

A scientific hypothesis or claim meet the following criteria

- (1) The hypothesis or claim must be falsifiable and testable. There must have criteria to tell if your claim is likely to be true or likely to be false through an experiment. Just because a question is not testable (what is the meaning of life), and hence not a scientific one, does not necessarily mean it isn't important.
- (2) Extraordinary beliefs require extraordinary evidence. Extraordinary is defined by empirical data accepted by the scientific community. This become problematic when the general community (not the scientific community) acquires questionable beliefs that have not undergone scientific scrutiny, or the scientific scrutiny has been ignored, casually dismissed, or undergone the peer review process.
- (3) The burden of proof of a hypothesis is on the person making the claim before should be accepted by the scientific community. It is not the skeptic's job to provide proof that a hypothesis is false—a claim is not to be accepted solely based on the fact that skeptics cannot prove it wrong, the person making the claim must provide the evidence first. Only then, skeptics need to provide evidence illustrating the claim is false.

These principles apply to criminal law (they are called verifiable principles)

If Jim claims he was abducted by aliens:

1. This claim must be falsifiable: There must be some evidence to support and not support his claim.
2. This extraordinary claim requires extraordinary evidence
3. It is up to Jim to demonstrate that he was abducted by aliens, not the skeptics to show that he was not.

If a claim is made the hypnosis improves memory:

1. There must be some criteria that would support or refute the claim.
2. This extraordinary claim (non-normal claim) requires a lot more than one study to support it.
3. It is up to the person making the claim to show that the claim can be supported, not the skeptics to disprove it.

If someone claims that the comet Hale-Bopp is being followed by a spacecraft:

1. The lack of evidence cannot be used as evidence to support the claim,
2. This claim requires a lot of supporting evidence that can withstand harsh criticism,
3. It is up to the proponents of this claim to demonstrate this claim, not the skeptics to show that it is wrong (which they often do anyway).

If someone claims that the Japanese are deceitful (as was proposed shortly after the attack on Pearl Harbor).

1. There must be some evidence to support or refute it (The lack of evidence of deceitfulness was used as evidence of their ability to deceive the American public)

When Wagner hypothesized that continents drift on “plates” and that the collision of these plates create earthquakes, he had to provide extraordinary evidence to support his claim.

When it was claimed that ulcers were caused by bacteria and not stress, extraordinary evidence was provided and it was up to the scientist to provide evidence provide evidence for his claim, not the skeptics who doubted him.

When scientists claim they have achieved cold fusion, they need present extraordinary evidence for their claim.

What is a Science?

- Content:** A body of scientific knowledge in disciplines such as physics, chemistry, metallurgy, geology, biology, psychology, medicine or astronomy. Scientific claims need to be falsifiable and empirically testable. Scientific knowledge should be consistent with what is known (unified).
- Process:** A method for systematically investigating and testing claims or beliefs about nature.
- Occupation:** Individuals who practice or study the sciences.
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What is a Pseudoscience?

A fake or false science that make claims based on little or no scientific evidence. A theory, method or practice that promote claims in a way that appear to be scientific or plausible even though supporting evidence is lacking or nonexistent.

The following are examples of pseudosciences discussed in your textbook (see p. xxiii):

- Phrenology
- Subliminal perception
- Iridology
- Biorhythms (versus the science of circadian rhythms)
- Recovered memory therapy
- Subliminal self-help tapes
- Astrology (astrology is different from astronomy)
- Graphology

Pseudosciences

Pseudosciences are a fake science that appears to be a science do not go through a rigorous process of testing their claims. For discussion of the following pseudoscience topics visit the Skeptical Inquirer at www.csicop.org.

- Water dowsing
- Psychic readings/Psychic networks, Palm reading
- UFO's (alien abductions, Roswell, and crop circles)
- ESP (psychokinetics and telepathy)
- Bigfoot, Lochness monster, Yeti (cryptozoology)
- Firewalking
- Faith healing
- Spontaneous human combustion
- Poltergeists/Exorcists
- Backward Satanic messages
- Cattle mutilations
- Shroud of Turin
- Shark cartilage therapies
- Bermuda triangle
- Magnetic therapy (there is very weak evidence to support it)

As with any claim, whether scientific or not, we should ask ourselves:

- Is the claim “true”?
- If so, why does it work? Is it due to perception, belief, or a real effect?
- What is the quality of the evidence?

**Some Key Similarities and Difference Between
Science and Pseudosciences**

	Science	Pseudoscience
Admits own ignorance; accepts need for more research	Yes*	No*
Advances knowledge by posing and solving new problems	Yes	No
Welcomes new hypotheses and methods	Yes	No
Theories and hypotheses are testable	Yes	sometimes
Systematically tests concepts by gathering data	Yes	No
Looks for examples that contradicts its beliefs	Yes	No
Applies objective checking procedures	Yes	No
Settles disputes by experimentation or systematic data collection	Yes	No
Suppresses or distorts unfavorable data	No	Yes
Seeks criticism from others	Yes	No

* these are not absolute yes or now, but in generally, are a yes or no

Source: Psychology 9th edition, Coons, D., 2001, who adapted it from Bunge, M. (1984). What is a pseudoscience?, Skeptical Inquirer, 9, 36-46.

What are the similarities between a science and pseudoscience?

	Science	Pseudoscience
Uses scientific sounding language	Yes	Yes
Uses charts and graphs to communicate their discipline.	Yes	Yes
Has formal training procedures for learning their discipline	Yes	Sometimes
Uses analogies and common sense to communicate the findings in the sciences	Yes	Yes

How are the pseudosciences sold to the public (why do many people accept the pseudosciences without evidence)?

What exactly do Americans believe when it comes to the paranormal, the occult and “out-of-this-world” experiences?

The results of a recent Gallup Poll suggest a significant increase in belief in the following experiences over the past decade. Belief in several of the experiences have changed since 1990:

Experiences	1990	2001
• Haunted Houses	29%	42%
• Ghosts	25%	38%
• Witches	14%	26%
• Communicating with someone who has died	18%	28%
• Psychic or spiritual healing	46%	54%
• Extraterrestrial beings have visited earth	27%	33%
• Clairvoyance	26%	32%

The only decrease was the following:

• Possession by the devil	49%	41%
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Rush Limbaugh: A Discriminating Person

(source: Logic and Mr. Limbaugh, Ray Perkins, Jr., 1995)

Let's discuss that bane of modern liberalism, discrimination. Frankly, I'm getting tired of the word—at least the way it is used most of the time today. The fact of the matter is that I've been discriminating lately. Sometimes discrimination is a good thing.

For instance, I've been searching for a new place to live...I have loved some and I have found others to be lacking. In other words, I have discriminated...Therefore, discrimination is not always bad, is it? [But] liberals have...the idea that discriminating among people, places and things for any reason is wrong. (See, I Told You So, pp 278-279)

Politics

Speeding up the approval process that the FDA uses to approve drugs will help get effective drugs to market faster, thus helping the consumer.