

## Evidence Counts: What Counts as Evidence?

*A Crash Course on Skepticism  
and the Paranormal*

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## Knowledge versus Belief:

- “Knowledge consists in understanding the evidence that establishes the fact, not in the belief that it is a fact.” *Charles T. Spirling*
- “It would be perverse to believe anything for which there is no evidence whatever.” *Bertrand Russell*
- “There is no compelling evidence for extraterrestrial life and, therefore, it would be absurd for me to ‘believe’ in it. Belief in the absence of compelling evidence is called faith. Belief after acquiring compelling evidence is called knowledge. The two are quite different.” *Carl Sagan*

## Emotive Truth Criteria

“Public opinion is mostly  
public sentiment.”

*Benjamin Disraeli*

## The essence of the New Age

- An attempt to reinsert a human-centered, moral element into the physical universe
- Epistemological relativism: “You create your own reality.”
- Passion over reason: “If it feels good, do it.”
- “Mind over matter.”
- “Physical laws only constrain those who are unimaginative enough to believe they are inviolable.”
- Logical inconsistency does not automatically undermine an argument.
- Irrationalism: raising shortcomings in reasoning to the status of a virtue

“Nothing is easier than self-deceit, for whatsoever each man wishes, that he also believes to be true.” *Demosthenes*

## We are very good at conning ourselves

- If there is a pay-off (e.g., money, power, prestige, adulation, self-esteem, confirmation of cherished “core beliefs,” etc.), we are remarkably good at convincing ourselves that the grounds for our convictions are objective and unassailable—and at filtering out contrary input.
- We are very good at recognizing “ulterior motives” in others, but not in ourselves.

Wishful thinking  
trumps critical  
thinking.

Even if claimants are not intentionally trying to con you, it’s entirely possible that they have conned themselves.

- I call these devotees the “Sincere but Self-deluded.”
- They make up the majority of the people whose beliefs I am called upon to dispute.

## We are very good at compartmentalizing our knowledge

The result is that:

- we can firmly believe contradictory things
- we can think critically about some things while avoiding being critical of our beliefs in other spheres

## Because we compartmentalize our knowledge

- We can ally ourselves with our natural adversaries on certain “single issue” causes (the “strange bed-fellows” phenomenon)
- We can convince ourselves we are acting rationally and honorably when we do things that violate many of our most cherished principles

## A constant source of amazement

- It never ceases to amaze me that, in this day of consumer advocacy, when we almost instinctually mistrust hawkers of used cars, encyclopedias, driveway sealers, and house paint, that so little of this “show me” attitude crosses over to political and religious pronouncements, stock IPOs, age-old con tricks, psychic powers, “alternative” medicine, pop-psychology, UFO abductions, dowsing...

As a species we have a strong need to enchant ourselves.

- Our brains evolved to favour emotionally comforting beliefs that happen to enhance survival, rather than necessarily seeking objectively true beliefs.
- We more easily accept as true things that enhance our self-esteem, reinforce our cosmological beliefs, reduce our anxiety levels, calm our apprehensions . . .

## “The Belief Engine”

- James Alcock (*The Skeptical Inquirer*, May/June, 1995)
- 19<sup>th</sup>-Century rationalists expected that universal education and the progress of science would eventually banish superstition and irrational beliefs for good.
- Obviously, they were somewhat overly optimistic. Our brains do not automatically seek the truth when forming our beliefs.

## It is very hard to unlearn things.

- “Faced with the choice between changing one’s mind and proving that there is no need to do so, almost everyone gets busy on the proof.”  
*John Kenneth Galbraith*
- “The fundamental cause of trouble in the world today is that the stupid are cocksure while the intelligent are full of doubt.”  
*Bertrand Russell*

The rational thinker will go with the preponderance of evidence at any given time.

"Rationality is the attitude of readiness to correct one's beliefs."

*Sir Karl Popper*

**Stephen Jay Gould:**

- **NATURAL LAW:** "A generalization so well-confirmed by scientific observation and everyday experience that it would be perverse to withhold provisional assent."

**Some skeptics can be dogmatic too (don't be one of them!)**

- The skeptic who refuses to give a claimant a fair hearing (if he or she is making an honest attempt to present the evidence for the claim) is just as bad as the gullible fool who uncritically accepts every tall tale that comes down the pike.

“Science is just  
organized common  
sense.”

*Thomas Huxley*

“Is it more probable that  
nature should go out of its  
course or that a man should  
tell a lie?”

*Thomas Paine, The Age of Reason*

### An addendum to Thomas Paine

- Is it more probable that nature should go out of its course or that a man, woman, or child should be *mistaken*?
- The Psychology of Human Error: James Reason, Stuart Sutherland, Ray Hyman, Daniel Kahneman, Amos Tversky, Robyn Dawes, Elizabeth Loftus, Thomas Gilovich, Donald Redelmeier . . . .

### Misinformation abounds. . .

“It ain’t so much the things we  
don’t know that gets us in  
trouble. It’s the things we  
know that ain’t so.”

*Mark Twain*

## Human frailties that contribute to false beliefs

- INPUT/ENCODING: fallibility of perception
- PROCESSING: fallibility of categorization and inference
- RECALL: fallibility of memory

## Cognitive Heuristics:

- systematic biases in everyday reasoning: “quick-and-dirty” modes of reckoning that get us sufficiently close to the correct answer often enough to have been favoured by evolution.
- But---they can lead to egregious errors in situations that are complex and have multiple, probabilistic, interactive, or hidden causes.

## Magical thinking is the “default” mode

- We have to be *taught* to think critically.
- E.g., not to mistake correlation for causation.
- To think proportionally rather than mere “bean counting.”

- To demand comparison or control groups.
- Not to jump to the quickest, easiest, most familiar, or most congenial conclusions.
- To adopt the habit of trying to think of alternative explanations.

## The Bottom Line . . .



If it sounds  
too good to  
be true, it  
probably is.

Knowing all this, how  
should skeptics approach  
those who make  
paranormal or  
pseudoscientific claims?

## Some recommended antidotes to fuzzy thinking:

- **T. Gilovich** (1991) *How we know what isn't so: The fallibility of human reason in everyday life*. Free Press/Macmillan.
- **D. A. Levy** (1997) *Tools of critical thinking*. Allyn and Bacon.
- **R. Nisbett & L. Ross** (1980) *Human inference: Strategies and shortcomings of social judgment*. Prentice-Hall.
- **T. Schick & L. Vaughn** (1995) *How to think about weird things: Critical Thinking for a New Age*. Mayfield Publ.
- **R. Dawes** (2001) *Everyday irrationality: How pseudo-scientists, lunatics, and the rest of us fail to think rationally*. Westview Press.
- **S. Sutherland** (1992) *Irrationality: Why we don't think straight*. Rutgers University Press.

## Ray Hyman's "Principle of Charity"

- Assume your opponent is acting in good faith, until proven otherwise.
- Encourage your opponent to present the *best* case for his/her belief.
- Examine the data carefully and fairly.
- If you can refute the best evidence, the other sources of support necessarily fall short as well.
- Stick to the data. Don't attribute motives.



"It is more from carelessness about the truth than from intentional lying that there is so much falsehood in the world." *Dr. Samuel Johnson*

How can you expect to be treated if you follow this enlightened course?

People generally do not like having their beliefs challenged

- "The power of accurate observation is commonly called cynicism by those who don't have it."

*George Bernard Shaw*

Skepticism is often confused with cynicism

**SKEPTIC**

- One who demands reasonable evidence and logical justification before granting *provisional* assent to truth claims.
- Also: One who will modify his or her beliefs on the basis of new evidence.

**CYNIC**

- One who consistently attributes base motives to others' actions (especially if they seem benevolent).
- I.e., "Scratch an altruist and watch a hypocrite bleed."

The philosopher Paul Kurtz distinguishes between productive and non-productive kinds of skepticism.

- *Philosophical Skepticism*: the assertion, associated with the Sophists and others, that we can never be absolutely sure of any knowledge about the world (essentially a form of nihilism)
- *Pragmatic or Methodological Skepticism*: the method of suspending judgment pending investigation---the challenge to justify claims to knowledge. A demand for logic and evidence to back up truth claims.

## Skeptical about Skepticism?

- What alternative do you prefer?
- Skepticism, as a point of view, is the opposite of *dogmatism*.
- Antonyms: gullibility, credulousness, dupability, exploitableness, humbugability, simpleness, naivety. *Roget's College Thesaurus*.

## My sound bite . . .

- When asked, "What is the skeptical movement?", I reply, "It's sort of a *Consumer Reports* for the mind."
- It assumes it's not a good idea to make the goat your gardener.
- It's better to have a product or idea vetted by a competent, objective third party, someone who doesn't stand to gain if you buy it or buy into it.

## Expect *ad hominem* counter-attacks if you don't buy into the conventional wisdom.

- Being the skunk at the garden party is not guaranteed to win you any popularity contests.
- You will often be accused of being closed-minded.

**“If you keep your mind sufficiently open, people will throw a lot of trash in it.”**

*William Orton*

### Obligation of the skeptic to be open-minded

- Open-mindedness is the willingness to examine a proponent’s evidence fairly.
- It does not commit the examiner, in advance, to any conclusion.

- If the evidence is insufficient, it is not closed-minded to reject the claimant’s case.
- It’s OK to say, “We don’t know what is happening here, but we do not feel the evidence justifies, at this time, accepting a claim that would imply the negation of a natural law (i.e., a miracle).

**“I was gratified to be able to answer promptly, and I did. I said I didn’t know.”**

*Mark Twain*

Sometimes, you need to concentrate on the hole, not the doughnut

- Ask yourself, "What well-established data would I have to *throw away* if I were to accept this new alleged fact?"
- Is it more likely that the claimant goofed somehow, or that all of this prior information that is so strongly confirmed is fundamentally wrong?

Kinds of scientific laws, empirical data, and well-established principles that would be violated by paranormal or pseudoscientific claims.

- One or more of C.D. Broad's "Basic Limiting Principles"
  - The fundamentals of reasoned thought, antecedent to the "named" laws of science.
  - The "cultural storehouse of truths", overwhelmingly confirmed by everyday experience.)

C. D. BROAD'S BASIC LIMITING PRINCIPLES:

- An event should not have any effects before it has happened.
- It is impossible that an event which ends at a certain date should contribute to or cause an event that begins at a later date unless the period between the two dates is occupied in one of the following ways:
  - the earlier event initiates a process or structural change (mechanism) that continues throughout the interim and contributes to initiation of the later event.

C. D. Broad (cont'd.)

- It is impossible that an event at a certain time and place should produce an effect at a remote place unless a finite period elapses between the two events and unless that period is occupied by a causal chain of events that occurs successively and continuously between the two times and two places.
- It is impossible for a mental event to produce directly any change in the material world except certain changes in the individual's own brain; i.e., it is impossible to move objects, etc., without the mediation of muscular effort.

### C. D. Broad (cont'd.)

- Dependence of mind on brain — a necessary condition for any mental event is an intact, functioning brain.
- It is impossible for a person to perceive a physical event or object except by means of sensations that event or thing produces in his/her mind. There must be a physical, causal chain of events linking the event/object to the sense organs, sensory pathway, and brain receiving area.

### C. D. Broad (cont'd.)

- It is impossible for A to know what experiences B is having or has had except by:
  - hearing or reading B's descriptions.
  - hearing or seeing, and interpreting, B's cries, gestures, expressions, etc.
  - drawing inferences from material evidence left by B.
- It is impossible for a person to forecast, except by chance, extrapolation from past regularities, etc., or from such information supplied by others.

### Kinds of scientific laws, empirical data, etc., that would be violated ... (contd.)

- The Laws of Thermodynamics
- The Laws of Conservation of Energy, Momentum, etc.
- The Inverse Square Law
- Injunctions against reverse causality ("Time's Arrow")
- Much of the data in modern psychology, neuroscience, physiology, chemistry, physics
- Well-founded suspiciousness about claims that entail extraordinary degrees of sensitivity or precision, huge effects from miniscule causes, etc.

### The Basic Principles of Skepticism

- *Extraordinary claims demand extraordinary evidence.*
  - the amount and quality of the evidence you should demand is proportional to the *a priori* implausibility of the claim

How much evidence would you require before accepting each of the following assertions?

- "There was a dog in my back yard this morning."
- "There was a cougar in my back yard this morning."
- "There was a giraffe in my back yard this morning."
- "There was a unicorn in my back yard this morning."

## Basic Principles of Skepticism (2)

- The burden of proof lies with the claimant
- It's not the skeptic's job to prove the proponent wrong
- It is alright to suspend judgment, pending further investigation

You are allowed to adopt the ancient Scottish system of trial verdicts

- "Innocent"
- "Guilty"
- "Not proved"

## Basic Principles of Skepticism (3)

- Skeptics should limit themselves to *testable* claims
- Claims (in principle) should be falsifiable
- Claims should be clearly stated; stipulating in advance what will count for and against the assertion
- The canons of logic should be obeyed
- No "special pleading" or *ad hoc* rationalizations should be allowed

## Basic Principles of Skepticism (4)

The evidence should be:

1. Sufficient in quality and quantity
2. Public and accessible to all reasonable and competent critics
3. Gathered under acceptably stringent methodological controls (to reduce the likelihood of hidden confounds and intentional and unintentional “fudging” of the data)
4. Subject to conventional statistical tests of significance
5. Replicable

## The Bare Minimum

- Adequate control group(s)
- “Blind” rating procedures at all stages of data collection and analysis
- Peer review of results
- Public availability of methods and results
- Replicability by skeptics as well as believers

## Distinguishing Features of Science

- The “ideals of the craft,” which, as in every other profession, are not lived up to in every instance
- Science is a way of asking questions, seeking answers, and evaluating the products.

## Science is not an immutable “grab-bag of truths”

- Data and resulting theory are held tentatively (as the “best guess” at the moment, given currently available technology, methods, etc.)
- The system, unlike religions or political ideologies, has the possibility of correcting itself

## Science is self-correcting

- In science it often happens that scientists say, "You know, that's a really good argument; my position is mistaken," and then they actually change their minds and you never hear that old view from them again. They really do it. It doesn't happen as often as it should because scientists are human and change is sometimes painful. But it happens every day. I cannot recall the last time something like that happened in politics or religion. *Carl Sagan*

## Strengths of the scientific approach

- Results are cumulative and data in one branch of science must be compatible with all the others
- The fact that science changes with new discoveries is one of its strengths, not a weakness as some detractors claim.

"Science reserves its highest praise for the young who prove their predecessors wrong."  
*Carl Sagan*

## Strengths of the Scientific Approach

- Commitment to open, public discourse
- The closest thing to an international, democratic institution that human beings have, so far, been able to create
- All hypotheses are entertainable as long as they are, in principle, testable



## Protecting ourselves from our very “human-ness”

- Science is a human activity and individual scientists can, on occasion, be as obtuse, venal, and pig-headed as anyone else.
- It's just that the system *tries* to weed out the effects of these sources of error, to the degree it is humanly possible.
- Tests are set up to minimize (though they rarely eliminate) the possibility of being misled by our expectations, hopes, and preconceived notions.
- It's far from perfect, but far better than any other way we fallible humans have devised to reduce our penchant for fooling ourselves.

- Even though error probably accounts for many more false beliefs than intentional misrepresentation, there are charlatans and mountebanks out there as well.
- In any given case, however, that is something which is to be proved, not something to be assumed at the outset.

## Who benefits from the claim?

- Remember that fortunes can be made by convincing you – especially if you *want* to believe
- There are those who don't believe the story they are peddling themselves but make a very good living from selling palatable absurdities to others

## Follow the money trail. . .

“Avoid as you would the plague a clergyman who is also a man of business.”

*St. Jerome*

It was in the papers...on TV...from  
“reputable sources” . . .

- There are many (most?) media outlets that pander to the desire of the public for comfort or titillation (don't expect objectivity as a matter of course)
- On the other hand, there are those who engage in “pious lying”—i.e., the end justifies the means – “it's for your own good”

Just because a claimant is not  
accepted by the “establishment,”  
this doesn't mean he's likely to be  
correct.

- “Great spirits have always encountered opposition from mediocre minds.”  
*Albert Einstein*
- “They laughed at Galileo, they laughed at Newton, and they laughed at Bozo the Clown.”  
*Carl Sagan*

Why persist in such a thankless task?

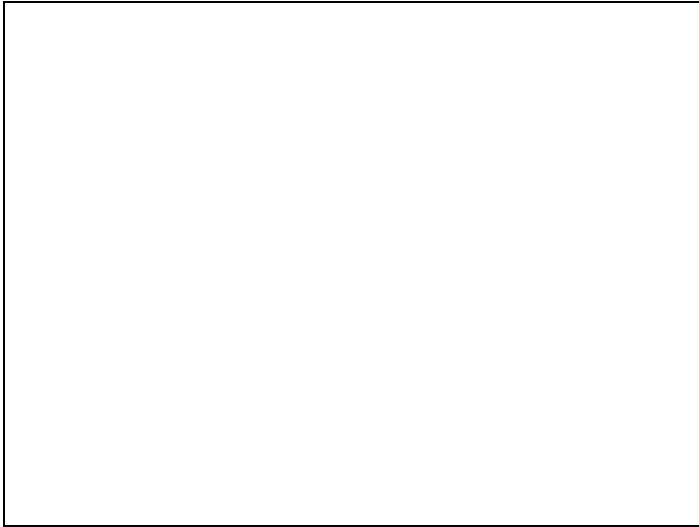
If we believe absurdities, we  
shall commit atrocities.

*Sarvapelli Radha Krishnan*

Nothing is more dangerous than  
active ignorance.

*Johann Wolfgang von Goethe*





**Son, no matter how far you travel, or how smart you get, always remember this: Someday, somewhere, a guy is going to come to you and show you a deck of cards on which the seal has never been broken, and this guy is going to offer to bet you that the jack of spades will jump out of the deck and squirt cider in your ear. But, son, do not bet him, for as sure as you do, you are going to get an ear full of cider.**

—Damon Runyon

The Idyll of Miss Sarah Brown

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