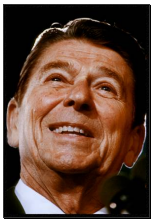
ISS 305:002
Evaluating Evidence:
Becoming a Smart Research Consumer

4. Science as a Method of Evaluation

Reminder: Turn on your I<CLICKER

Alternative ways of testing empirical statements

3. Rely on dogma
   - What is "dogma"?
   - "an official system of principles or tenets concerning faith, morals, behavior, etc.; especially one considered to be absolutely true"
     - Examples:
     - **Ronald Reagan's 11th Commandment: "Thou shalt not speak ill of a fellow Republican."**
     - **Roman Inquisition's reliance on Church dogma on the question of whether the Earth is the center of the universe**



Alternative ways of testing empirical statements

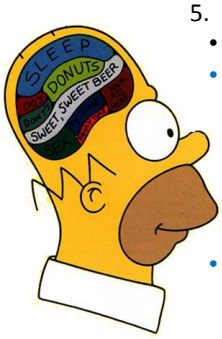
3. Rely on dogma
   - What is "dogma"?

PROTECT THE SHIELD!!!

Alternative ways of testing empirical statements

4. Rely on authority
   - **Still need to be a skeptic.**
   - **Should not differ to experts always.**
     - **Why?**
   - **But, they are more likely to be right.**
     - **Why?**

Alternative ways of testing empirical statements



5. Rely on "common sense"
   - Problems:
   - **Common sense can be contradictory**
     - **There is a "commonsensical" explanation for nearly any conclusion and for its opposite**
   - **We may differ in what seems commonsensical to us; no way to resolve differences between individuals**

Alternative ways of testing empirical statements

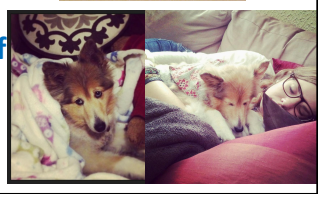
6. Rely on heuristics/rules of thumb/cognitive shortcuts (fallacies)
   - **Reliance on consensus (Bandwagon fallacy)**
   - **Reliance on past experience (Past Practice fallacy)**
   - **Be a Skeptic (Fallicist's fallacy)**

7. Rely on observation.
   - Q: But what observations, made how?
   - One Answer: Make one's observations "scientifically"
     - But what does that mean?

Empiricism: Uncertainty

Why?

- Our observations may be distorted
  - By what?
  - **Drugs**
  - **Fatigue**
  - **Altered states of consciousness (e.g., in dreams)**



Empiricism: Uncertainty

- **At best**, the probability of an empirical statement being true can only **approach 1.0**
- **We can never be absolutely certain that it is true**
- Likewise, the probability of an empirical statement being false can only **approach 0.0**
- **We can never be absolutely certain that it is false**
- To say science is empirical is to say that scientific answers to empirical questions are always uncertain

Empiricism: Uncertainty

- It **does** mean that one never concludes that an empirical statement is **absolutely** true or false (although we can sometimes get very close to such certainty)
  - examples where P(true)≈ 1.0?
    - **–"The sun will come up tomorrow"**
    - **–"The Earth is older than 10,000 years"**
- When scientists speak of theories being **proven** or of a scientific **law**, they only mean that the probability of the theory/empirical statement is very near (but never at) 100%

Empiricism: Uncertainty

- Example where P(true)≈ 0.0?
  - **–"The Earth is flat"**
  - **–"Dennis Adams raised 15 people from the dead."**
  - –Contrast with certain value and metaphysical statements, or bogus empirical claims.

Prediction of future dangerousness

- Two methods
  - clinical judgment (by individual clinicians for individual defendants)
  - statistical judgment (odds that a defendant with certain characteristics will offend again)
- Latter more reliable than the former, but too few cases (repeat offenders) to make reliable predictions
- **Neither method very good.**
- **Trained psychologists wrong from 50%-65% of the time**
- **American Psychiatric Association's (APA) conclusion:**

  accurate prediction of future dangerousness beyond a psychiatrist's ability

Empiricism: What evidence is considered?

- Empiricism also requires that
  - **we evaluate empirical statements in light of all available and relevant observations, and not just our own immediate or preferred observations**
- We can't pick and choose which "facts" (i.e., carefully and well established observations) we will pay attention to and which we will ignore
  - some "creation science" advocates ignore evidence like
    - converging evidence shows age of the earth is > 4 billion years
    - the fossil evidence documents the appearance of new species over geological time

Publicness

- Science only trusts and relies on observations which ***are replicable*** **or** ***repeatable***
- Thus, science disregards observations which
  - **only one person has had (e.g., a unique personal experience)**
    - **single report of an alien abduction**
  - **Others have tried, but constantly fail to replicate (cold fusion)**

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Publicness

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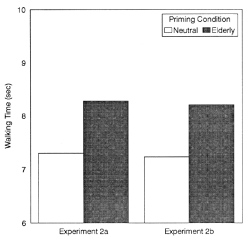
  - **Others have tried, but constantly fail to replicate**
  - **Bargh (again)**

Bargh's response:
Authors - "incompetent or ill-informed"

PLoS (the journal) - "does not receive the usual high scientific journal standards of peer-review scrutiny"

Journalist who first reported the story - "superficial online science journalism"



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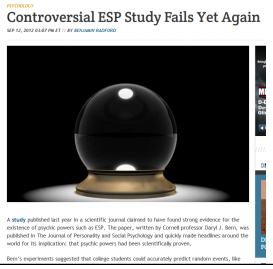

Publicness

- This is also why, if we want to test an empirical statement scientifically, we must tell others how they can attempt to repeat our observations
  - **our observations/data must include an adequate description of the steps we took to make our observations so that others can attempt to replicate them**
  - **that is, we must provide an *operational definition* of our words/concepts**

Publicness: Peer review

- Is the peer review process a good thing? What are some of the negatives?
  - **Slow and expensive**
  - **Significant results more likely to be accepted**
  - **"Wow" effect!**
  - **Inconsistent**
  - **Abuse of ideas**
  - **Peer review ≠ broad agreement in scientific community, or the ability to replicate**
  - **Potential bias against (or for) certain authors / institutions**
    - **Matthew effect – "To those who have, shall be given; to those who have not shall be taken away even the little that they have"**

Self-fulfilling prophecies
A 3-step process