DENIAL AND CONTROVERSY!

(a toolkit)

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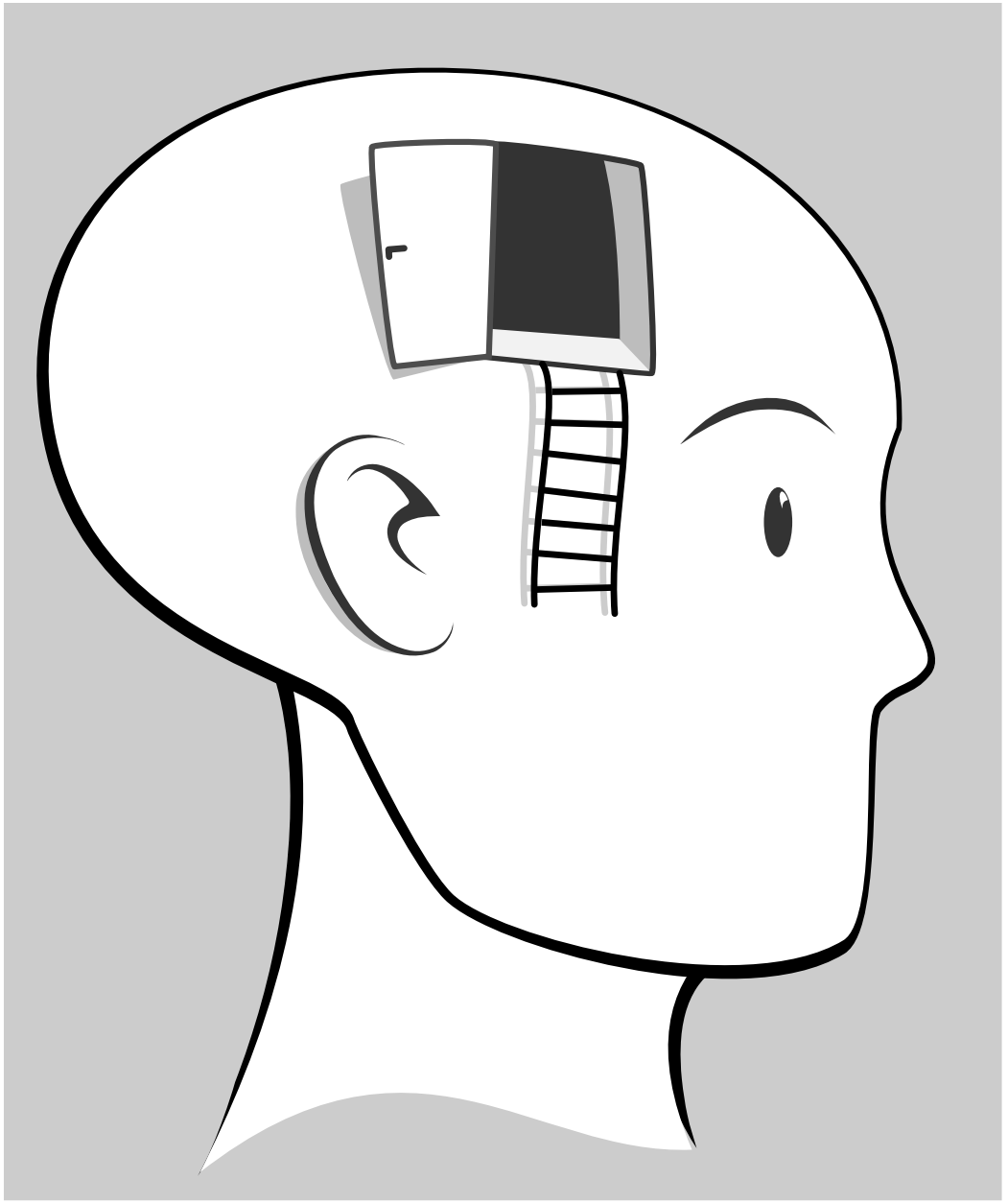
What is “Skepticism”?

Skepticism

The act of critically appraising the reasons for a claim. The more extraordinary the claim, the more extraordinary the evidence required to support the claim.

Skeptic

A “skeptic” is one who does not readily accept all claims, but does accept claims once the weight of the highest-possible quality evidence is shown to support the claim.



A “skeptic” is open-minded, but not so open-minded that their brains fall out.

Skepticism is neither mean nor nasty

There is a lot of nonsense in the world;
much of it is dangerous.


Skepticism vs. Denialism

Denialism

The refusal to accept evidence for a claim, no matter the quality or weight of the evidence.

This is often done to protect a world view, which itself may not have anything to do with the science issue.

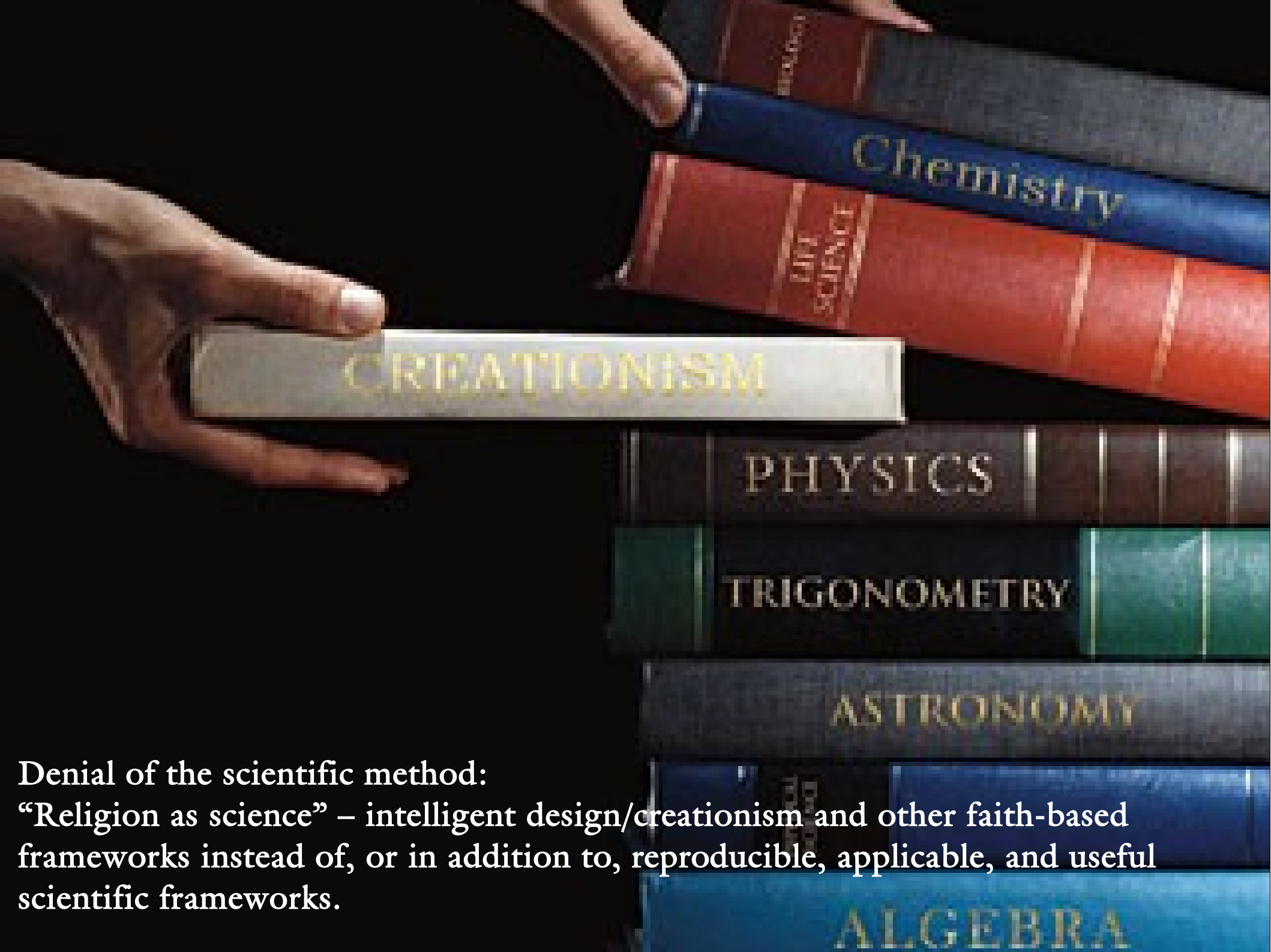
Denialism is Part of Pseudoscience

"Denialism" is the mirror-twin of "Credulousness"
(the willingness to accept any idea without scrutiny)

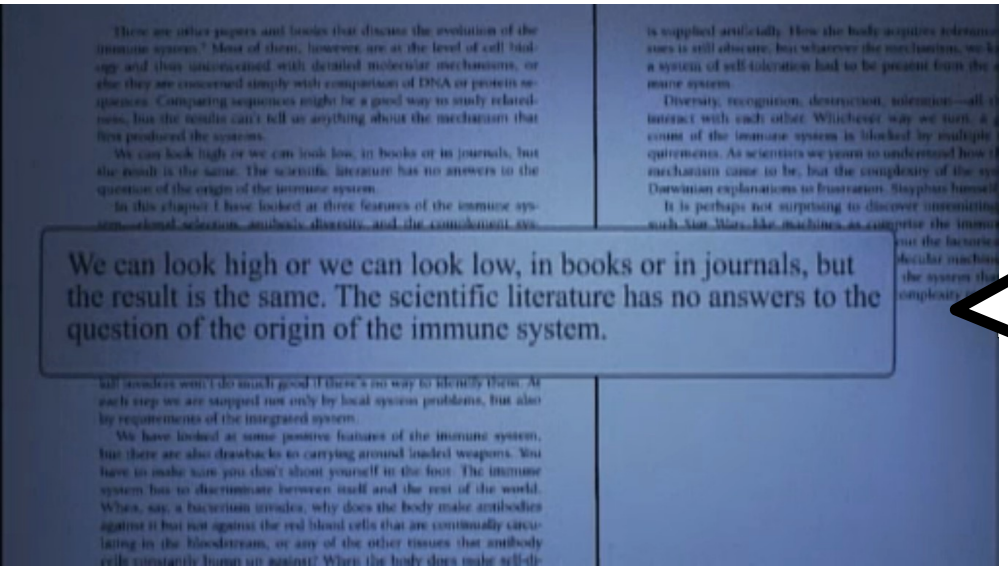
Denial of evidence-based medicine: anti-(childhood) vaccination groups, the "alternative medicine" movement, faith-healing, etc.

Denial of evidence-based public health measures

Denial of evidence-based research:
Human-induced climate disruption ("global warming", "climate change")



Denial of the scientific method:
"Religion as science" – intelligent design/creationism and other faith-based frameworks instead of, or in addition to, reproducible, applicable, and useful scientific frameworks.



Michael Behe, "Darwin's Black Box" : *"We can look high or we can look low, in book or in journals ... the scientific literature has no answers to the question of the origin of the immune system."*

Eric Rothschild, Kitzmiller v. Dover Area School District. *"All these hard-working scientists publish article after article over years and years, chapters and books, full books, addressing the question of how the vertebrate immune system evolved, but none of them are satisfactory to you?"*

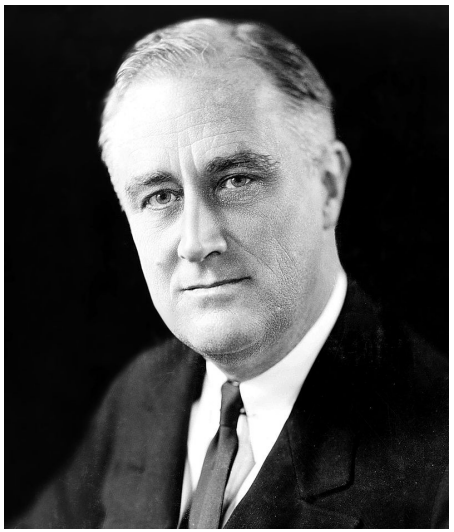
Michael Behe: *"Mr. Rothschild, would you like your books back? They're heavy."*

Stills from NOVA dramatization of courtroom transcript.

The Denialism Playbook

Playbook Denialism

"Campaigning against Herbert Hoover in 1932, [Franklin Roosevelt] gave no indication of the bold programs he would recommend, if, in fact, he had yet thought of them himself. Addressing a campaign rally in Pittsburgh, the Democratic standard-bearer pledged to slash government spending and balance the budget."



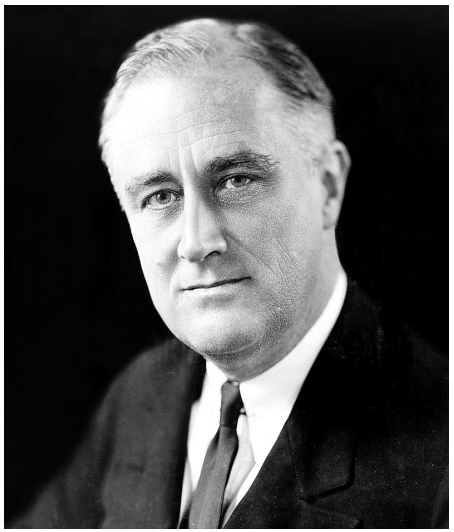
Franklin Roosevelt

Herbert Hoover

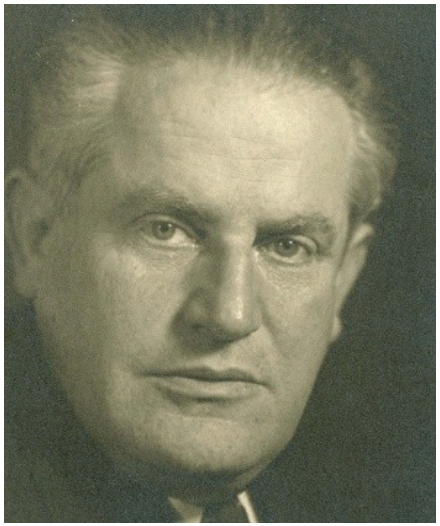
Robert Shogan. "The Fate of the Union: America's Rocky Road to Political Stalemate." Basic Books. 2004.

Playbook Denialism

"Returning to that city in 1936, seeking reelection after four years of record government outlays, he asked his top speechwriter, Samuel Rosenman, what he should say about the promise he had made [in Pittsburgh] in 1932."



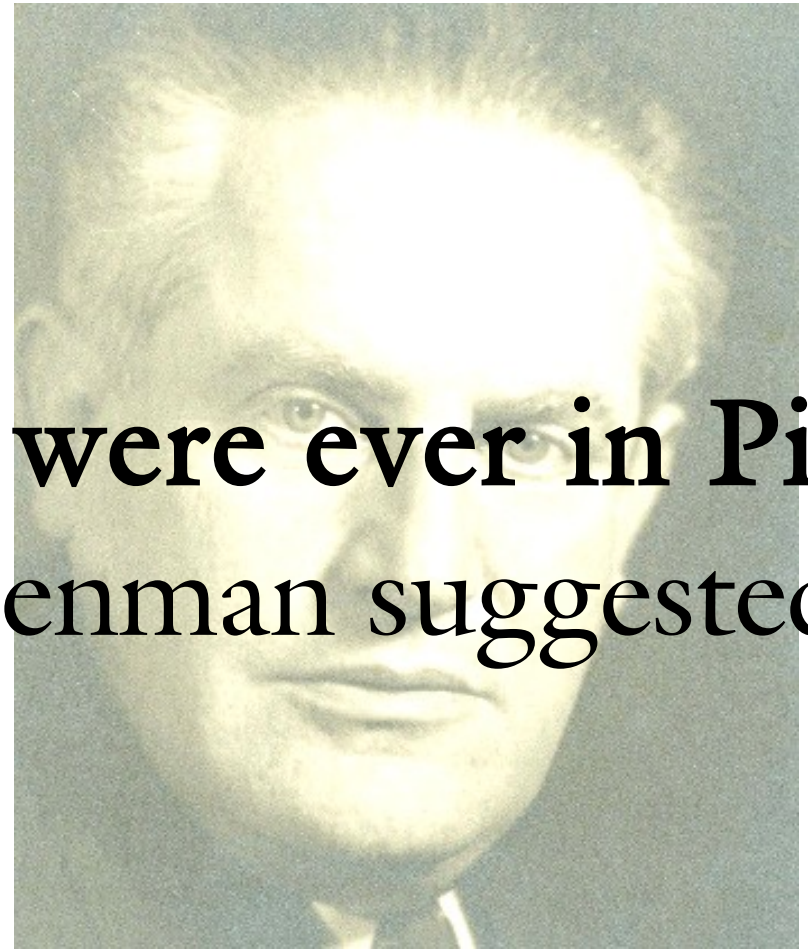
Franklin Roosevelt



Samuel Rosenman

Robert Shogan. "The Fate of the Union: America's Rocky Road to Political Stalemate." Basic Books. 2004.

Playbook Denialism



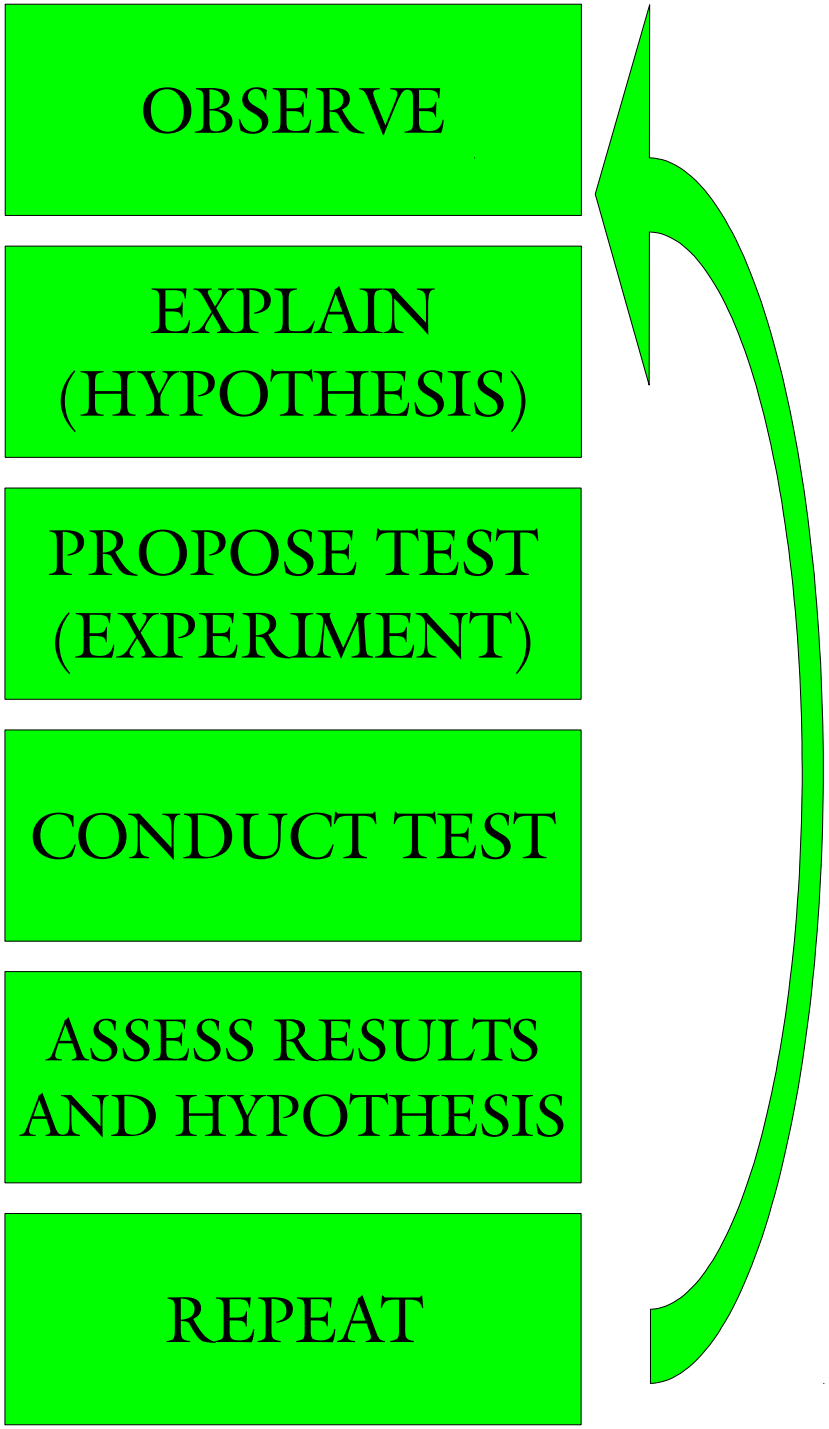
"**Deny you were ever in Pittsburgh,**' Rosenman suggested."

Robert Shogan. "The Fate of the Union: America's Rocky Road to Political Stalemate." Basic Books. 2004.

Common Themes in Public Controversies about Scientific Issues/Issues with a Science Component

- Declare a (scientific) controversy exists
  - avoid making policy or a decision as a result
- Deny the conclusions of a body of knowledge
  - cast doubt on the research and evidence (the science)
  - ignore evidence that supports the conclusion, or cherry-pick evidence that supports the opposite of the conclusion
  - argue using weak evidence or logical/reasoning fallacies
  - avoid testing your claims to avoid disproving them

The Scientific Method (in a nutshell)



The method is imperfect, especially because human beings execute it, but it's the best way we know of to establish reliable information about the natural world.

The Progression of Knowledge

HYPOTHESIS → MODEL → THEORY → LAW → FACT

(In reality, it's a bit messier than this but it's a good place to start – this is an "ideal progression.")

The Dictionary of Weasel Words

“ . . . ONLY A THEORY . . . “

Make the audience think that a framework or fact established by the scientific method can be dismissed because it's “only a theory” - equating the word with “opinion” or “belief” in the mind of the listener.

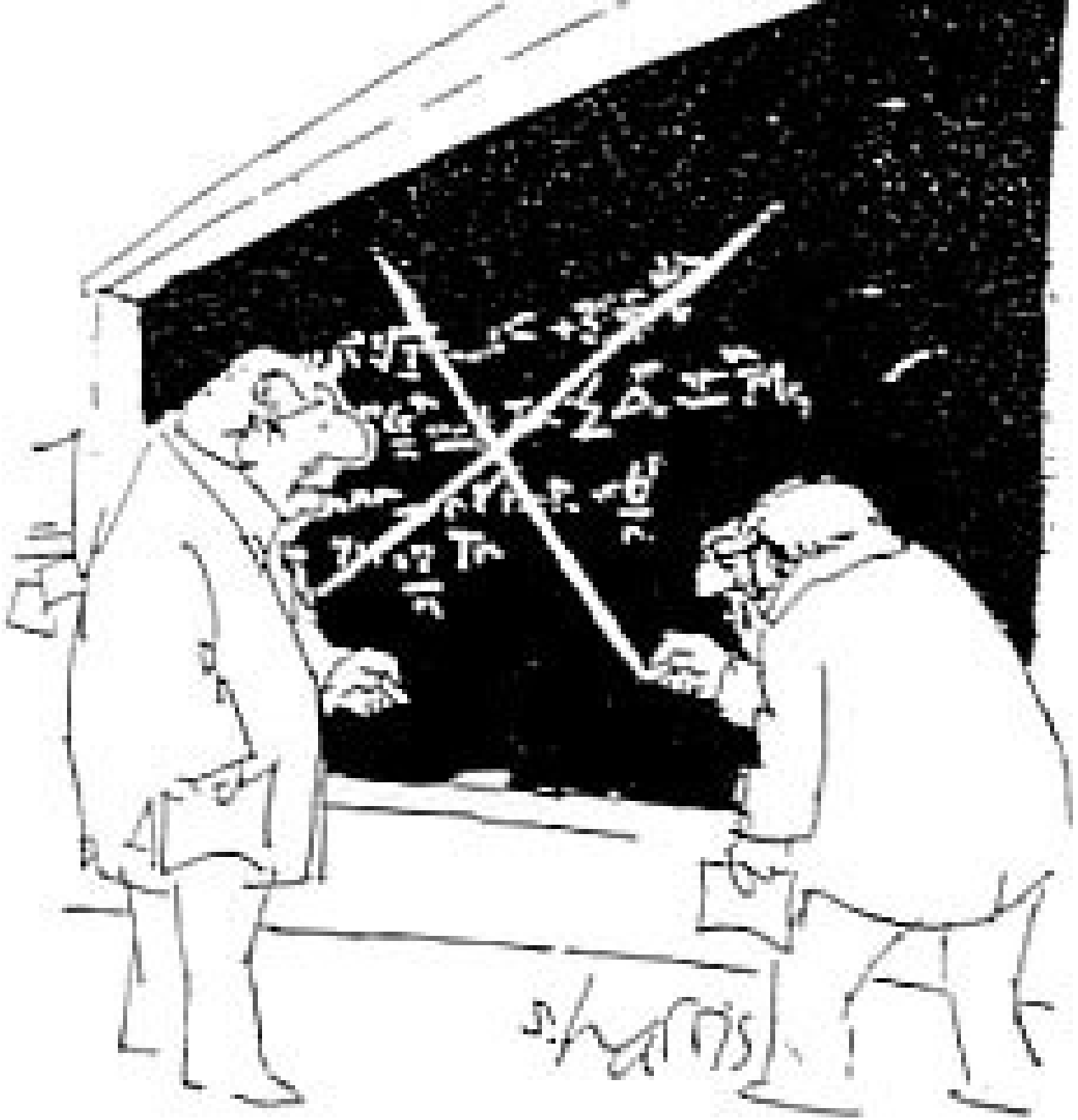
Misuse case

Scientific meaning

A Scientific Theory is a very well-tested (many decades or longer) explanation, built from facts, confirmed hypotheses, and inferences; it is more powerful than a fact, because it explains facts.

Pseudoscience readily admits opinion and equates that with the idea of “scientific theory,” requiring no evidence to make explanatory claims about the world.

The Practice of Science



"That's it? That's peer review?"

Medical Doctor and Epidemiologist Ben Goldacre:

". . . real science is about critically appraising the evidence for somebody else's position. That's what happens in academic journals. That's what happens at academic conferences. The Q&A session after a postdoc presents data is often a bloodbath, and nobody minds that. We actively welcome it. It's like a kind of consenting intellectual S&M activity."

TED Talk

Detecting a Scientist vs. Denialist

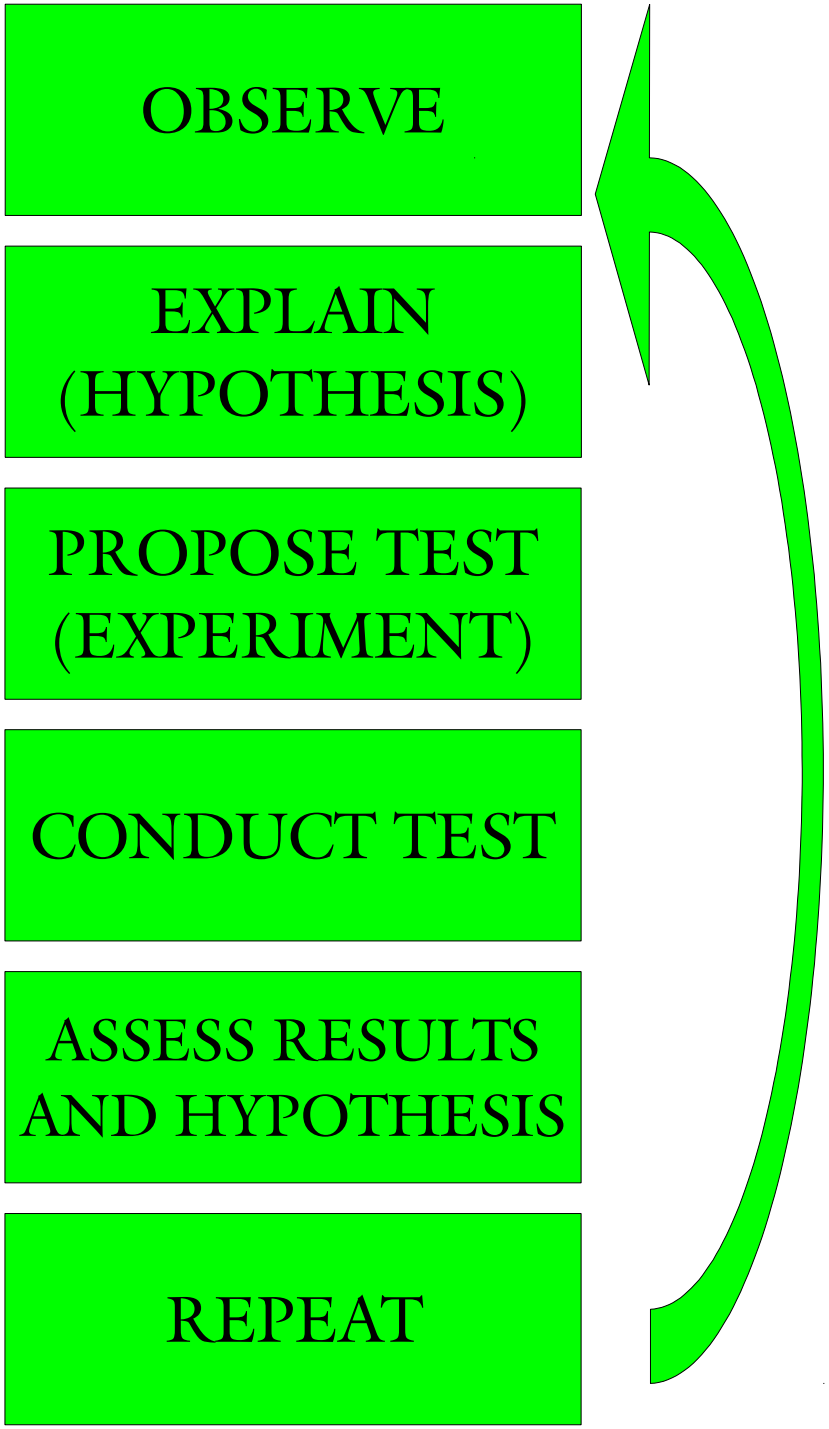
- Refuting claims is part of being a scientist
  - using strong evidence to counter the claim
    - it is not enough to say "I don't believe it" or "that can't be true"
  - designing a new, independent measurement to test the claim
    - just because a new measurement doesn't agree with previous ones doesn't automatically make it right or wrong
- When the weight of the evidence is in favor of (against) the claim, accept (reject) the claim.
  - refusal to accept (reject) the claim when the evidence is in favor (against) the claim is a bad sign.

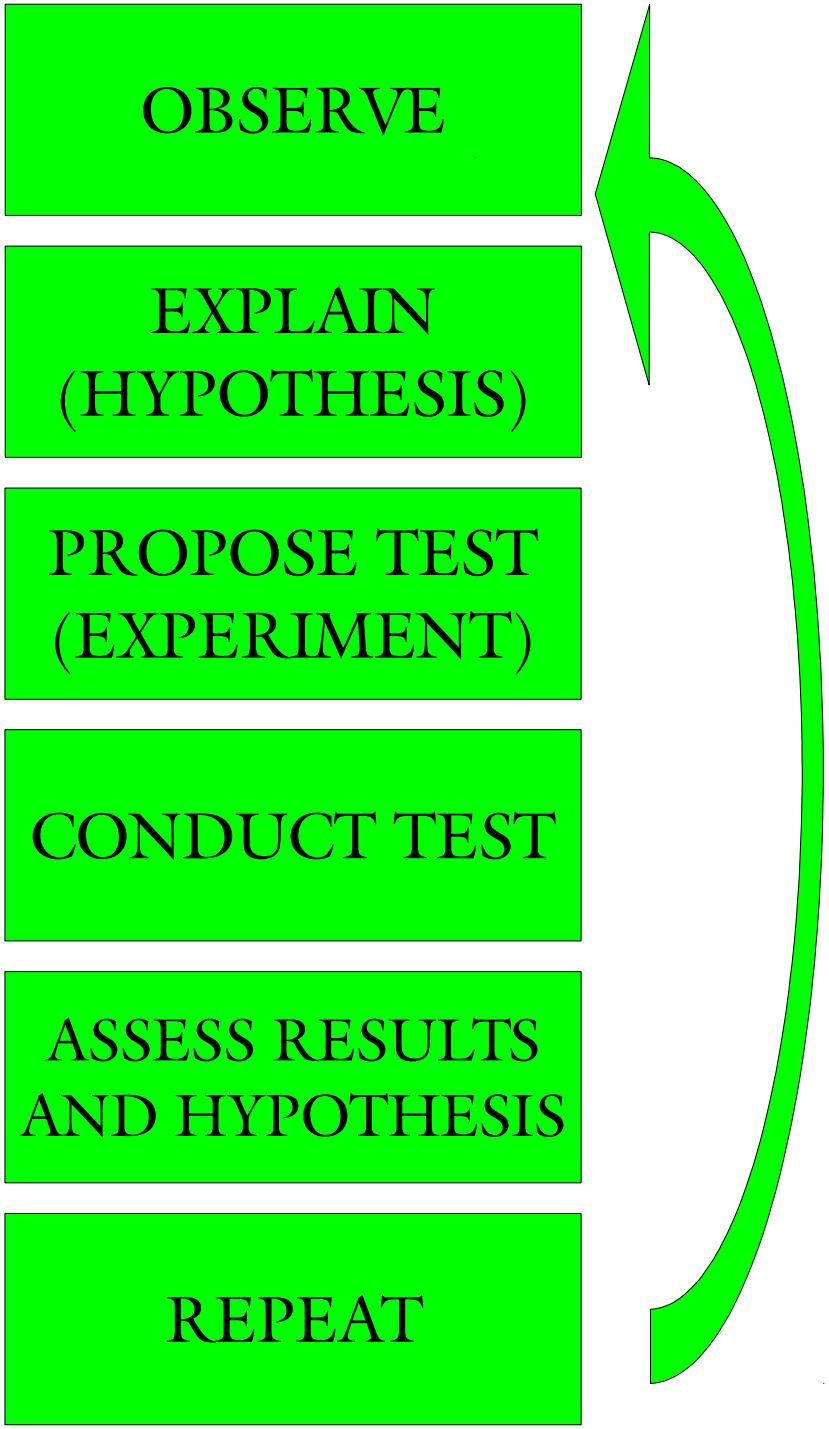
Detecting a Scientist vs. Denialist

- Denialists don't apply evidence-based methods
  - employ authority, title, position, degrees
  - employ logical and argument fallacies (see next part of talk)
  - define evidence weakly or not at all, or substitute "experience" (e.g. a limited set of personal observations) for "evidence" (e.g. a large body of data)
  - conduct none/little of their own independent, peer-reviewed work
  - avoid scientific meetings and established scientific journals
  - may not even have experience or credentials in the area they profess denial

What is a "Scientific Controversy?"

A Scientific Controversy must stem from a stage of the Scientific Method


OBSERVE
EXPLAIN (HYPOTHESIS)
PROPOSE TEST (EXPERIMENT)
CONDUCT TEST
ASSESS RESULTS AND HYPOTHESIS
REPEAT



A real scientific controversy occurs when there is a flaw in the application of the scientific method. For instance:

- Asserting untested or even falsified hypotheses as valid explanation.
- Asserting the results of a single (or very few) experiment or measurement are sufficient evidence for a conclusion.
- Poor experimental design, which leads to unreliable data (e.g. confounded by uncontrolled uncertainties).
- Poor or non-independent peer review of results, leading to bias in the assessment of the experimental methods and conclusions.

Other Kinds of Controversies

- Social Controversy
  - e.g. the scientific assessment of the efficacy of the death penalty has little to do with arguments about employing/banning the death penalty
- Political Controversy
  - e.g. how to deal with human-induced climate disruption via taxes, markets, regulations, campaigns, outreach, etc. has little to do with the science that evaluates the size, scale, and causes of the disruption itself.
- Values Controversy
  - e.g. your right to or not to vaccinate yourself or your child (i.e. based on personal or religious belief) has nothing to do with the scientific assessment of the efficacy of and very low risks associated with vaccination.

The Dictionary of Weasel Words

" . . . CONTROVERSY . . . "

Make the audience think that there is a scientific disagreement about an issue. Their goal is often to conflate a social, political, moral, or philosophical disagreement ("values") with a scientific one.

Misuse case

Scientific meaning

<u>Good science always has criticism and skepticism</u>. Bad science readily admits groupthink and arguments from authority.

Scientifically, remember what a "scientific controversy" means – a dispute over the application of the principles of the scientific method. A scientific controversy doesn't admit purely moral, social, political, or philosophical disagreements.

The Dictionary of Weasel Words

" . . . UNCERTAINTY . . . "

Often, opponents of a scientific idea will use this weasel word and let the audience equate this with "unreliability."

Misuse case

Scientific meaning

<u>**Good science always has an assessed uncertainty**</u>. Bad science avoids uncertainty. Uncertainty is a key element in science. Unreliability and uncertainty are different things.

Scientifically, what matters is the **range of outcomes bracketed by the uncertainty**. These outcomes are often quite clear and crisp. The real uncertainty does not allow the wiggle room for alternative claims/outcomes that the opponents would have you believe.

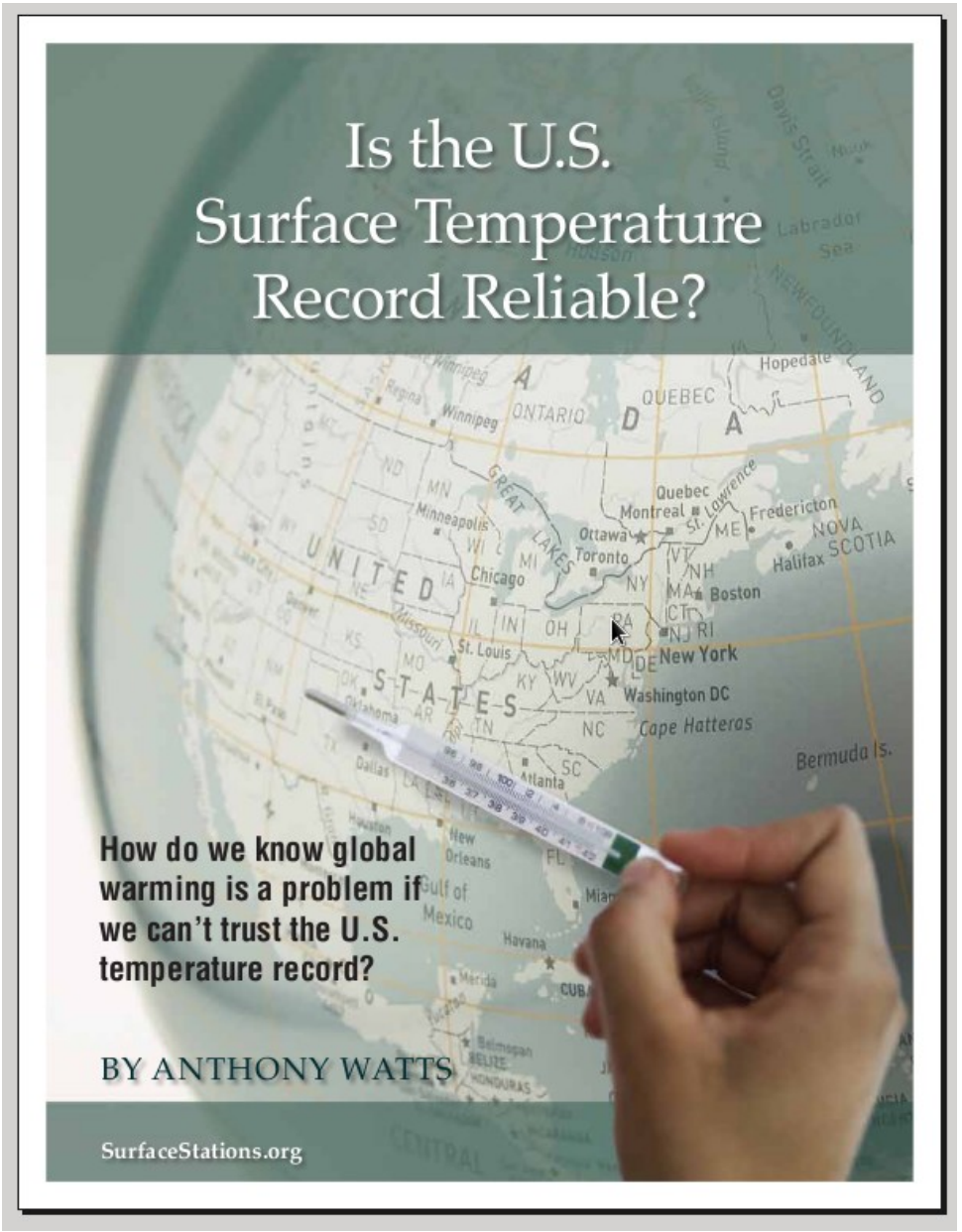
Denial: A Toolkit

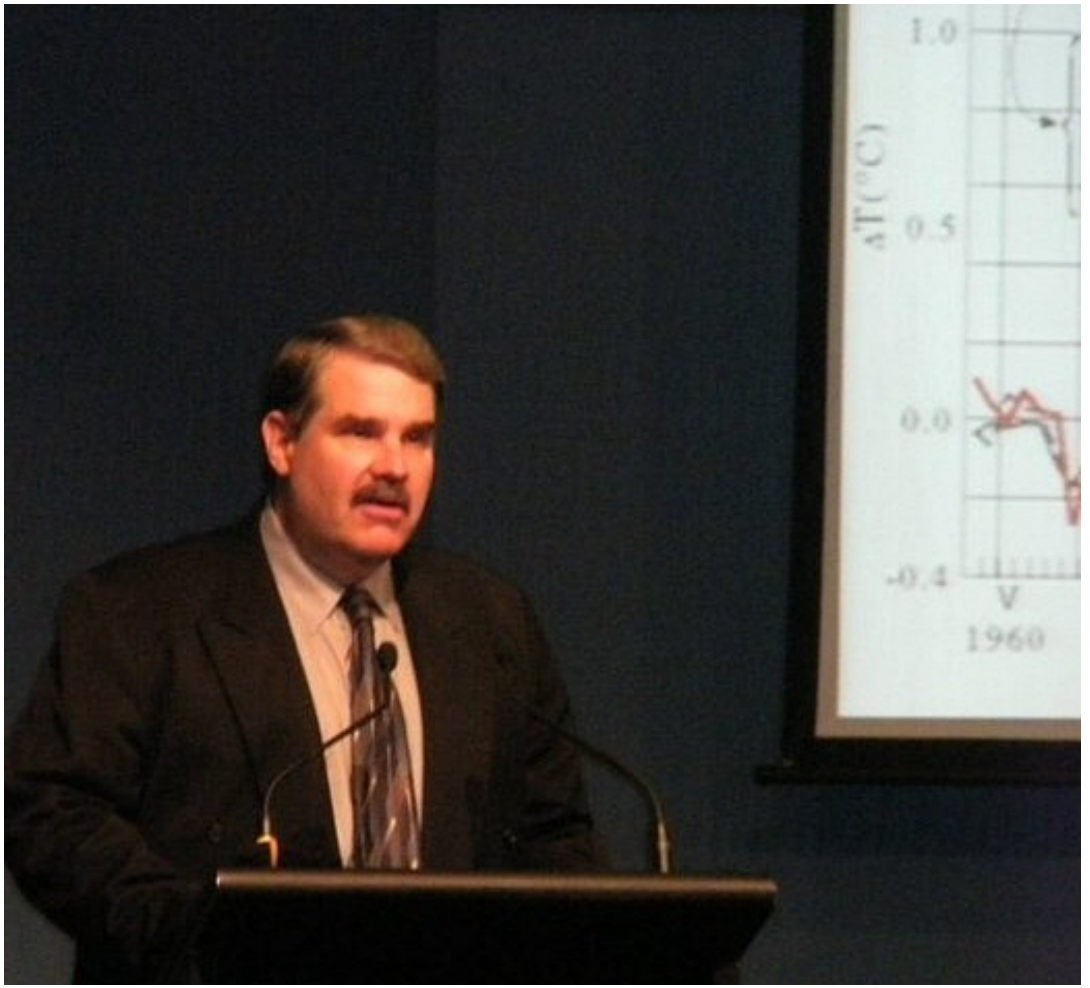
A Denial Toolkit

- Cast doubt on the scientific research
- Question the scientists' motives and integrity
- Cite only the disagreements among scientists, and amplify the arguments of a tiny group of dissenters
- Exaggerate the potential harm
- Appeal to personal freedom
- Argue that acceptance of the claim would violate or invalidate a core philosophical tenet


Example: human-induced
climate change

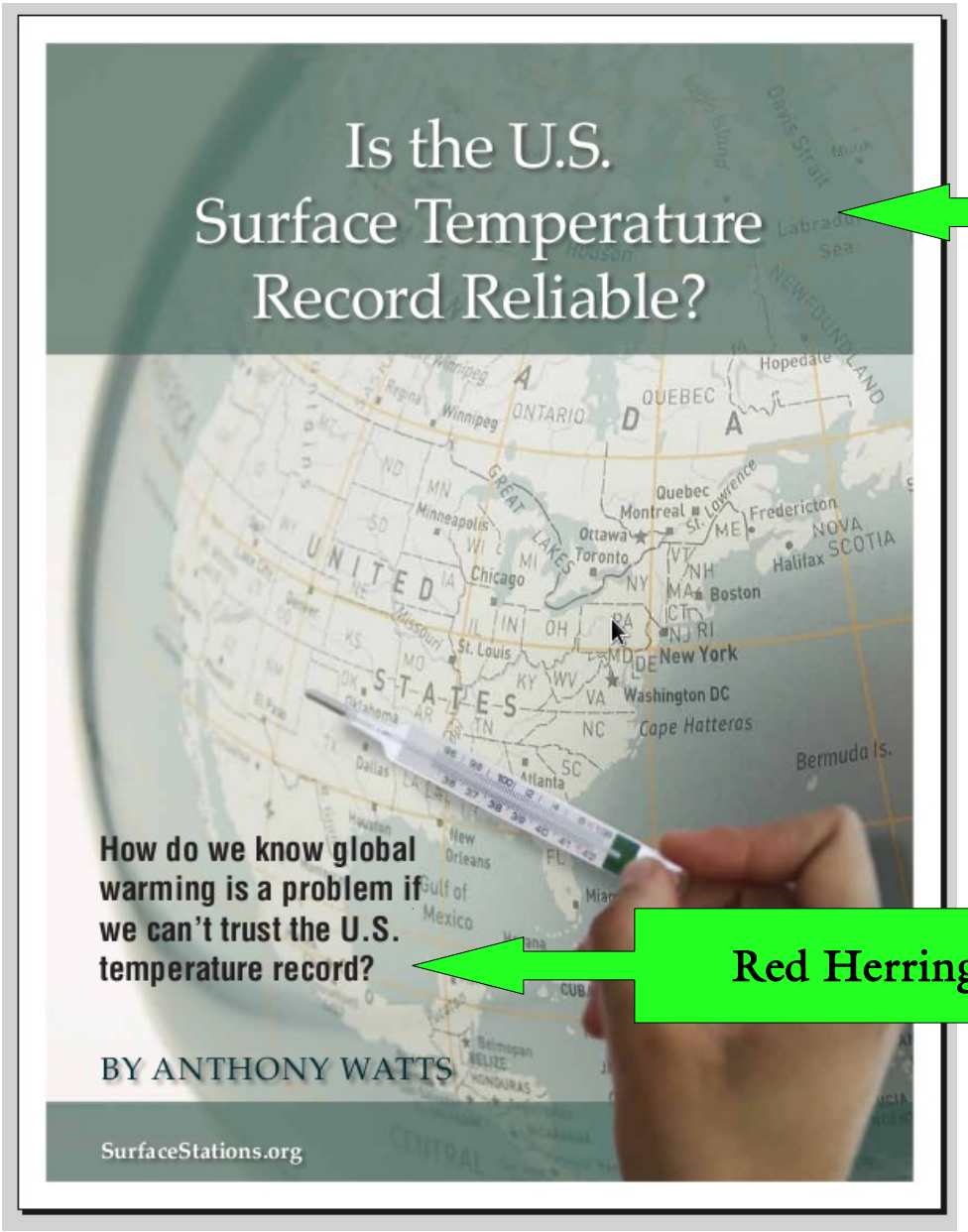
Cast Doubt on the Science



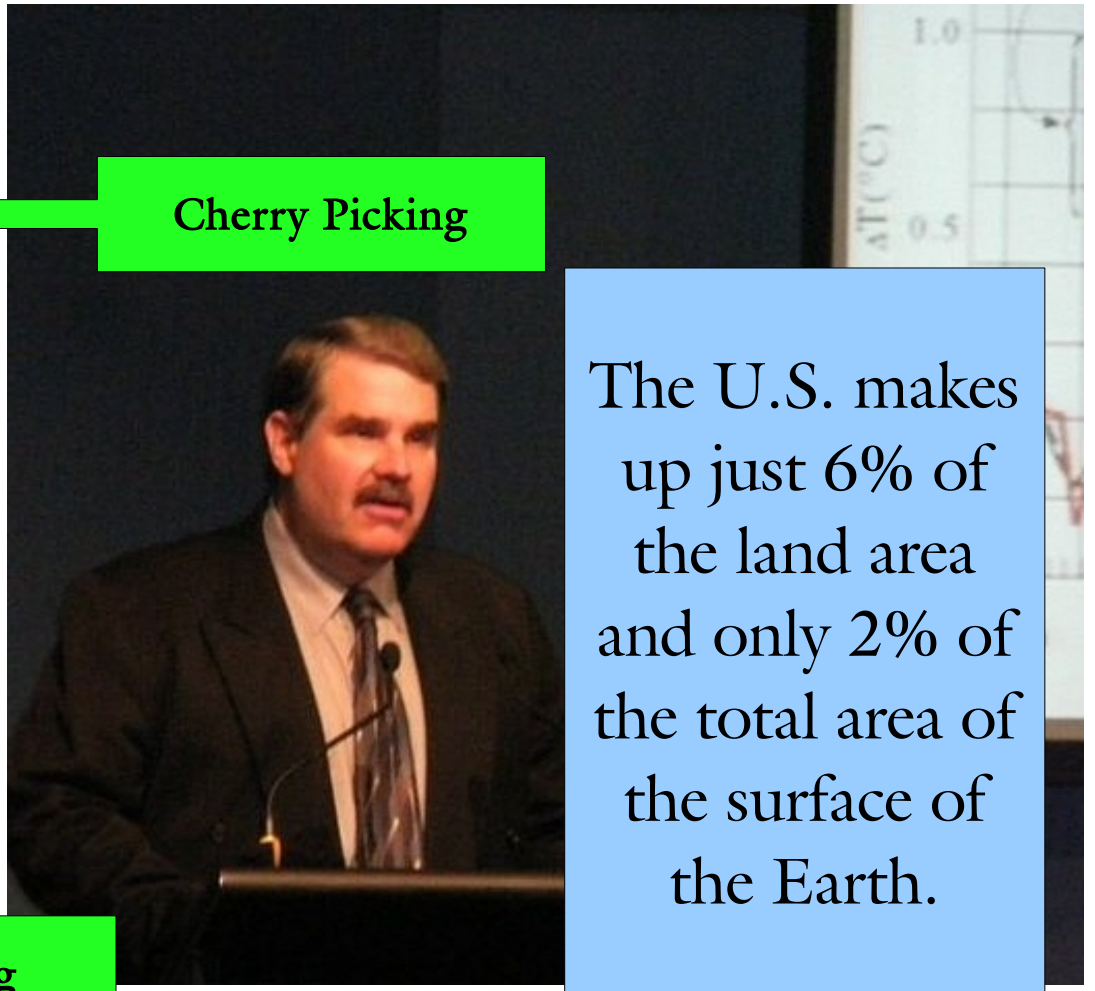


Anthony Watts, a meteorologist with no training in scientific research, routinely broadcasts science doubt about the existence of climate warming trends.

Cast Doubt on the Science



Cherry Picking



The U.S. makes up just 6% of the land area and only 2% of the total area of the surface of the Earth.

Red Herring

Anthony Watts, a meteorologist with no training in scientific research, routinely broadcasts science doubt about the existence of climate warming trends.

Cast Doubt on the Science

Rep. Lamar Smith (R-TX)
Photo from Wikipedia

*". . . there is a great amount of **uncertainty** associated with climate science. These uncertainties **undermine** our ability to accurately determine how carbon dioxide has affected the climate in the past. They also limit our understanding of how anthropogenic emissions will affect future warming trends."*

Rep. Lamar Smith (R-TX). "Overheated rhetoric on climate change doesn't make for good policies". Op-Ed. Washington Post. May 20, 2013.

Note: at the time, Rep. Smith was chairman of the House Committee on Science, Space, and Technology.

Cast Doubt on the Science

Rep. Lamar Smith (R-TX)
Photo from Wikipedia

Equivocation

"... t ***uncertainty*** *associa science. These uncertainties* ***undermine*** *our ability to accurately determine how carbon dioxide has affected the climate in the past. They also limit our understanding of how anthropogenic emissions will affect future warming trends."*

He's equating "uncertainty" with "unreliability" - those are not the same thing.

Question the Scientists' Motives and Integrity

"Why is there so much passion about global warming…? There are several reasons, but a good place to start is the old question 'cui bono?' Or the modern update, **"Follow the money."**

Alarmism over climate is of great benefit to many, providing government funding for academic research…"

-- From an Op-Ed piece in the Wall Street Journal, printed in January, 2012 and signed by 16 scientists. (emphasis mine)

Question the Scientists' Motives and Integrity

"The WSJ OpEd makes a lot of hay from having 16 scientists sign it, but of those only 4 are actually climate scientists. And that bragging right is crushed to dust when you find out that the WSJ turned down an article about the reality of global warming that was signed by 255 actual climate scientists."

-- Phil Plait, author of the "Bad Astronomy" blog hosted at Discover Magazine.

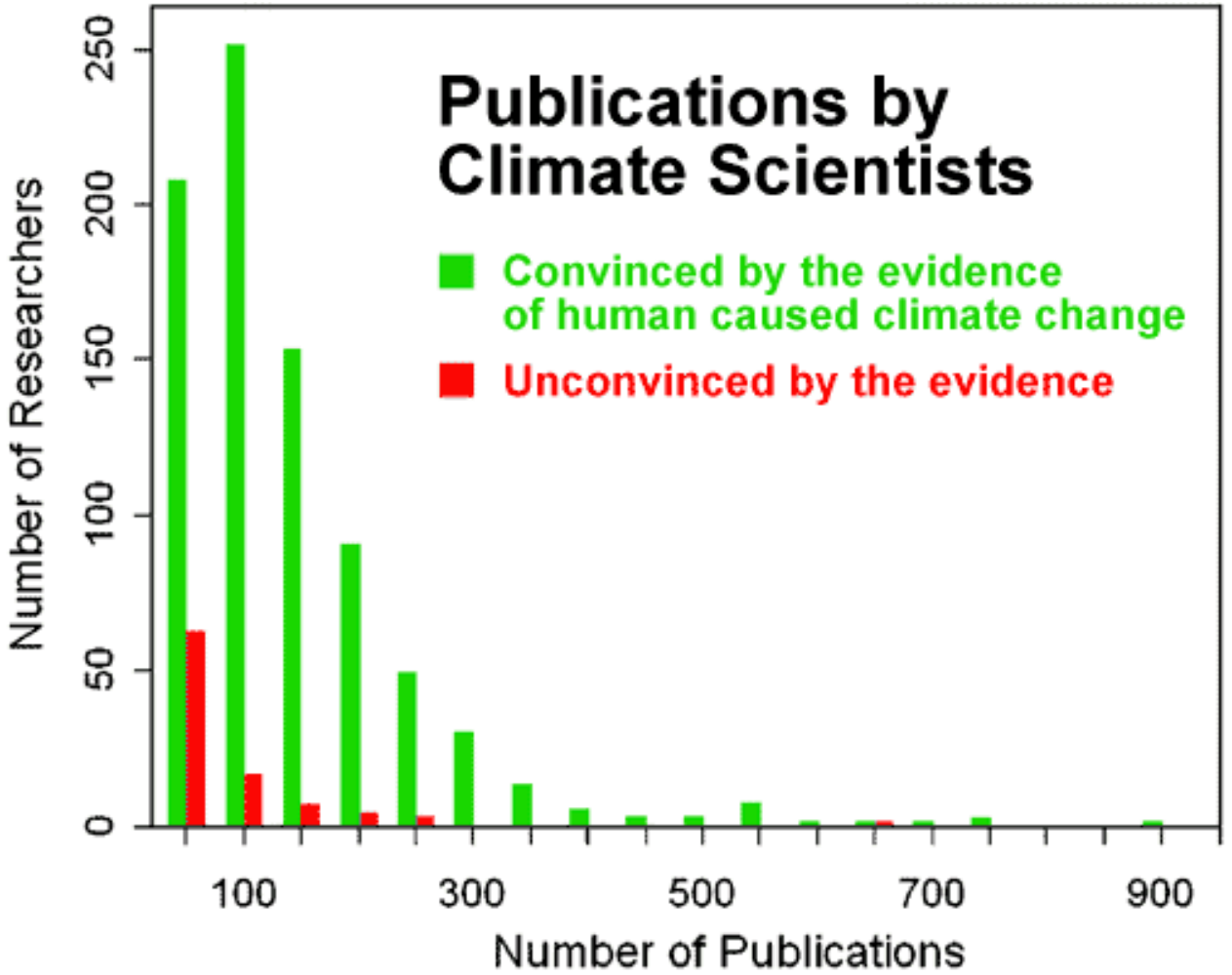
Cite only disagreements/amplify the small minority opinions

"Despite media claims to the contrary, the debate is not over. There is no consensus among scientists concerning global warming. While most appear to subscribe to the theory, thousands of others do not."

-- From the "About" page of http://noconsensus.org

Exercise: analyze the above passage – see if you can spot the weak critical thinking, logical fallacies, weasel words, etc.

Cite only disagreements/amplify the small minority opinions

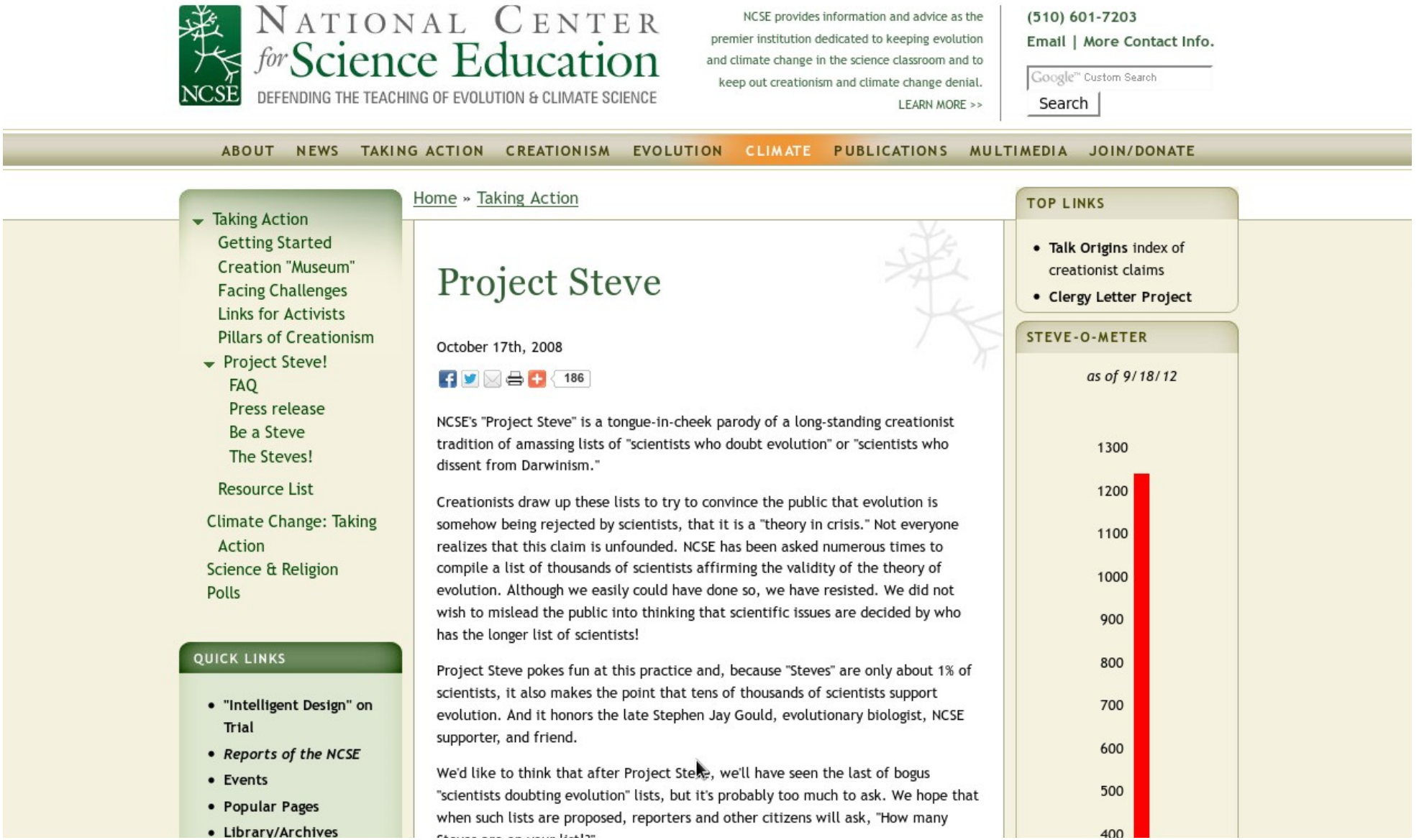


Survey of actively publishing climate scientists – 97-98% of them are convinced by the evidence that climate change is happening and caused by human activity. This is one of a few detailed studies of this issue that all draw the same conclusions.

Publication: *"Expert credibility in climate change." Anderegg, William R. L., Prall, James W., Harold, Jacob, and Schneider, Stephen H. Proceedings of the National Academy of Sciences. 2010.*

http://www.pnas.org/content/early/2010/06/04/1003187107.abstract

Project Steve



Exaggerate the potential harm

"The U.S. Environmental Protection Agency (EPA) seems to be on a drunken binge to impose increasingly **economy-killing regulations** to reduce CO2 emissions. "

-- Michael S. Coffman, August 12, 2012
(emphasis is mine)

His Ph.D. is in forest science from the Univ. of Idaho at Moscow (http://www.uidaho.edu/cnr/frfs). He has no formal training in economics, physics, or chemistry.

This person is equivocating a political issue with a scientific issue.

http://www.newswithviews.com/Coffman/mike132.htm

Appeal to personal freedom

"The auto industry calls [an average Fuel Economy Standard of 35 miles per gallon by 2020] unrealistic. Its new radio ad campaign, which can be heard at the website DriveCongress.com, features a so-called SUV mom fretting about Congress forcing her to drive a smaller car."

-- From "Special Report with Brit Hume," June 19, 2007. Reported by Major Garrett, a Fox News Correspondent, during the segment.
http://www.foxnews.com/story/0,2933,285113,00.html#ixzz26xJwae34

Argue that acceptance would invalidate a philosophical tenet

Senator James Inhofe (R-OK) is a key, outspoken denier of the scientific evidence for human-induced climate disruption. He is the current chairman of the US Senate Committee on Environment and Public Works.

"Well actually the Genesis 8:22 that I use in there is that 'as long as the earth remains there will be springtime and harvest, cold and heat, winter and summer, day and night.' My point is, God's still up there. The arrogance of people to think that we, human beings, would be able to change what He is doing in the climate is to me outrageous."

-- Senator James Inhofe, in an interview with Vic Eliason of Christian Youth America. March 7, 2012.

This person is equating a religious issue with a scientific issue.

FAQ: What do I do?

Stop, Ask, Think

- A friend over dinner says, "Hey, do you believe that X is true?"
  - You have studied the issue. You know that the scientific answer is one thing, but the social, political, ethical, moral, or values answer is another. How do you know which the person is looking to get?
- Ask them a simple question: "How much scientific evidence would it take to convince you that X is true/false?"
  - If the answer is: "there isn't an amount that would convince me," move on . . . talk about something else – this isn't about a scientific issue.
  - Or, clarify that there are many dimensions to the subject – ask them about which they want to talk.

What to do, what to do?

- What can you do if you encounter denial?
  - Try to understand how the denial is conducted (apply the toolkit – be a skeptic, avoid denialism!)
    - use the scientific method, and make sure it's been used correctly
    - look for logical and reasoning fallacies, including weasel words – these simple flaws place a claim in a questionable zone.
  - Determine if the person would ever be convinced of the claim (how much evidence would it take?)
  - Try to understand the real cause of the denial
    - is it a science issue, or a values, social, or political issue?
  - Understand that more data may not be the right path to making the argument – try separating the issues.

References

- "Science Writing in the Age of Denial" http://sciencedenial.wisc.edu/videos/
- Sagan, Carl and Druyan, Ann. "The Demon-Haunted World: Science as a Candle in the Dark." Ballantine Books (February 25, 1997)
- Global climate disruption
  - The website http://www.skepticalscience.com has a ton of the most common denial arguments and 10 tons of cited research to assess each argument
- Ben Goldacre's excellent TED Talk on "Battling Bad Science"
  - http://www.ted.com/talks/ben_goldacre_battling_bad_science.html
- Oreskes, Naomi. "Merchants of Doubt: How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming." Bloomsbury Press; 1 edition (May 25, 2010)

References on Climate Science

- Surveys of active research scientists
  - Oreskes (2004), Oreskes (2007), Doran and Zimmerman (2009)
  - http://iopscience.iop.org/1748-9326/8/2/024024/article
- Assess climate claims
  - http://www.skepticalscience.com/
- Number of actively engaged researchers in the world
  - http://chartsbin.com/view/1124 (data from UNESCO)