

## Ch. 1: Thinking Critically with Psychological Science (1/17 & 1/22)

How do we gather psychological information in a scientific way?

- Critical thinking refers to a more careful style of forming and evaluating knowledge than simply using intuition
  - In addition of the scientific method, critical thinking will help us develop more effective and accurate ways to figure out what makes people do, think, and feel the things they do
  - The brain is designed for surviving and reproducing, but it is not the best tool for seeing reality clearly
- Critical thinking errors
  - Hindsight bias: “I knew it all along”
    - AFTER learning the results of some psychological research, you believe you could have predicted that very outcome
    - Ex. Birds of a feather flock together vs. opposites attract (both can't be right)
  - Overconfidence: “I am sure I am correct”
    - Performance-We are much too certain in our judgments. We overestimate our performance, our rate of work, our skills, and our degree of self-control.
    - Accuracy-We overestimate the accuracy of our knowledge. People are much more certain than they are accurate.
      - Often a problem in eyewitness testimony
      - Also a problem on tests if students are overconfident about how well they know the material
  - Perceiving order in random events
    - Thinking you can make a prediction from a random series
    - Trying to make sense out of random events when in reality there is no order
    - We have the wrong idea about what randomness looks like
- Critical thinking: analyzing information to decide if it makes sense, rather than simply accepting it
  - Examine assumptions, look for hidden bias, how the information was collected, put aside own assumptions/biases
- The Scientific Method: the process of testing our ideas about the world by...
  - Setting up situations that test our ideas
  - Making careful, organized observations
  - Analyzing data
- The basics: theory, hypothesis, operational definitions, replication
  - Theory: big picture, a set of principles that explains some phenomenon and predicts its future behavior
  - Hypothesis: informed predictions, testable prediction consistent with our theory

- Operational definitions: defining research variables (Ex. of how to correctly measure-impulsivity, hyperactivity, inattention)
- Replication: trying it again using the same operational definitions of the concepts and procedures
- Example: Depression
  - Theory-low self-esteem feeds depression
  - Hypothesis-people with low self-esteem will score higher on a depression scale
  - Research and observations-administer tests of self-esteem and depression
- Descriptive research is a systematic, objective observation of people
  - Goal is to provide a clear, accurate picture of people's behavior, thoughts, and attributes
    - Case study
      - Examining one individual (small #) in depth
      - It can be unrepresentative information
    - Naturalistic observations
      - Observing "natural" behavior means just watching and not trying to change anything
    - Survey
      - Gathering information through self-report
      - Many cases, less depth
      - Try to get a representative sample
      - Population > sample
        - Random sampling is a technique for making sure that every individual in a population has an equal chance of being in your sample
  - Result of descriptive research → correlation
    - When two traits or attribute are related to each other
    - A measure of how closely two factors vary together
      - Scatterplots
      - Positive correlation vs. negative correlation
        - +: as x increases, y increases; as x decreases, y decreases (vary together in the same direction)
        - -: as x increases, y decreases; as x decreases, y increases (vary together in opposite directions)
      - Correlation coefficient is a statistical measure of the relationship between two variables
        - $r = +/- (0.00-1.00)$
        - +/-: direction of relationship (pos. or neg.)
        - 0.00-1.00: strength of relationship
    - What conclusions can we draw from a correlation?
      - Positive correlation between ice cream sales and rates of violent crime, but there is a 3<sup>rd</sup> factor → temperature

- Correlation does NOT mean causation
- So how we find out about causation?
  - Experimentation: manipulating one factor in a situation to determine its effect
    - Experimental group: receives treatment
    - Control group: does not receive treatment
    - Groups are similar in every way except for the manipulated factor
  - Random assignment of participants to control or experimental groups is how you control all variables except the one you're manipulating
  - Placebo effect: How do we make sure that the experimental group doesn't experience an effect because they expect to experience it?
    - Ex: An experimental group gets a new drug while the control group gets nothing, yet both groups improve
    - Experimental effects that are caused by expectations about the intervention
    - Control groups may be given a placebo (an inactive substance or other fake treatment in place of the experimental treatment)
      - Blind vs. double-blind
  - Naming the variables
    - Independent variable (IV): the variable manipulated by the experimenter
    - Dependent variable (DV): the outcome factor
    - Confounding variables might have an effect on the DV
- Correlation vs. causation: The breastfeeding/intelligence question
  - Studies have found that children who were breastfed score higher on intelligence tests, on average, than those who were bottle-fed
  - Can we conclude that breast-feeding CAUSES higher intelligence?
  - At least one confounding variable...genes
  - Set up experiment
    - Experimental group → promoted breast-feeding (IV) → IQ score, age 6
    - Control group → did not promote breast-feeding (IV) → IQ score, age 6 (DV)
- Value of statistics (from data to insight)
  - To present a more accurate picture of our data (ex. scatterplot)
  - To help us reach valid conclusions from our data
- Measures of central tendency
  - Mode: the most common level/number/score