Variables, Relationships, Hypotheses
How to Build a Good Conceptual Model

Jim Goes, Ph.D.
School of Advanced Studies
University of Phoenix
Induction and Deduction

Select and define the research problem

**DEDUCTIVE METHOD** (Classic)
- Review the literature
- Formulate the hypothesis
- Develop the research design
- Collect and analyze the data
- Draw conclusions; report the findings

**INDUCTIVE METHOD** (Inclusive)
- Review the literature
- Develop the research design
- Collect and analyze the data
- Generate hypotheses for theory construction, draw conclusions, and report the findings
- Review the literature
- Develop the research design
- Collect and analyze the data
Where Theory Fits In

1. Research question
2. Research design
3. Data collection
4. Data analysis
5. Developing conclusions
6. Theory

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What is a theory?

Theory verses Ideology

Theories

- prevent “exceptions to the rule”
- make sense of patterns
- shape research
- Theories are maps of reality. The truth they depict may be objective facts “out there” or subjective meanings inside our heads.

A theory is a statement about how reality works (Einstein)

A theory is a systematic explanation for the observed facts and laws that relate to a particular aspect of life (Babbie)
Good theory provides…

- An explanation of the data
- Prediction of future events
- Relative simplicity (parsimony)
- Hypotheses that can be tested
- Practical utility
What makes a good research question?

• Is the question or problem stated in a solvable way?
• Is the question open and non-biasing?
• How important/relevant is the question?
• Does the research answer the question?
• Are definitions misused as explanations, circular, or inadequately specific?
• Are conceptual definitions operationalized?
Putting Theory into a Conceptual Model

- **Concept:** Abstract elements representing classes of phenomena with the field of study.
- **Variables:** Concepts stated in measurable terms (more specific than concepts).
- **Statements:** Principles, laws, axioms, propositions and hypotheses in theory building.
- **Postulates lead to propositions**
- **Propositions lead to hypotheses**
Examples

Concept: The role of gender in communication.

Variable: verbal arguments made by women and men in public speaking.

Statement: Women have more hedges and qualifiers in their verbal arguments in public speaking than do men (a hypothesis).
From Theory to Hypothesis

Idea/interest
``What causes X?''

THEORETICAL UNDERSTANDING

$X$ causes $Y$

HYPOTHESIS

$X = f(Y)$  Theoretical expectation

$\downarrow$  $\downarrow$

$x = f(y)$  Operationalization

$x = f(y)$  Testable hypothesis

$x = f(y)$  Observation (hypothesis testing)
Causes and Common Knowledge

✦ Going to college causes people to be smarter
✦ Old age leads to senility
✦ More frequent testing of students makes schools more accountable for results and leads to greater student learning
✦ Tax breaks for corporations stimulate job creation and lower unemployment
✦ Left-handed people lead shorter lives
Causal Relationships and Hypotheses

Criteria for causality

- Association
- Temporal priority
- No spurious variables
- All three criteria must be met

Hypotheses

- At least two variables
- Expresses a causal relationship
- Expressed as a prediction
- Logically linked to theory and a research question
- Is testable, i.e., with empirical evidence
Types of Causal Relationships

A. Causal relationship
   Depression \rightarrow Suicide rate
   “Depression causes suicide”

B. Inverse causal relationship (Durkheim)
   Social Integration \rightarrow Suicide rate
   “The lack of social integration causes suicide”

C. Multiple-cause explanation
   Rate of social change
   Poverty \rightarrow Suicide rate
   Religiosity
   “Many factors interact to cause suicide”

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Stating Causal Relationships

- Family breakups cause delinquency
- Family breakups lead to delinquency
- Family breakups are related to delinquency
- Family breakups influence delinquency
- Family breakups are associated with delinquency
- Family breakups produce delinquency
- Family breakups result in delinquency
- The higher the level of family breakups the higher the level of delinquency
- Family breakups increase the likelihood of delinquency
The Priority of Variables

Independent variable (X) → Intervening variable (Z) → Dependent variable (Y)
The Null Hypothesis predicts no relationship

The Research or Alternative Hypothesis predicts a relationship

We say that we can “reject the null” (reject) or “fail to reject the null” (accept)

We DON’T say “we can adopt the research hypothesis”

Hypotheses are either accepted or rejected – they are not “partially” accepted or rejected
Evaluating Relationships

Issues in Relationships
- “third” variables or spurious relationships
- crossing levels of analysis/measurement
- freedom to vary
- causality

Issues to Consider
- Is the analysis based on a single variable?
- Are important “third” variables missing?
- Is the level of relationship measurement the same as level of hypothesis/conclusion?
- Are variables indeed free to vary?
- Are causal relationships stated or implied? If so, are they defensible?
Logical Errors in Causal Explanation

- Tautology
- Teleology
- Spuriousness (Questionable Cause)
- Provincialism
- Hasty Conclusion
A Spurious Relationship

FIGURE 3-1

Diagram of a Spurious Correlation.

Hand size is correlated with shoplifting only because each is related to gender. Within each gender there is no such correlation. A correlation like this is known as a spurious correlation.