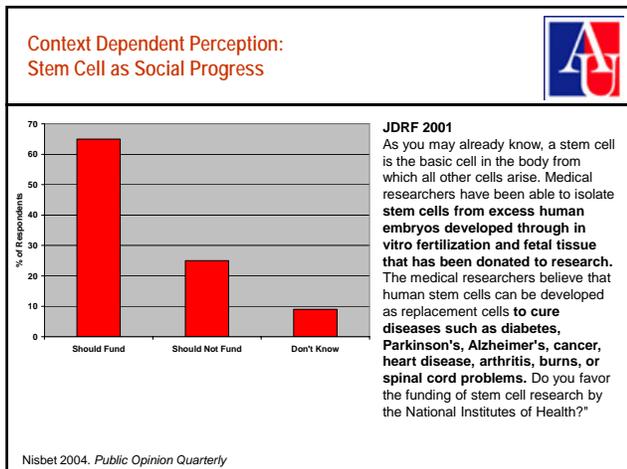
Kahneman, D. (2003) in T. Frängsmyr (Ed.),  
Les Prix Nobel: The Nobel Prizes 2002 (pp.  
449-489). Stockholm, Sweden: Nobel  
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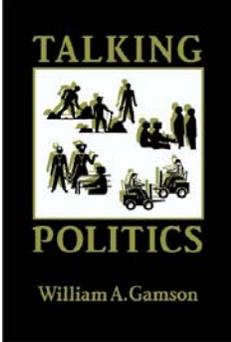
### Framing and Science Communication

- Frames organize central ideas on an issue. They endow certain dimensions of a complex topic with greater apparent relevance than the same dimensions might appear to have under an alternative frame.
- Frames communicate why an issue might be a problem, who or what might be responsible, and what should be done.
- Communicated in short hand by catch-phrases, slogans, historical references, cartoons, and images.

### Framing and Science Communication

- **Strategists** use frames to define issues in ways that fit their policy and political goals.
- **Journalists** use frames to organize stories and appeal to intended audiences.
- **Citizens** use frames to make sense of complex topics, and to articulate their opinions. Accept media frames that fit existing interpretative schema.
- **Scientists** use frames to communicate to non-specialists in other fields, craft grant proposals, write popular books, make powerpoint slides, and talk to journalists.

**Framing as a Sociological Process:  
Media & Conversation** 




**Where to Start?  
A Generalizable Frame Typology for Science** 

Frame	Science Issue Defined As....
<i>Social progress</i>	Improving life, solving problems, master/harmony nature.
<i>Economic develop.</i>	Market benefits/competitiveness.
<i>Pandora's box / Runaway science &amp; fatalism</i>	Call for precaution in face of possible impacts/catastrophe; Out-of-control monster; or action is futile, path is chosen.
<i>Morality/ethics</i>	Right or wrong, crossing/respecting boundaries.
<i>Scientific uncertainty</i>	What is known or unknown; evoking or undermining consensus, "sound science," peer-review.
<i>Public accountability</i>	Responsible use or abuse of power; "politicization," citizen responsiveness.
<i>Third way/alternative path</i>	Compromise solution, middle way between opposing sides.
<i>Conflict/Strategy</i>	Game among elites, battle of groups/personalities.

**The Ethics of Framing Science** 

- Emphasize dialogue, two-way interaction and participation.
- Emphasize values that guide and relate to policy decisions.
- Emphasize accuracy and avoid either distortion or hype.
- Avoid using framing to denigrate, stereotype, or attack a particular social group or for partisan and electoral gains.

Nisbet, M.C. (2009). The Ethics of Framing Science. In B. Nerlich, B. Larson, & R. Elliott (Eds.), *Communicating Biological Sciences: Ethical and Metaphorical Dimensions*. London: Ashgate.



**The Case of Climate Change**

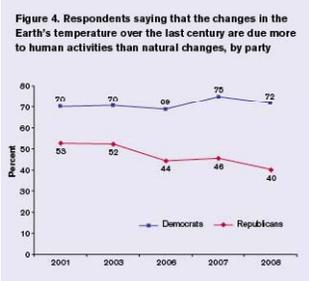
Nobel Peace Prize 2007



Al Gore and Rajendra Pachauri, the head of the IPCC

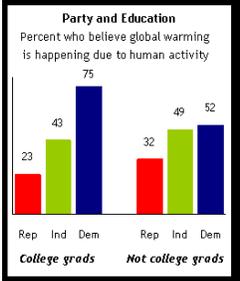
The Perceptual Gridlock:  
Two Americas of Global Warming

Figure 4. Respondents saying that the changes in the Earth's temperature over the last century are due more to human activities than natural changes, by party



Year	Democrats (%)	Republicans (%)
2001	70	55
2003	70	52
2006	69	44
2007	70	46
2008	72	40

Party and Education  
Percent who believe global warming is happening due to human activity



Education Level	Rep (%)	Ind (%)	Dem (%)
College grads	23	43	75
Not college grads	32	49	52

Dunlap & McCright, 2008. *Environment*, Pew 2007

Framing Global Warming:  
Scientific Uncertainty & Economic Competitiveness

Luntz Strategy Memo

**WINNING THE GLOBAL WARMING DEBATE – AN OVERVIEW**

Please keep in mind the following communication recommendations as you address global warming in general, particularly as Democrats and opinion leaders attack President Bush over Kyoto.

1. **The scientific debate remains open.** Voters believe that there is *no consensus* about global warming within the scientific community. Should the public come to believe that the scientific issues are settled, their views about global warming will change accordingly. Therefore, *you need to continue to make the lack of scientific certainty a primary issue in the debate, and defer to scientists and other experts in the field.*
4. **The "international fairness" issue is the emotional home run.** Given the chance, Americans will demand that all nations be part of any international global warming treaty. Nations such as China, Mexico and India would have to sign such an agreement for the majority of Americans to support it.

Source: Environmental Working Group

Framing Global Warming:  
Uncertainty & Economic Burden



Framing Global Warming:  
Pandora's Box of Catastrophe



Framing Global Warming:  
Restoring Science to its Rightful Place?



Framing Global Warming:  
*Religious & Moral Duty*



Framing Global Warming:  
A Matter of Economic Growth



"We need a price on carbon because it will stimulate massive innovation in the next great global industry — E.T. — energy technology. In a warming world with huge population growth, clean power systems are going to be in huge demand. The scientific research and innovation needed for America to dominate E.T. the way it did I.T. could be the foundation for a second American industrial revolution, plus it would tip the whole planet onto a greener path. So American economic renewal is the goal, but mitigating climate change would be the great byproduct."

Cap and Trade Bill?  
"American Clean Energy and Security Act"



NY Times Tom Friedman

**Framing Global Warming:  
A Matter of Public Health**




**The Lancet on Climate Change:  
Greatest Public Health Threat of the 21<sup>st</sup> Century?**



The big message of this report is that climate change is a health issue affecting billions of people, not just an environmental issue about polar bears and deforestation.



**Anthony Costello,  
University College London**

→ A concerted communication campaign on the part of health officials can "create a solidarity and authority that politicians will find hard to resist."



**The Case of Climate Change**

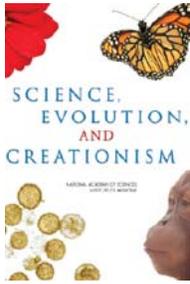
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**Science Communication:  
Audience-Based Approach**


Spring 2008

**Social Progress:  
The Building Block for Medical & Societal Advances**



**Evolution in Medicine: Combating New Infectious Diseases**

2002 several hundred in China came down a severe form of pneumonia caused by an unknown virus agent. Dubbed "acute respiratory syndrome" or SARS, the disease spread to Vietnam, Hong Kong and Canada and led to tens of deaths. In March a team of researchers at University of California, San Diego, tested samples of immediately, work began on a blood test to identify people's the disease but they could be quarantined, on treatments of the disease, and on vaccines to prevent infection with the virus. An understanding of evolution was essential to the identification of the SARS virus. The

**Evolution in Agriculture: The Domestication of Wheat**

Humans understood a phenomenon that when ripe and could easily be separated from the hulls. Over the next few millennia, people around the world used similar processes of selective breeding to transform many other wild plants and animals into the crops and domesticated animals we rely on today. In recent years, plant scientists have hypothesized wheat was altered by an over time. About 8,000 years ago, people in the Middle East began growing plants for food than relative extent.

**Evolution in Industry: Putting Natural Selection to Work**

The concept of "natural selection" has been applied in many fields outside biology. For example, chemists have applied principles of natural selection to develop new medicines with specific functions. First they create a set of molecules, and then they use computers to test the molecules for the desired function. The molecules that do the best job are used to generate new molecules. Repeated rounds of this selective process result in molecules that have a greatly enhanced ability to perform a given task. This technique has been used to create new

**The Middle Way:  
Science and Religion Not in Conflict**



**Excerpts of Statements by Scientists  
Who See No Conflict Between Their Faith and Science**

"Our scientific understanding of the universe . . . provides for those who believe in God a marvelous opportunity to reflect upon their beliefs."  
— Father George Coyne, Catholic priest and former director of the Vatican Observatory.

**Excerpts of Statements by Religious Leaders  
Who See No Conflict Between Their Faith and Science**

"[T]here is no contradiction between an evolutionary theory of human origins and the doctrine of God as Creator."  
— General Assembly of the Presbyterian Church

**Reinforcing Polarization:  
Identity Politics and Deficit Model Assumptions**




Greater science literacy, which is going to lead to the erosion of religion, and then we will get this nice positive feedback mechanism going where as religion slowly fades away we will get more and more science to replace it, and that will displace more and more religion which will allow more and more science in and we will eventually get to that point where religion has taken that appropriate place as a side dish rather than a main course.

"If people think God is interesting, the onus is on them to show that there is anything there to talk about. Otherwise they should just shut up about it."  
— Richard Dawkins in *Expelled* trailer.



Sam Harris, PZ Myers, & Christopher Hitchens



New Pathways for Engagement



The Medium Also Matters  
1. "Going Broad": Entertainment and Comedy








*Darwinius masillae?*  
The "Missing Link," "Lost Ark" and "Holy Grail?"








Any pop band is doing the same thing. Any athlete is doing the same thing. We have to start thinking the same way in science.

Jorn H. Hurum



The Medium Also Matters  
2. "Going Deep:": New Models for Science Journalism

- Will be open-access, non-profit and government, foundation, and university funded.
- Will be multi-media, interactive and "pro-am" with professional staff but also user-generated content from "citizen journalists."
- Will be social-problem focused with an emphasis on agenda-setting, framing, mobilization, and engagement.
- Will be internationally, nationally and locally focused based on need and goals.

### Starting the Conversation 3. Opinion-leaders and everyday conversation



- Identify, recruit, and train opinion-leaders across social groups to spark conversations about a science topic or science media resource.
- Combine and coordinate face-to-face interactions with social media sites, news media, and paid advertising campaigns.



Nisbet, M.C. & Katcher, J.E. (2009). Two Step Flow of Influence? Opinion Leader Campaigns on Climate Change. *Science Communication*.

### Cultivating the Audience 4. Science Media Literacy



- Part of every gen-ed science course or high school course. Also continuing education at libraries and community-level.
- Introduces to quality online sources of information about science and more traditional sources.
- Encourages evaluation of content, sources, and arguments, provides context relative to the science.
- Provides context on social and political context for science, the relationship between science, policy, and involvement of other stakeholders.

### 5. What Dimensions of Knowledge Matter? The Example of Climate Change



- **Civic science literacy:** Understanding scientific terms and constructs sufficient to make sense of a news report. Also involves understanding how scientific investigation works, and how expert agreement develops over time.
- **Social, legal, and ethical knowledge:** Refers to information about who funds climate change research, how relevant policy decisions are reached and by whom, the ethics and values that guide decisions, and the connections between the climate change debate and other societal areas such as the economy, partisan politics, or national security.
- **Participatory knowledge:** How a citizen can get involved and have a say in decisions that are made about climate change at the community or national level. Empowers community members to voice their preferences, draw attention to perceived problems, and express their ideas on possible solutions.
  - Organizations in their community that are working on climate policy:
  - Upcoming major events, decisions, or meetings
  - Names and contact information of key government organizations and officials.
  - Web sites that make contacts and participation easier through direct email links or displaying maps for event locations would also reduce barriers to participations.
- **Localized and experiential knowledge:** Drawing connections between complex science-related topics and local impacts or relevance. Midwest: Agricultural impacts and biofuels. Northeast: Health impacts and air quality or ocean conservation and public health.
- **Practical science literacy** refers to knowledge that can be applied to solving common everyday personal problems such as consumer and household decisions or interpreting the packaging on energy appliances.

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