

The Science of Psychology

I. The Goals of Science

A. Basic Research – Gain Scientific Understanding

1. Describe Phenomenon
2. Predict Phenomenon
3. Explain Phenomenon

B. Applied Research – Solving Practical Problems

4. Controlling Phenomenon (Ethical?)
5. Create Change

II. Scientific Method

A. Sources of Knowledge- Epistemology

1. Unscientific Sources of Knowledge

- a. Authority - Because someone (expert) says so
- b. Folk Wisdom - Cultural Truisms; It seems to have been true in the past, so must be true now.
- c. A Priori Methods (Intuition) - Because it seems reasonable and Likely

- Untested, Unquestioned, & Unconfirmed.

2. Scientific Method - Francis Bacon (1561 - 1626) : Theorize, hypothesize, test, revise

-Self-Correcting Source of Knowledge





B. Components of the Scientific method

1. Empirical/**Empiricism**: knowledge is based on directly observable events.
2. Public
3. Clearly defined concepts
4. Measurable
 - a. Reliability across time and items.
 - b. Validity: measures what is intended.
5. Instrumentation
 - Accuracy = established through calibration
 - Precision = useful units of measure

B. Components of the Scientific method

6. Testable Hypotheses

- Make predictions concerning the cause effect relationships between variables.
 - a. **Independent Variables**: a variable that is expected to cause a change in another variable.
 - b. **Dependent Variables**: a variable that is expected to change as a result of changes in the Independent Variable.

7. Skepticism-

NOTHING CAN BE PROVEN!

III. Theories in Behavioral Science

- A. Theories describe the relationship between variables to explain social phenomenon
- B. Functions of Theories
 - a. Organize
 - b. Describe
 - c. Predict
 - d. Explain
- C. Theories often use **Intervening Variables** (Abstract Constructs/Concepts or Scientific Rules) to explain the relationship between the cause (Independent Variable) and the effect (Dependent Variable).
 - Also known as **Mediating Mechanisms**

D. Good theories are...

- 1) Precise (clear and understandable)
- 2) Parsimonious/Occam's Razor – the shortest and simplest explanation possible are the considered the most likely.
- 3) Disconfirmable / Falsifiable (stated so that it can be tested)
- 4) Useful : they can be applied to real problems
- 5) Internally Consistent: no contradictory explanations
- 6) Based on as few Intervening Variables as possible
- 7) Heuristically Valuable: lead to new research and new discoveries.
- 8) Have more of its hypotheses supported than competing theories.

IV. Process of Research

- 1. Develop an Idea
 - Source of Ideas
 - a. Observation
 - b. Experts
 - c. Lit Search
 - d. Theory Driven (Basic)
 - e. Problem Driven (Applied)
- 2. Develop Testable Hypotheses
 - a. State variables of interest
 - b. Operationalize the Variables : State how variables will be measured (every operationalization is limited)
 - c. State relationship between variables (ID causes change in DV)

3. Review Literature

- 1. Psychological Abstracts
- 2. PsychInfo
- 3. Reference List of relevant articles
- 4. Text Books (but always refer back to primary source)

- 5. Revise your original hypotheses

4. Design Methodology (write proposal including intro, methods, & results)

a. General Methods

- Observational Methods
 - Case Studies
 - Naturalistic Observation
 - Structured Observation
- Correlational Studies
 - Survey Studies
- Experimental Studies
 - Lab Experiments
 - Quasi-Experimental Studies
 - Field Experiments

b. Internal Validity (Control) and External Validity (Generalizability to Population, & Realism) Tradeoffs.

c. Subject to institutional review (human subjects approval)

5. Conduct Pilot Research (n = 10 -15)

6. Collect Data in ethical & unbiased manner

1. Human Subjects Approval (provides ethical review)
2. Control researcher effects (Uniform treatment of participants/Double blind methodology)

7. Analyze Data > Statistical Procedures > Interpret Results

8. Report Results - Publish in peer reviewed journal or invited book chapter

1. Report in a clear and replicable manner