For Friday

- Read Frank & Gilovich paper & bring to class
- ERES
  - Password: research

Psychology: Explaining Behavior

- Practice exercise
- Next Slide

Ways of Knowing

- How do you set your beliefs about the world?
- Authority
- Reason
- Experience

- This course:
  - Examine how we use Science to reach conclusions
Ways of Knowing: Authority

- Believe something to be true because a trusted source (authority) claimed that is was.
  - Ex: My kids believe in the Tooth Fairy
- Do you ever rely on authority?
- Potential Problem – How did authority gain information?
  - Reason?
  - Faulty research?
- Ex: Aristotle claimed that heavier objects fall faster than lighter objects
  - People believed for over 1000 years
  - Galileo showed that it was false (science)
- Authority -- sometimes best option available
  - But -- don’t blindly assume they are correct

Ways of Knowing: Reason

- Create “logical” argument supporting a belief
- Problem:
  - Even if logic is sound
  - Depends on truth of the premises

Logically Drawn Conclusions & Truth

- Heavier objects fall faster than light objects
- A real egg is heavier than a plastic egg
- Therefore, a real egg will fall faster than a plastic egg

- Reliance on external information decreases with self-confidence level
- People susceptible to flattery rely more on external information
- Therefore, people low in self-confidence are more susceptible to flattery
Ways of Knowing: Experience/Empiricism

- Relying on your own experiences and observations to set beliefs
- Important component of scientific method
- Empiricism on its own – set of problems
  - Illusory correlations
  - Belief perseverance
  - Confirmation bias
  - Availability heuristic
- Problems acknowledged and addressed by scientific method

Problems with Experience

- Illusory correlations (observations)
  - Overestimation of the co-occurrence of two events
  - Ex: Couples adopt -- then become pregnant
    - Salient event -- more memorable
    - Negative case: adopt - no pregnancy
      - More common
      - Less memorable
    - People overestimate frequency of adopt-pregnant
    - Infer relationship that doesn’t really exist

Problems with Experience

- Belief Perseverance
  - Feel more secure with strongly held beliefs
  - Unwillingness to admit that long held beliefs are false
  - Dogmatically clinging to beliefs in the face of mounting contradictory evidence
Problems with Experience

Confirmation bias

- Better memory/processing of events consistent with our beliefs
- Result: Overestimate strength of evidence supporting our beliefs
- Ex: Couples adopt -- become pregnant
  - Once you believe there is a relationship between the two
  - Process & remember positive instances
  - Ignore negative instances
  - Strengthens “belief”
- Leads us to hold onto our “beliefs/theories” about the world

Tangent

- Belief perseverance and confirmation bias
- In Social Psychology
  - Will talk about how the combination of these two contribute to prejudice and stereotyping
- In Psychology of Personality
  - Will talk about how the combination of these two undermine people’s ability to implement personal changes
- In this class
  - Will learn how to avoid them
  - Not let them influence our conclusions

Authority, Reason, Experience

- All OK as a starting point for research ideas
  - Don’t stop with just the idea
  - NEED TO VERIFY SCIENTIFICALLY
- In the past, led people to believe that:
  - Skull size (and therefore brain volume) was related to intelligence
  - Teaching subjects such as Latin exercised the brain, and would transfer to other domains
  - Athletes shouldn’t drink water during practice
- And even the contradictory notions that:
  - Birds of a feather flock together / Opposites attract
  - Absence makes the heart grow fonder / Out of sight, out of mind
Ways of Knowing: Science

- Utilizes other ways of knowing

- Authority
  - Rely on research literature
  - Evaluate whether scientifically sound

- Reason/Logic
  - Deductive reasoning – generate hypotheses from theories
  - Inductive reasoning – use data to evaluate theories

- Empiricism
  - Base our conclusions on data
  - Collect data in such a way to avoid biases

Characteristics of Scientific Thinking:

- Determinism
- Objectivity
- Data Driven / Empirical Approach
- Conclusions Subject to Revision
- Empirical Questions
- Skeptical Attitude

Characteristics Scientific Thinking

- Determinism – all events have a cause
  - These causal relationships can (ultimately) be understood
  - Studying Ordered Systems
    - Systematic relationship among events
    - Can be observed, described, understood
Characteristics of Scientific Thinking

- Objectivity
  - Knowledge is built from observations / empiricism
  - Scientists are human – subject to same biases as others
  - Take care to avoid biases and subjectivity
    - Scientist is aware of these biases -- takes steps to avoid
    - Seek to be as objective as possible
      - Make observations that others are able to verify
      - Others can replicate our results
    - Objective vs. Subjective measures
      - Objective -- other observers can verify/confirm
      - Subjective -- info available only to “observers”

- Data-Driven
  - Use objective, unbiased observations to reach conclusions
  - Data used to generate theories
  - Data used to evaluate theories
    - (more detail later)

Characteristics of Scientific Thinking

- Conclusions subject to revision
- Scientific Method
  - Make observations to verify/test our ideas
  - Ideas that fail to receive empirical support
    - Revised
    - Rejected
  - Advantages:
    - Self-correcting – if we are wrong, we will know it (eventually)
    - Ultimately will lead to the best answer
Characteristics of Scientific Thinking

- Empirical Questions
  - Can only address questions that can be answered through systematic observations
  
  - Nonempirical questions:
    • Is golf better than tennis?
    • Are women morally superior to men?
    • Can money buy happiness?
    • Are dogs better pets than cats?

- Must frame research questions such that they can be answered with data

Characteristics of Scientific Thinking

- Skeptical Optimists
  - Don’t accept assertions without data to back them up
  - Question how the data was collected
    • Were sound research methods used?
  - Look for alternative explanations for findings
    • Biases? Confounds?
  - Check/verify findings from other scientists before accepting
  - Uncovers unsound or fraudulent research
    - Tentative acceptance of theories/ideas
      • May currently be best available explanation
      • Our understanding can change with new data
  - Belief that full understanding is ultimately possible

Prove
Goals of Scientific Method

- Understanding usually progresses in this order
- Description -- characterize and catalog variables of interest
  - Describing characteristics of phenomenon
- Prediction -- identify relationship among variables
  - Relationship -- able to predict one from the other
- Explanation -- establish causal relationship
  - Understand how one variable influences the other
- Control -- use knowledge to improve human condition
  - Understanding of causal relationship -- allows control of phenomenon

Necessary Conditions for Causal Inference

- Temporal Precedence
  - Cause has to precede the effect
- Covariation
  - When cause changes, effect should change
- Elimination of plausible alternative explanations
  - Rule out other possible causes
  - **most difficult to establish**