



- The Earth isn't warming
- If the Earth is warming, it isn't caused by humans
- Vaccines cause autism, or are otherwise unsafe
- Cellphones cause cancer
- Living near power lines or cell towers is harmful
- Intelligent design / creation science
- Acupuncture / homeopathy / chiropractic / detoxification / naturopathy
- Dowsing / witching
- Organic foods are healthier than conventional foods
- Gluten sensitivity is common
- GMOs are unhealthy or harmful

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- **Objective:** largely based on facts, on evidence, on what is measurable, on what is observable
- **Subjective:** largely based on opinions, on emotions

**GENTLEMEN, WHAT IF ANYTHING
WOULD CHANGE YOUR MIND?**

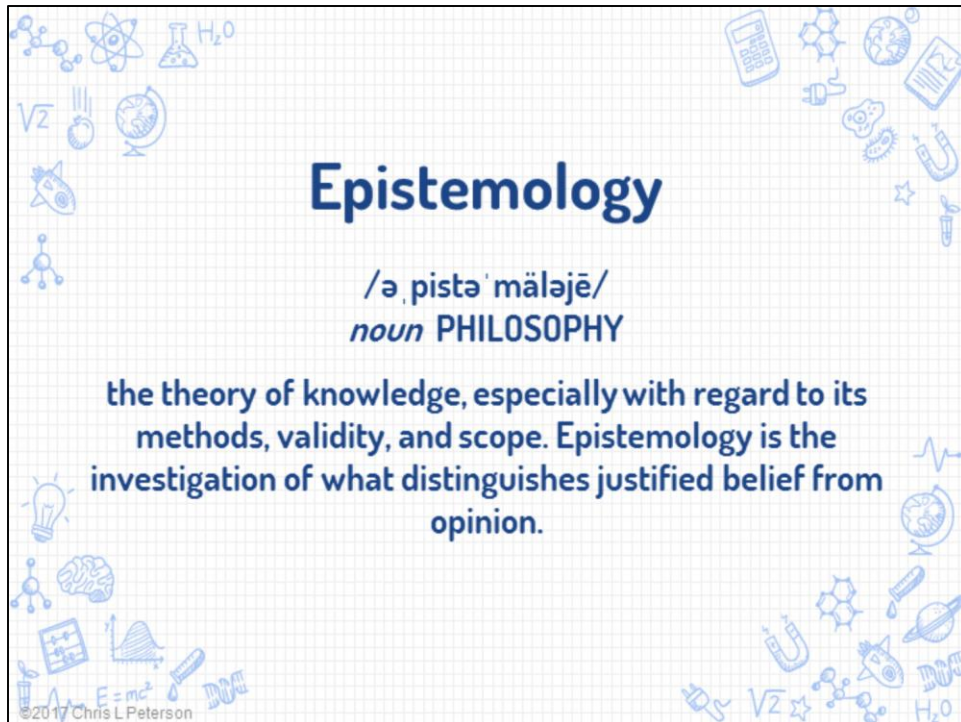
EVIDENCE

NOTHING

Are you willing to honestly evaluate your beliefs?

Are you willing to change your mind?

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Epistemology deals with the ways that we obtain knowledge. What knowledge is, what belief is, what justifies the two.

Epistemology

Evidence-based: belief is based on the relative weight of objective evidence

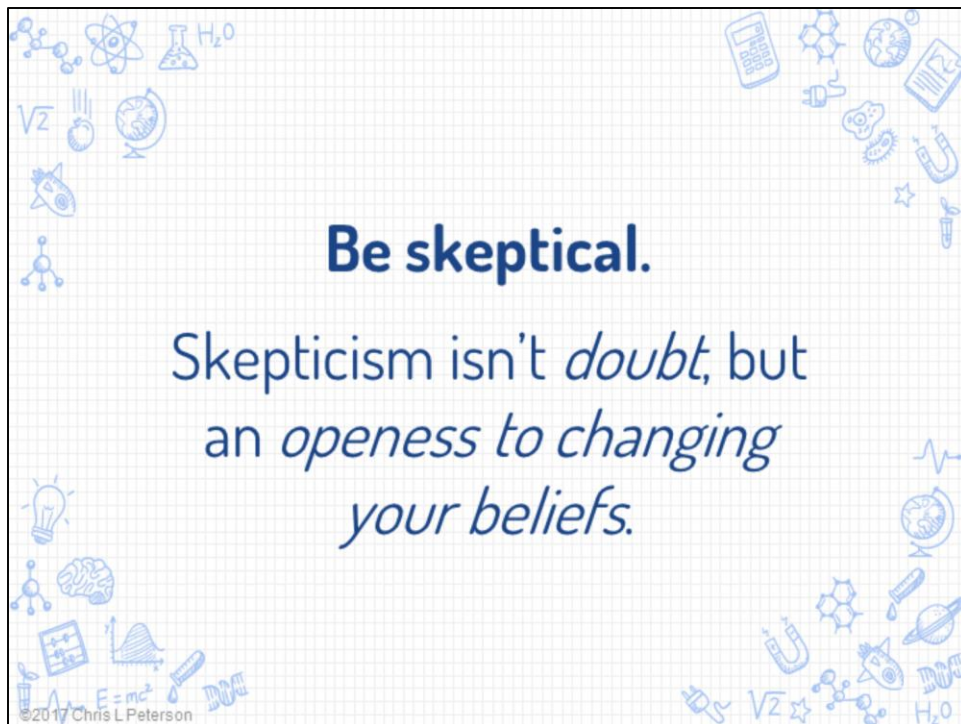
Faith-based: belief is based on indoctrinated ideas, on the acceptance of ideas from trusted parties, on dogma



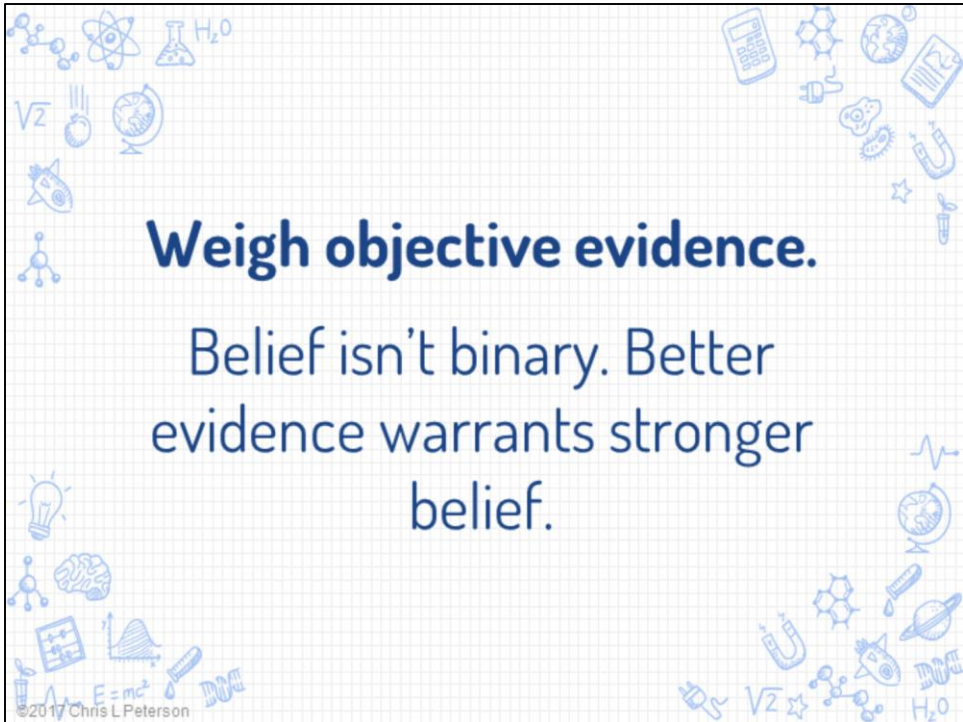
**You cannot accurately
assess news if you can't
think critically.**

**Critical thinking is a
learned skill!**





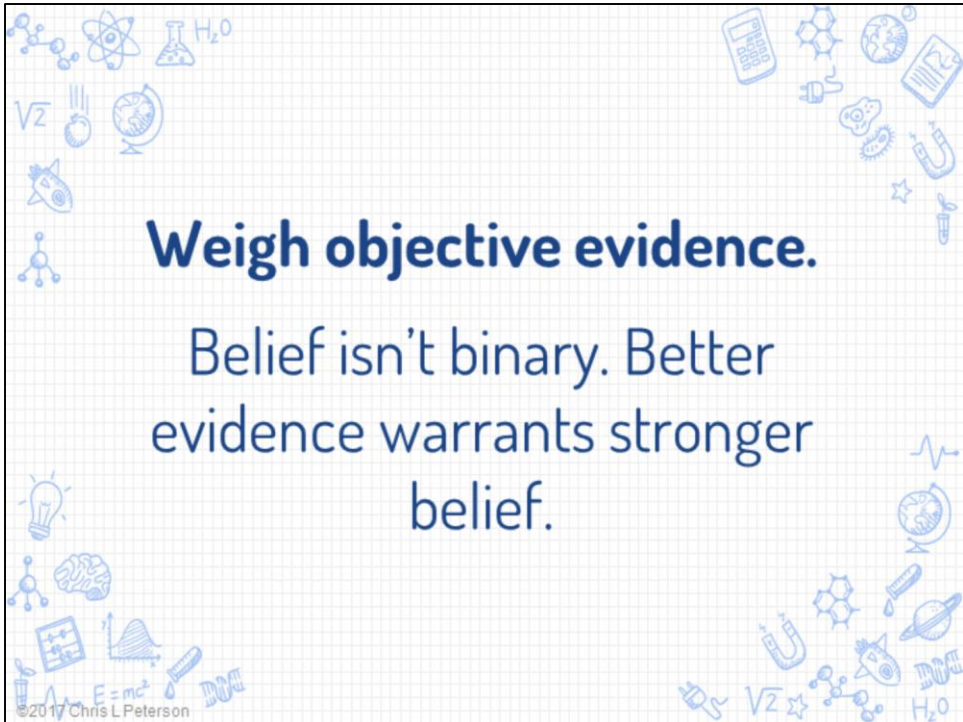
Very important not to confuse meaning of skepticism as “doubt” with the meaning in its critical thinking sense!



Weigh objective evidence.

Belief isn't binary. Better evidence warrants stronger belief.

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- This is related to the Black/White fallacy.
- Skepticism doesn't demand that all viewpoints have equal weight!

Respect expert consensus.

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Cognitive Biases

- Confirmation bias
- Belief bias
- Backfire effect (denialism)
- Bandwagon effect
- Reactance
- Authority bias
- Illusion of truth effect

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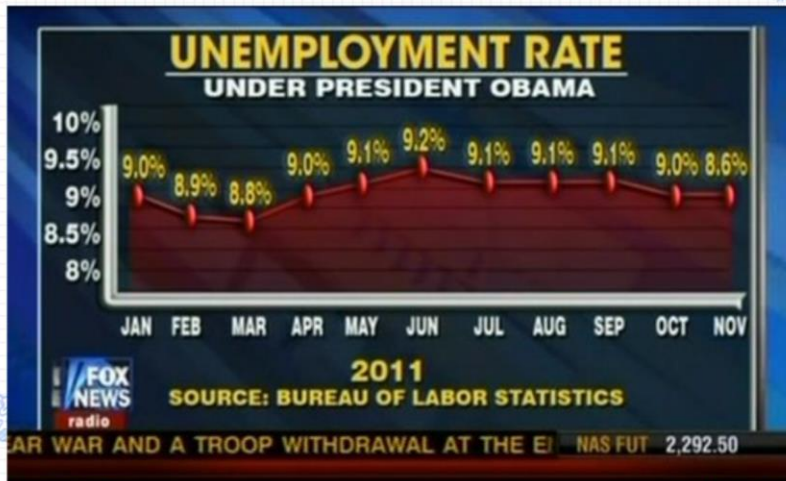
- **Confirmation bias:** The tendency to search for, interpret, focus on and remember information in a way that confirms one's preconceptions.
- **Belief bias:** An effect where someone's evaluation of the logical strength of an argument is biased by the believability of the conclusion.
- **Backfire effect:** The reaction to disconfirming evidence by strengthening one's previous beliefs.
- **Bandwagon effect:** The tendency to do (or believe) things because many other people do (or believe) the same.
- **Reactance:** The urge to do the opposite of what someone wants you to do out of a need to resist a perceived attempt to constrain your freedom of choice.
- **Authority bias:** The tendency to attribute greater accuracy to the opinion of an authority figure (unrelated to its content) and be more influenced by that opinion.
- **Illusion of truth effect:** A tendency to believe that a statement is true if it is easier to process, or if it has been stated multiple times, regardless of its actual veracity.

[illegible]

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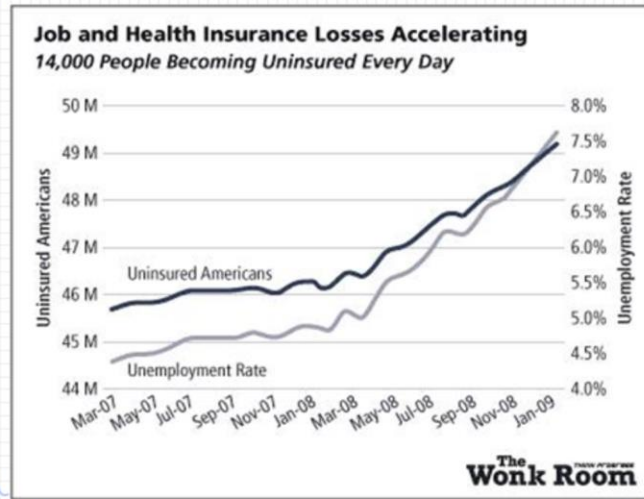
- **Argument from ignorance:** Assuming that a claim is true because it has not been or cannot be proven false, or vice versa.
- **Slippery slope:** Asserting that a relatively small first step inevitably leads to a chain of related events.
- **Black-or-white:** Two alternative statements are held to be the only possible options, when in reality there are more.
- **False cause:** Presuming that a real or perceived relationship between things means that one is the cause of the other.
- **Ad hominem:** Attacking the arguer instead of the argument. Not always a fallacy (Kierkegaard on Martensen: “My opponent is a glob of snot.”)
- **Appeal to authority:** Where an assertion is deemed true because of the position or authority of the person asserting it.
- **Shifting the burden of proof:** I need not prove my claim, you must prove it is false.
- **Cherry picking:** Pointing at individual cases or data that seem to confirm a particular position, while ignoring a significant portion of related cases or data that may contradict that position.
- **Tu quoque:** A certain position is false or wrong or should be disregarded because its proponent fails to act consistently in accordance with that position.

Graphical Data

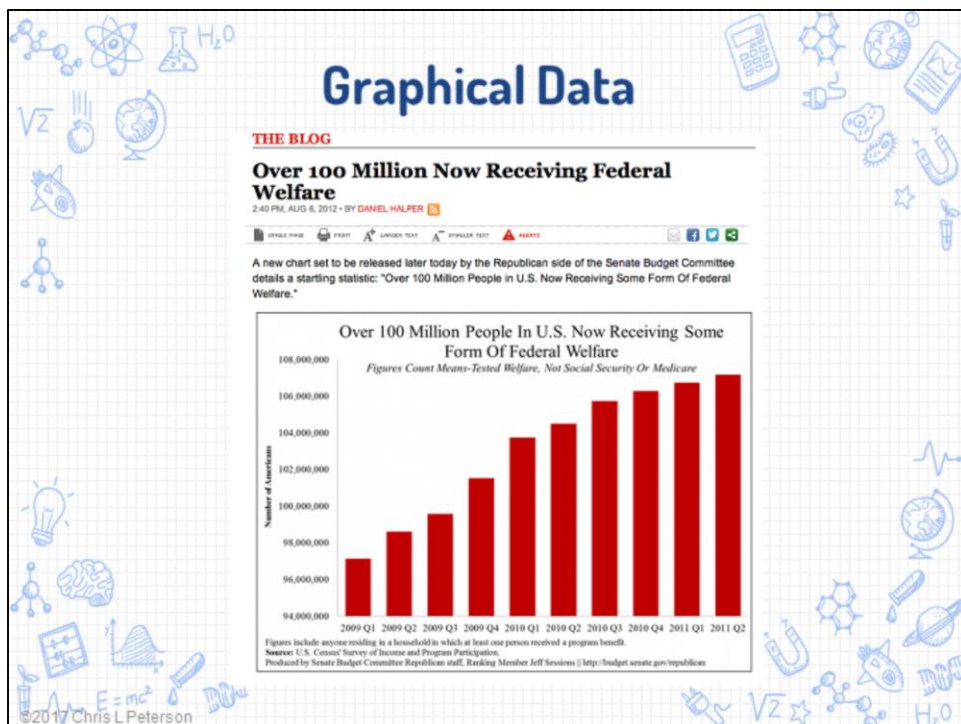


This is nearly flat... and the last point is misplotted. Note limited y-axis.

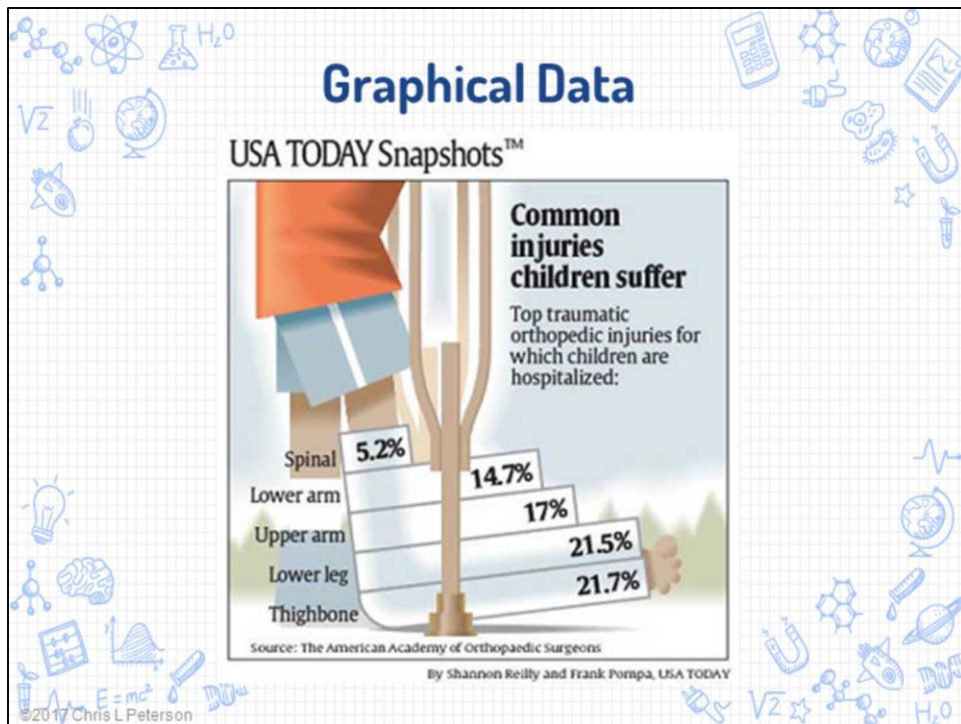
Graphical Data



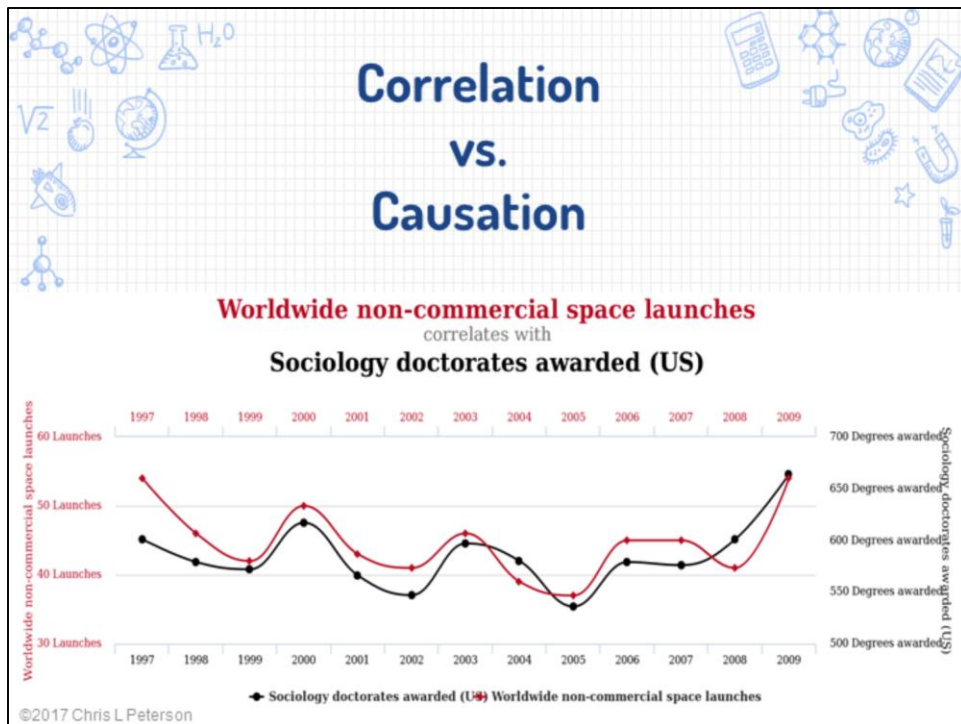
Note independent dual y-axes. What does the crossover point mean? Also, note narrow range



Narrow y-axis amplifies apparent impact.

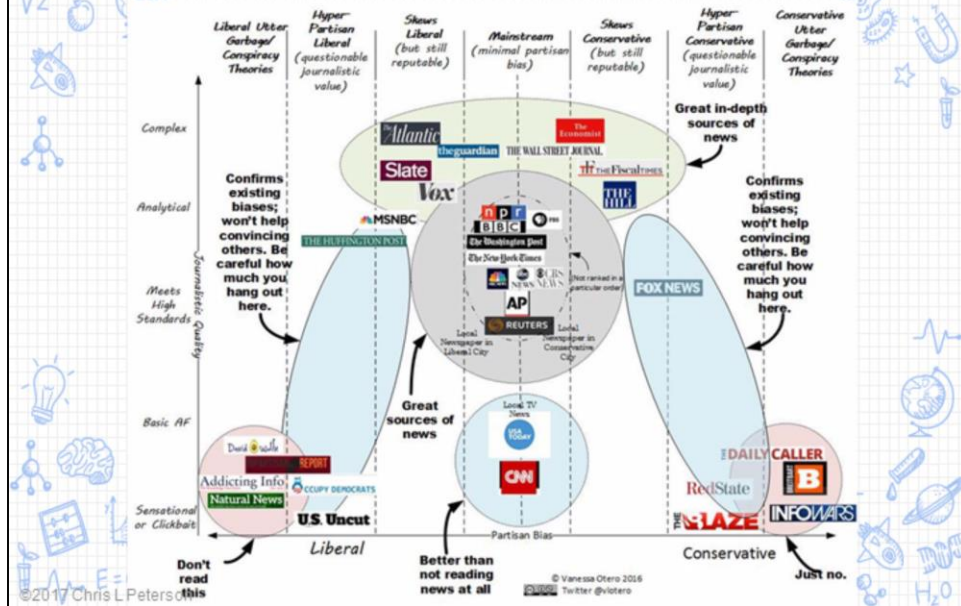


For spinal, the real figure is about .0000003% (based on 2000 injuries per year out of a population of around 74,000,000).



It is extremely easy to show an apparent correlation between unrelated things.

Consider Sources



Fact Checking

- Is the source real and reputable?
- Read the story!
- Check out the author
- Look at quotes; check them
- Read comments
- Check sources
- Look for independent accounts
- Does the data make sense?
- Be aware of your biases
- Use experts: Snopes, FactCheck, PolitiFact, WP Fact Checker, MediaBiasFactCheck

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Good sites: .GOV, .EDU, Wikipedia, major journals.

