



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; Because it has always been so and nothing will change that
- 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** René Descartes : - only things that can be directly observed can be studied.
2. Public
3. Clearly defined concepts
4. Accurate and Precise Instrumentation
Accuracy = match between what measure says and what really happens:
Precision = the size of the units of measure.
(don't measure reaction time in years)

B. Components of the Scientific method

5. Measurable
 - a. Reliability
 - b. Validity
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. Psychology as a Soft Science

1. Can't manipulate (control) all variables
 - (can't raise children in a box)
 - a. ethical limitations
 - b. practical limitations (time, \$, workers)
2. Human behavior is complex, multi-determinant, and contextually sensitive

IV. 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.
 - 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.

V. 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