

Science Con-Artists & the Credibility Game

<http://shipseducation.net/credibility>

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Efforts to usurp scientific authority abound. Here are some strategies for teaching about the problem of credibility and expertise, and for developing skills in analyzing scientific claims in the media.

The Problem:

- **Science Con-Artists**

The problem is *NOT* “pseudoscience” — not “what is science?” but what are the forms of imitation, imposture, masquerading, disinformation tactics, deceit? *What claims* are reliable? *Who* can you trust?

- **fake news** (examples: pollution is not a threat?; consumer products pose no risks?)

- **anti-vaxxers, climate change deniers, flat-Earthers, anti-fluoridationists**

These cases pose a question of detecting (dis)honest communication. It is *NOT* about exercising scientific reasoning, the ability to assess evidence or to understand the nature of science. The deceit exploits those very assumptions.

How do we help students learn about and address con-artists?

★ “science media literacy”

- The central issue of ascertaining credibility is shared by **scientists, journalists, military intelligence, grand juries.**

- It is an epistemic question: What knowledge should one **trust**? Ironically, mere skepticism (often emblematic of science) is not the relevant skill. [See new book by Naoimí Oreskes, *Why Trust Science?* (2019)]

Why do we trust? Often, WHO is a *credible* spokesperson for science?

What warrants *epistemic* trust: based on evidence, not moral trust or loyalty?

Challenge: How to package this lesson in active, student-centered, inquiry learning?
NOT with a prescribed list of criteria when diagnosing sources (not inquiry)

- **Credibility Game #1: Marvels & Monsters** -- sample classroom activity

Let's return to late Renaissance, 16th century and the emergence of books. Based on report. image, try to guess which organisms are real, which are unsubstantiated.

Discuss: ▢ *Identify the factors that customarily guide our judgments:*

Sample responses: plausibility, prior beliefs, confidence in the speaker's authority, as well as evidence, expertise, and credibility.

- *variant?:* Ripley's “Believe It or Not!”™

Overview of Science Media Literacy [preview from Instructor's perspective]

- All public scientific knowledge is mediated from expert to non-expert. [**network**]
 - Figure 1: bird's eye view of the mediation of expert science via "gatekeepers"
 - Figure 2: The full trajectory, or "ontogeny," of a scientific claim. Each claim passes through a series of epistemic steps, "from test tube to YouTube" or "from lab book to Facebook." Arrows indicate information flow, or any form of direct causality or necessary trajectory. (Arrows may thus be best read in reverse, as mapping the origin or provenance of a claim as it is relevant to assessing the claim's reliability, or trustworthiness.) The domain of conventional science is compared to the more expansive domain of science-in-society. Information is conveyed and transformed at several points, each posing specific epistemic challenges, including: (A) observations, experimental measurements and the instruments that mediate them; (B) scientific, statistical and theoretical reasoning; (C) peer review, correspondence among scientists, and epistemic checks and balances, often mediated by assessments of credibility; (D) "external" publications and testimony to media professionals and public institutions (legislatures, courts, government agencies); and (E) various communication media (print and broadcast, news and entertainment, Internet, social peer-to-peer networks).
 - Figure 3: Gatekeepers as mediators; con-artists as imitators. Reliable scientific claims typically flow through three relatively independent domains of discourse (top row). Science journalists and other public media professionals function as "gatekeepers" who assess and interpret claims from experts (D), and regulate and limit unjustified claims from non-experts and false experts (Q). Consumers and citizens face the responsibility of identifying trustworthy media (E) and managing claims from other questionable or unreliable sources (R). Citizens and consumers may further convey information through informal, peer-to-peer social networks (S). They must recognize and regulate the effect of their own cognitive biases and filters (E, R, S).
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- **Credibility Game #2: "To Tell the Truth"** ... 1960s gameshow, revived 2016
 "I am a scientist." "I am a scientist." "I am a scientist."
 "Two of these speakers are imposters. Only one is the real scientist."
-  **Who can be trusted as a *credible scientist*?**
 - **Steve Milloy**, author of *Junk Science Judo: Self-Defense Against Health Scares & Scams*; adjunct scholar at the Cato Institute; and editor of the junkscience.com website, rated a "Hot Pick" by *Science* magazine; a frequent science commentator on radio and television
 - **James Inhofe**, 4-term Senator and former Chair of the Environment and Public Works Committee.
 - **Phil Jones**, former head of the Intergovernmental Panel on Climate Change, whose hacked e-mails revealed that he discussed suppressing the release of data and the "tricks" used in graphing long-term temperature changes
 = What matters is *expertise*, not prestige, impressive-sounding titles or style.

- ☐ *Who can be trusted as an **expert** about climate change?*
 - **Fred Singer**, physicist, head of the Non-Intergovernmental Panel on Climate Change, fellow at the Marshall Institute; founder of the National Weather Satellite Service; and former deputy assistant administrator for the Environmental Protection Agency
 - **John Coleman**, co-founder of the Weather Channel, former TV weatherman, with 6 decades of experience in broadcasting
 - **Naomi Oreskes**, historian of science with background in geology and a former mining consultant, analysis of climate change consensus in *Science*

= What matters is *consensus*, not expertise alone.
- ☐ *Who can be trusted to speak for the **scientific consensus**?*
 - **John Christy**, professor of Atmospheric Science and Director of the Earth System Science Center at the University of Alabama Huntsville, and Alabama State Climatologist; a pioneer in satellite temperature detection and 1991 recipient of NASA's Exceptional Scientific Achievement Medal; who gave Congressional testimony on atmospheric temperature data and its implications on May 14, 2015
 - **Steve McIntyre**, former mining consultant and statistician, Editor of the ClimateAudit website, whose analysis revealed errors in compiling temperature data for the last 1,000 years
 - **Paul Huttner**, local radio weatherman, author of the "Updraft" blog on Minnesota Public Radio, interviews other scientists on the air

= What matters is *honest reporting* of consensus, not the voice of individual experts with potential bias or conflicts of interest.

= NOTE: There is a fundamental shift from internal science -- **what** is the evidence? and what is its quality? -- to **who** can give credible (expert and honest) testimony on science? The most immediately relevant evidence is *about the trustworthiness (expertise and honesty) of the speaker*.

Credibility Game #3: Find the Expert

- Extend problem of credibility to **plumbers, auto mechanics, dentists, lawyers**
 - ★ problem of EPISTEMIC DEPENDENCE, concept of EPISTEMIC TRUST
- OR: **cell phone repair, pregnancy test, STD consultation ?**
 - (or: who can help w/ science homework, find good parties)
- ☐ [Choose one form of expertise relevant to you.] *How do you know who is an expert? What would be your #1 criterion?* [For presentation, ☐ collect quick one-word answers from participants.]
 - IF** a fellow expert: assess performance & demonstrated skills; track record (a form of "calibration" against known expertise?)
 - IF NOT:** credentials; track record/documented experience; referrals; portfolio
 - Caveat:* online reviews only as good as the epistemic trust of the reviewer
- ☐ *What are the problems of applying these criteria for consumers interpreting science?*
 - ★ Echo problem of epistemic dependence, concept of epistemic trust

Consumers & Con-Artists

- **Figure 4** (adapted from Figure 2) -- competition between experts and non-experts
- example of science con-artists (not new!) [**Ben Jonson's *The Alchemists***]
- modern metaphor by sociologist Chris Toumey: **conjuring science**— gaining TRUST is central, NOT evidence

What are their major strategems to gain trust (or “confidence,” in the sense of con-artists)?

- 1. Style [**James Bond**]
 - Fox News x 4 — looks like a responsible news broadcast
- 2. Disguise [**Groucho glasses**]
 - NIPCC vs. IPCC — bogus document on climate change modeled after UN document, almost page by page
- 3. Social emotions [**anti-vaxxers**]
 - Plaquemines, LA — climate-change denial in community dependent on oil
 - sociologics — when trust is based on maintaining social relations, not logic or evidence
 - Teacher Sutter & his student GW-denier — problem even in schools
- 4. Conjuring Doubt [**skeptic**]
 - **books: “It Ain’t Neccessarily So”**; “Sketpical Environmentalist” — If you can’t win the argument scientifically, use the principle of skepticism to foster uncertainty and doubt to stall action
- 5. Flooding the Media [**tsunami**]
 - Gaming the search engines.
- Review
- **Credibility Game #4: “Bluff the Listener”** (NPR’s “Wait, Wait, Don’t Tell Me”)

Students form groups of 3. Find one weird story. Invent 2 others on the same theme. Present them to the class. Vote on the most convincing. Extra points for stumping the teacher? (See also Penn & Teller’s TV show, “Fool Us”)

★ Discussion ▢ *What made the stories convincing, since you have no evidence? How might these factors— plausibility, emotion, language, vocal presentation—affect our interpretation of scientific claims?*

Sources?: “News of the Weird”; the Ig Nobel Awards / (Annals of) Improbable Research / Journal of Irreproducible Results; Ripley’s “Believe It or Not!”

Student Activity: Map the Origin of a Scientific Claim

- **ontogeny of a scientific claim**

- ▢ *Where does a scientific claim come from? What makes it credible or trustworthy at each stage of that process?*

Teacher chooses an unlikely scientific claim of relevance to students. Students use web & library resources to trace the claim backwards to its foundations and evidence — revealing all the stages of interpretation and communication susceptible to potential epistemic missteps, errors, or deception (echo concept of epistemic trust)

Gatekeepers

- **Figure 3:**(reprise) — Science/expert information is inevitably mediated en route to user — Traditionally, professional science journalists have functioned as “gatekeepers.” Conventional filters of the news curator (editor): relevance, intelligibility, accuracy

Game #5 / Role-Play: Students as Science News Editors

- **[Washington Post: Woodward, Bernstein, Bradley]**
 - ▢ *Now YOU are the Editor. What principles will guide your work, ideally?*
 - ▢ *Specifically, what rules will you use to enforce accuracy and credibility?*

Synthesis / Rehearsal

Credibility Game #5: Contemporary Case (not a “game” anymore?)

- ▢ ***“Do cell phones cause brain cancer?”*** (as declared by the **Italian Supreme Court**) (one SAMPLE case — choose your own controversial claim, concretely relevant to students)
 - ?? ▢ Internet search, other sources?
 - [Limit time, to reflect “real-world” conditions?]
 - Recall: Mapping the Origin of a Scientific Claim (back to the original evidence)

Problems of Social Media

- **Figure 4** (reprise) — consumer domain of discourse in mediation of expertise
- problem of **social media**
- **spread of lies** (see Allchin, 2018)
- blind, teleological faith that the **Truth-Will-Out?**
- **Red Queen** -- fact-checking cannot keep up to the pace of lies? damage in its wake.
- concepts of (mis)communication in social networks: confirmation bias/**filter bubbles** — students on computers or phones with separate browsing histories | **echo chambers** | **false-consensus effect**

Resources

- some **books**

David Michalek, *Doubt is their Product*
Naomi Oreskes and Eric Conway, *Merchants of Doubt*
Rampton and Stauber, *Trust Us, We're Experts!*
Chip Heath and Dan Heath, *Made to Stick*
David Freeman, *Wrong: Why Experts keep Failing Us*
Thomas McGarity and Wendy Wagner, *Bending Science*
Ben Goldacre, *Bad Science: Quacks, Hacks, and Big Pharma Flacks*
Naomi Oreskes, *Why Trust Science?*

- **Videos**

- **Merchants of Doubt**

- **Classroom Resources & Activities**

- module: "From Expertise to Science"

Zemlen (2009) -- https://www.academia.edu/2020633/Putting_sociology_first_reconsidering_the_role_of_the_social_in_nature_of_scienceeducation

- Union of Concerned Scientists "The Disinformation Playbook"

<https://www.ucsusa.org/resources/disinformation-playbook>

Review?

- a science con-artist: *Are you prepared?*