Chapter 1

Thinking Critically with Psychological Science

I. The Need for Psychological Science

- The limits of intuition and common sense
  - <u>Hindsight Bias</u> – Tendency to believe, after learning an outcome, that one would have foreseen it.
  - <u>Over Confidence</u> – We tend to be more confident than correct.
- The Scientific Attitude
  - Questions asked by Psychologists
  - Curiosity, skepticism and humility made modern science
  - <u>Critical Thinking</u> – Thinking that examines assumptions, discerns hidden value, evaluates evidence and assesses conclusions.

I. The Need for Psychological Science

- The Scientific Method
  - <u>Theory</u> – Explanation using an integrated set of principles that organize and predict observations.
  - <u>Hypothesis</u> – A testable prediction, often implied by a theory.
  - <u>Operational Definition</u> – Statement of the procedures used to define research variables.
  - <u>Replications</u> – Retesting the essence of a research study to see whether the basic findings generalize to other people and circumstances.

II. Research Strategy - Description

- Case Study – Observation Technique in which one person is studied in depth

    - Hope to reveal universal principles
    - Can be used to suggest a hypothesis for further study
    - Misleading if taken alone

    - Example video

II. Research Strategy - Description

- <u>Survey</u> – Technique using self-report usually by questioning a representative, random sample of people.
    - Caution! The wording of a question effects responses.
    - <u>False consensus effect</u> – Tendency to overestimate the extent to which others share our belief.
    - <u>Population</u> – All the cases in a study from which the samples are drawn.
    - <u>Random sample</u> – A sample that fairly represents a population.
    - Caution! Consider the sample and don't over-generalize.

II. Research Strategy - Description

- <u>Naturalistic Observation</u> – Observing and recording behavior in naturally occurring situations without manipulating the situation. (Does not *explain* behavior – it only *describes* it)

- Jane Goodall video

III. Research Strategy - Correlation

- <u>Correlational Coefficient</u> – A statistical measure of the extent to which two factors vary together, and how well each predicts the other.

- Correlation indicates a relationship but does not prove causation. (correlation ≠ causation)

- <u>Illusory correlations</u> – The perception of a relationship where there is none.

III. Research Strategy - Correlation

- <u>Scatterplot</u> – Graphed cluster of dots which each represent the values of two variables.
    - The slope of the points suggest a positive or negative correlation.
    - The amount of scatter suggests the strength of the correlation.
    - Examples:
        - Perfect positive correlation = +1.00
        - No relationship = 0.00
        - Perfect negative correlation = -1.00
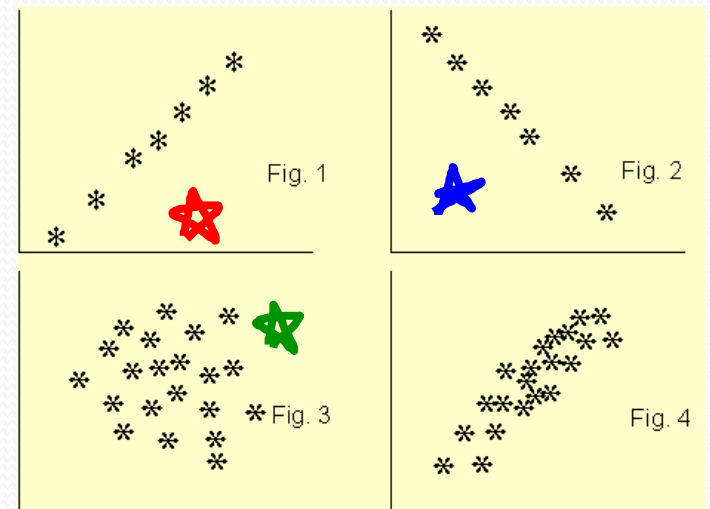
IV. Research Strategy - Experimentations

- <u>Experiment</u> – A research method where one or more variables are manipulated to observe the effect on some behavior or mental process.

- <u>Placebo</u> – An inert substance or condition that may be given instead of a presumed active agent, such as a drug.

- <u>Double-blind procedure</u> – Neither the research participants or the researcher are aware of whom is receiving the treatment or the placebo.

- <u>Placebo effect</u> – Any effect on behavior caused by a placebo.

IV. Research Strategy - Experimentations

- <u>Experimental condition</u> – The condition that exposes participants to the treatment (one of the independent variables).

- <u>Control condition</u> – The condition that serves as a comparison for evaluating the effect of the treatment.

- <u>Random assignment</u> – Assigning participants to experimental and control conditions by chance to minimize pre-existing differences.

- <u>Independent variable</u> – The experimental factor that is manipulated or the variable whose effect is being studied.

- <u>Dependent variable</u> – Experimental factor that is being measured.

Can you figure it out?

- A farmer fed five different types of grain to his chickens to see if these different diets resulted in differences in gain of weight. In this experiment, what is the:
  - Independent Variable
  - Dependent Variable

  - Independent Variable is the type of grain
  - Dependent Variable is the weight gain

Let's try another one…

- A scientist is conducting a study on the effects of drinking beer on winning or losing handball games. In this study, what is the:
    - Independent Variable
    - Dependent Variable
    - Experimental Group
    - Control Group

    - Independent Variable is the beer
    - Dependent Variable is the winning/losing of a game
    - Experimental group drinks the beer
    - Control group drinks no beer

More practice…

- A course in research methodology was taught by two methods (lecture plus lab and lecture only.) The teachers wanted to find out if taking the lab was more or less beneficial to the students compared to the traditional lecture only class. Later, an achievement test was given to both sections. In this study, what is the:
  - Independent Variable
  - Dependent Variable
  - Experimental Group
  - Control Group

  - Independent variable is the method of teaching the class
  - Dependent variable is the achievement test score
  - Experimental group was in lecture plus lab
  - Control group was in lecture only

Last one...

- A research psychologist was interested in the effects of practice on a short-term memory task. Each subject received 5 practice trials. The psychologist hypothesized that the number of correct responses would increase as the number of trials increased. In this study, what is the:
  - Independent Variable
  - Dependent Variable
  - Experimental Group
  - Control Group

  - Independent variable is the number of practice trials
  - Dependent variable is the memory task score
  - Experimental group is the more trial group
  - Control group is the group with 5 practice trials

V. Statistical Reasoning

- Measures of central tendencies
  - <u>Mean</u> – Arithmetic average of a distribution (Add the scores and then divide by the number of scores)
  - <u>Median</u> – The middle score in a distribution.
  - <u>Mode</u> – The most frequently occurring score in a distribution.
  - Be cautious with mean scores – they can be skewed by atypical scores.
- Measures of variation
  - Tells how similar or diverse scores are.
  - <u>Range</u> – The difference between the highest and lowest scores in a distribution.
  - <u>Standard deviation</u> – A computed measure of how much scores vary around the mean score.

V. Statistical Reasoning

- Making inferences
  - When is a difference reliable?
    - Representative samples are better
    - Less variation in observations is better
    - More cases are better
  - When is a difference significant?
    - <u>Statistical difference</u> – Criterion for rejecting the assumption of no differences in a study.
    - When the averages are reliable and the difference between them is relatively large.
    - Difference is not due to chance.

VI. Frequently Asked Questions About Psychology

- Specific attitudes and behaviors vary across culture, but underlying processes are much the same.
- Men and women are overwhelmingly similar but some gender issues exist.
- Psychologists study animals to learn more about people.
- Ethical principles:
  - Informed consent
  - Protect from harm and discomfort
  - Confidentiality
  - Fully disclose research upon completion of the experiment
- Psychology's purpose is to enlighten, but it also has the power to deceive.