

# Science vs. Pseudoscience

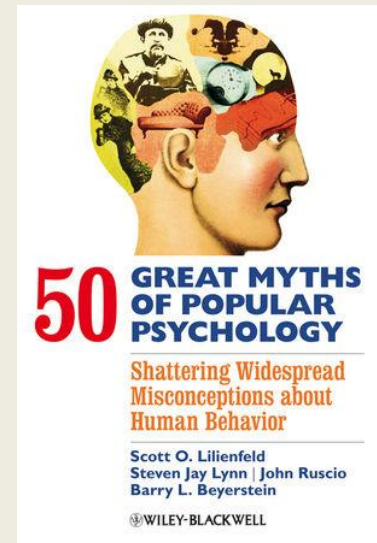


CH 1

# Popular psychology topics: myth or real



- Most people use only 10% of their brain
- Expressing anger is better than holding it in
- Opposites attract in relationships
- High self-esteem is needed for good psychological health
- Listening to Mozart can make infants smarter
- A full moon can trigger wacky behavior
- Your first guess is the right one on a test
- Most people will have a mid-life crisis
- Handwriting can reveal personality traits



# Pseudoscience



- “Claims that appear to be scientific but that actually violate the criteria of science.”
  - “Claims exhibit superficial trappings of science but little of its substance” (Lilienfeld, 2004)
- Examples?
  - Crop circles, alien abductions, Big Foot, ...
  - What about... hypnosis for memory recovery, multiple personality disorder, Rorschach inkblot test, handwriting analysis, polygraphs...?
- Scientific revolution (new paradigm/theory) or pseudoscience?
  - Thomas Kuhn (1970)
  - <http://www.youtube.com/watch?v=GT3NoGiLyTQ&feature=related>
- What are the “criteria of science”?

# Scientific approach (ch1)



- Systematic empiricism
  - Design controlled study to observe behavior and draw conclusions
- Publicly verifiable knowledge
  - Present research so it can be observed, replicated, criticized and tested in other ways
- Empirically solvable problems
  - Questions are potentially answerable (can't as “is there life after death”)
  - Principle of falsifiability – possible to disconfirm hypothesis

# Characteristics of Pseudoscience (Lilienfeld, 2004)



- A tendency to invoke loopholes or ad hoc hypotheses to immunize claims from falsification
- An absence of self-correction; intellectual stagnation
- An emphasis on confirmation
- A tendency to place burden of proof on skeptics
- Excessive reliance on anecdotal and testimonial evidence to substantiate claims
- Evasion of scrutiny afforded by peer review
- Absence to build on existing scientific knowledge
- Use of impressive-sounding jargon
- Absence of boundary conditions or where claims do not hold

# Pseudoscience and Science



- Each has a different approach to evidence
  - Science seeks out contradictory evidence; and adds it into theory
- Good or bad science, NOT good or bad scientist
  - No scientist is free of biases
  - But, can be aware of biases and try to control them
- Pseudoscience beliefs are not foolish or stupid
  - Don't be a critic just to be contrary
  - There are remarkable theories that appear to be true
  - Seek out the truth – require good research methods!
- Do not confuse pseudoscience beliefs with religious beliefs
  - “Religious claims cannot be tested empirically so are outside the boundaries of science” (Lilienfeld, 2004)

# Pseudoscience



- Scientific American Frontiers video
  - Palm reading
  - Dowsing
  - Alien body discovered
  - Zero-point energy
  - Handwriting analysis
  - Healing touch
- 
- What are the claims?
  - What is the evidence of pseudoscience?

During video...



**Claims**

**Evidence of Pseudoscience**

|  |  |
|--|--|
|  |  |
|--|--|



# Criteria to differentiate science from pseudoscience



## Science

- Gather data (especially quantitative)
- Seeks to confirm and disconfirm theory
- Tries new theories
- Admits need for more research
- Seeks criticism from others – publishes data

## Pseudoscience

- Gathers anecdotal data (qualitative)
- Suppresses/distorts unfavorable data
- Stagnant theories
- Does not admit need for more research
- Sees self as authority – uses obscure language

# Identify science or pseudoscience



- Article 1: Dixon, Smilek, Cudahy, & Merikle (2000). Five plus two equals yellow. *Nature*, 406, 365.
- Article 2: Tressoldi & Del Prete (2007). ESP under hypnosis. *Journal of Parapsychology*, 71, 125-138.
- What are the claims?
- What are your criticisms?
- What criticism do you have of their methodology?
- How could you test their claims?

# ESP



- What are the characteristics of pseudoscience?
- <http://www.youtube.com/watch?v=6TKn8H6vnWo>
- What are the claims?
- What are your criticisms?
- What are the methodology/statistic problems?
- How could you test their claims?

# Synesthesia



- What are the characteristics of pseudoscience?
- When senses collide
- <http://science.discovery.com/videos/when-senses-collide-origins.html>
- What are the claims?
- What are your criticisms?
- What are the methodology/statistic problems?
- How could you test their claims?

# Dowsing



- What are the characteristics of pseudoscience?
  - Using dowsing rods to measure human aura
  - <http://video.google.com/videoplay?docid=-7092818733187587554&ei=EiRvS6yRGIToqALN6IjnBg&q=dowsing+video#>
- What are the claims?
- What are your criticisms?
- What are the methodology/statistic problems?
- How could you test their claims?