

Science, Scientists, & Scientific Information

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**Science is just another way of
understanding reality.**

Participation Activity #1

- What does science mean to you?
- Locate a definition of science from any source (have fun)
- What does science do for you?



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Test relentlessly?

“Blind faith, no matter how passionately expressed, will not suffice. Science for its part will test relentlessly every assumption about the human condition” [E. O. Wilson](#)

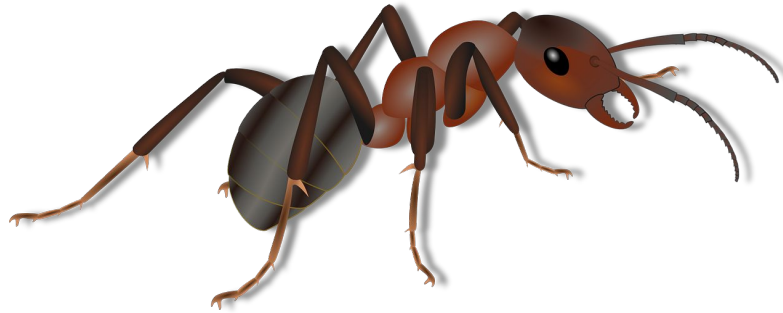


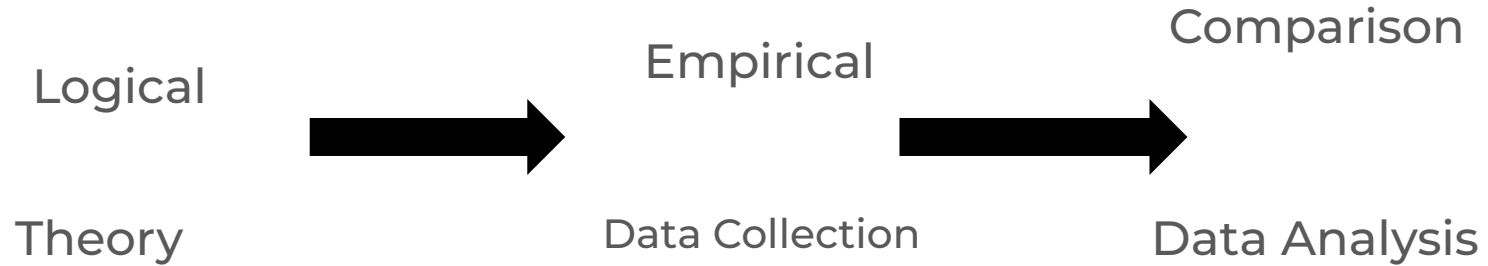
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Trust in Science?

- A recent perceived lack of confidence in science prompted Congress to mandate the NSF to explore issues related to reproducibility and replicability as well as how these issues impacted the public's trust in science (National Academies, 2016).
- The report highlights some underlying matters that may contribute to a lack of confidence in science, such as a clear misunderstanding of the concepts of consensus and uncertainty.
- For example, in one survey a large swath of Americans thought “scientists are divided” on the human causes of climate change (37%) and on evolution (29%) (National Academies, 2016).
- One study showed that when scholars provide uncertainty information this actually leads to readers' distrust and confusion of science since it lacks absolute certainty (Frewer et al., 2003).

National Academies of Sciences, Engineering, and Medicine. (2019). *Reproducibility and Replicability in Science*. Washington, DC: The National Academies Press. <https://doi.org/10.17226/25303>

To be upheld, scientific knowledge needs to have logical and empirical support.



Errors in Inquiry

- Inaccurate observations
- Overgeneralization
- Selective observation
- Illogical reasoning



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Possible Problematic Areas of Knowledge

- Tradition
- Authority



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Can scientific results become tradition?

**How might authority affect your
research?**

Tradition can be way wrong

- Simple, not necessarily flat, and Jerusalem in the center
- Strabo – Climata zones

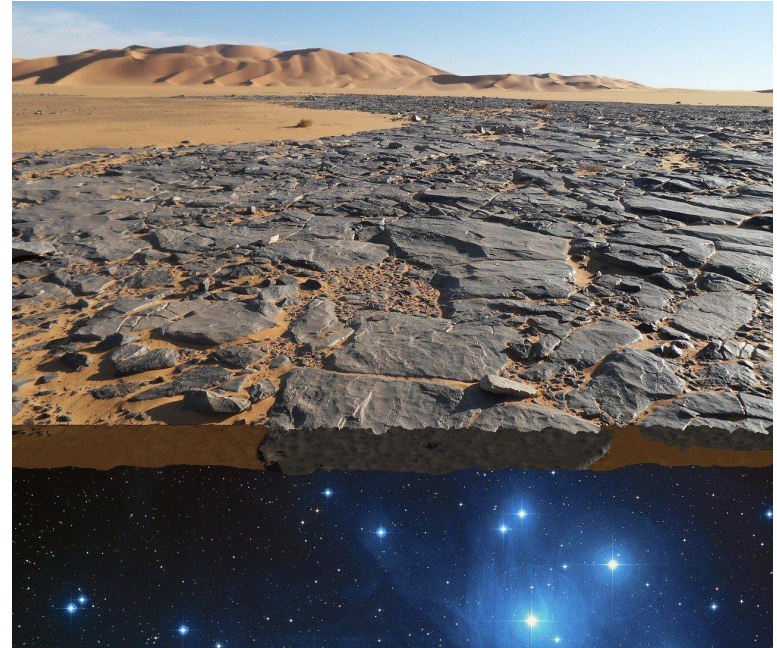


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What is positivism?

- Philosophical system grounded on the rational proof of scientific assertions. Positivism assumes a knowable, objective reality.
- The Scientific Method!
- “every positive theory must necessarily be founded upon observations, it is, on the other hand, no less true that, in order to observe, our mind has need of some theory or others”

Types of Reasoning

- Inductive – general principles are developed from specific observations.
- Deductive – specific expectations are developed on the basis of general principles.

Empiricism continued

- Logical positivists sought verification.
- Science is the practice of formulating meaningful statements, and using observations to judge whether a meaningful statement is correct.
- Scientific claims were verifiable through observation; claims that were not verifiable were not scientific.

Critical Rationalism

- Karl Popper denied that induction was the method of science.
- Science is distinguished from other human activity by its attitude (i.e., skepticism) rather than its activities.
- He also argued that the goal of science is not to prove theories—since that can't be done—but to disprove them.
- So, scientists should NOT be looking for observations that confirm a theory, but any that might refute it.

Ludwik Fleck and the Thought Collectives

- Lud proposed that scientific facts are the collective accomplishments of communities.
- He called these communities “thought collectives” as in any discipline that had common ways of thinking that makes it possible to work together, share data, and interpret others information.
- What members of a collective call truth is merely what the thought collective has settled upon at that point.

Theories not supported lead to new Paradigms

- Theories – A systematic explanation for the observations that relate to a particular area of social life
- Paradigms – A model or frame through which we observe and understand

Thomas Kuhn

- Scientists share not just theories and methods, but values and beliefs.
- Most of the time scientists do not question their paradigms (i.e., 'normal science').
- Kuhn argued that science advances not by verification or refutation BUT Paradigm Shifts!

Social Epistemology

- If the conclusions of scientists—who for the most part were European or North American men—were social constructions, then they had no more or less purchase on truth than the conclusions of other groups.
- It's not so much that Science corrects itself, but that scientists correct each other through the social processes that constitute “transformative interrogation”.
- Further Helen Longino urged us to accept the fact that individual scientists invariably bring biases, values, and background assumptions to their work.

So what?

- There is no singular scientific method and scientific practice consists of communities of people, making decisions for reasons that are both empirical and social, using diverse methods.
 - Science should be trusted due to its sustained engagement with the world and its social character.
- “Without this trust in experts, society would come to a standstill. Scientists are our designated experts for studying the world.”
- “The success of science as a source of stable epistemic authority has been called into question, and its future success as a cultural enterprise appears to be at least somewhat in doubt.”
- “Outside their domains of expertise, scientists may be no more well informed than ordinary people. Indeed, they may be less so!”

Science Liaison Librarians

- How can librarians help?
- Transdisciplinary?

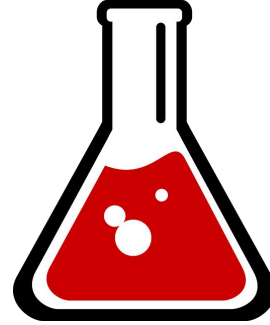


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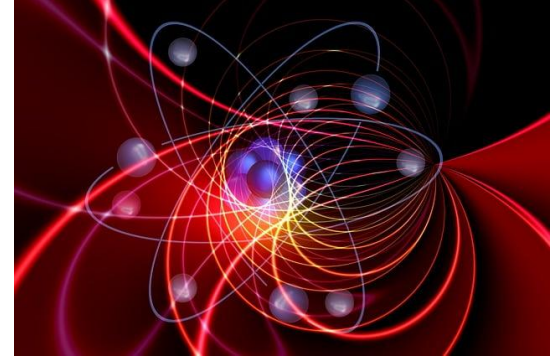


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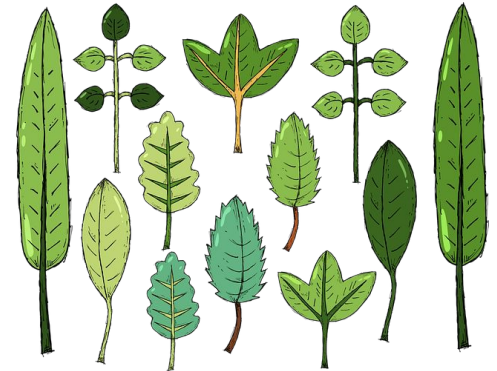


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Resources

- Frewer, L. J., Scholderer, J., & Bredahl, L. (2003). Communicating about the risks and benefits of genetically modified foods: The mediating role of trust. *Risk Analysis: An International Journal*, 23(6), 1117-1133.
- National Academies of Sciences, Engineering, and Medicine. (2019). Reproducibility and Replicability in Science. *Washington, DC: The National Academies Press*. <https://doi.org/10.17226/25303>