Testing and Experimentation

PSY 395 – Oswald
Fall 2005

Read the book!

- The lecture and book do not entirely overlap
- TAs can help w/ concepts you don’t understand
- Read before each lecture (vs. cramming)

Outline

- Testing and Experimentation
- Causal reasoning
- Biases in causal reasoning
- Examples of these biases
- Ways we learn causality
- Science vs. values
Survival requires that we are constantly testing and experimenting

- Hurricanes cause flooding
- Water extinguishes a fire
- Spoiled food causes sickness
- Striking objects results in a noise
- Sharp things cut
- ...

Piaget’s Stages of Causal Reasoning

- Stage 1 (0-4mo): no concept of cause
- Stage 2 (4-8mo): egocentric
  - child is the cause of all actions
  - repeats pleasurable actions but no attention to effects
- Stage 3 (8-12mos):
  - knows others cause effects in familiar situations
- Stage 4 (12-18mos):
  - knows that others are cause agents in new situations
- Stage 5 (18-24mos):
  - development of representation allows child to represent cause-effect in mind
  - uses cause-effect to problem solve

Biases in causal reasoning

Humans see cause-effect relations even when they don’t exist

- Magic
Biases in causal reasoning

Humans see cause-effect relations even when they don’t exist

- Confirmatory Biases

Biases in causal reasoning

Humans see cause-effect relations even when they don’t exist

- Humans are easily misled into perceiving causality among events that occur close in time (e.g., someone says something that happened ‘causes’ you to be irritated, when really...you are an irritable person).

Biases in causal reasoning

Humans don’t see cause-effect relations even when they do exist

- Humans don’t easily see causality between events that are more spaced out in time (e.g., sunscreen and skin cancer)
- Humans are lousy at deductive reasoning:
  If A then B \xrightarrow{\text{if}}\ \text{If NOT B then NOT A}
  e.g., If it rains, then I use an umbrella. That means if I don’t use an umbrella then it’s not raining.

  Modus Tollens
Wason Reasoning Task

- 4 Cards (letter/number)
- Rule:
  - If a card has a vowel on one side, then it has an even number on the other side
  
  E  K  4  7
- Which cards do you have to flip to determine whether the rule is violated?

Wason Answer

- Flip E card: Modus Ponens
  easy: If A then B means...if A then B!
- Flip 7 card: Modus Tollens
  harder: If A then B means...if not B then not A
- Flip K card: Error (not-A)
- Flip 4 card: Error (B) – rule doesn’t say that B can’t occur in absence of A.
- Less than 25% of population get this deductive reasoning problem correct

Wason Reasoning Task – Easier?

- 4 Cards (drink/age)
- Rule:
  - If a person is drinking a beer, then that person has to be over 21
  
  beer  buttermilk  Age 22  Age 19
- Which cards do you have to flip to determine whether the rule is violated?
Ways we learn causality

Ways of Knowing

- Logical Analysis/Reason
  - our brain isn't set up to excel at this (e.g., danger of a handgun at home vs. a swimming pool at home)
- Authority
  - Galileo, Mommy
  - Consensus
    - gossip, rumor, belief...the earth is flat
- Observation
- Previous experiences/Common Sense
- Values affect interpretation for each of these
- Once a belief is accepted, often very difficult to change
  (example: learning skill is fixed vs. malleable)

Science vs. values

Science vs. Societal Values

- The history of science reflects a clash between what we currently believe to be true (values) and the new “truths” we discover about the world (science).
- Magic
- Geocentric models of the universe
- Flat earth
- Medicine (blood letting, arsenic, etc.)
- Other?


- Societal Belief: Child Sexual Abuse is wrong and causes substantial harm and results in negative outcomes in adults.
- Rind et al (1998) performed a meta-analysis (a statistical summary) of the existing literature and did not find support for the claim that CSA results in substantial negative long-term outcomes in adults
  - < 1% of variance in outcomes
Huge public and political response

- Lilienfeld (2002) documents the response
- Nearly caused the downfall of the APA
- Dr. Laura condemned the research
- Religious groups united against the research
- Politicians with no scientific training began criticizing the study
- APA caved to political and public pressure and renounced the study

Aftermath

- Public policy review initiated at APA
- Congress voted 355 to 0 to condemn and denounce the findings
- Senate passed the resolution the same month
- Scientific review panels found no serious fault with the study
- Highlights a huge gap between popular press and academic science