

## Philosophy of Science

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PSY 6217 – Research Design



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## Goals of Research

### ☞ Description

- ♦ *Naturalistic Observation*

### ☞ Prediction & Control

- ♦ *Correlational Research*

### ☞ Explanation & Understanding

- ♦ *Experimental Research*

### ☞ Evaluate Proposed Solutions to Problems

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## Developing Good Research Questions

### ☞ Characteristics of good research questions

- ♦ *Answerable*
- ♦ *Empirical*
  - *Role of operational definitions*
- ♦ *Manageable scope*
- ♦ *Important*

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## Is My Research Question Important?

### ☞ Important

- ♦ Will the answer improve our understanding of a behavioral system?
- ♦ Will the answer help us choose between competing theories or explanations?
- ♦ Will this help us develop a practical application to solve a problem?

### ☞ Not Important

- ♦ The answer is already known
- ♦ The manipulations are likely to have only small effects, if any
- ♦ Effects have no theoretical interest (they have no impact on our evaluation of the theory)
- ♦ No reason to believe the variables studied are related in any way

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## Theory

### ☞ Qualitative versus Quantitative Theories

### ☞ Mechanistic versus Functional Theories

- ♦ Mechanistic explanation for the operation of an automobile (i.e., auto engineering)
- ♦ Functional explanation for the operation of an automobile (i.e., driving)

### ☞ Level of Description

- ♦ Descriptive theories
  - Labels as descriptions (pseudoelements)
- ♦ Analogical theories
  - Explanations based on a concrete model
- ♦ Fundamental theories
  - Explanations based on abstract structure that provides the model

### ☞ Level of Explanation

- ♦ Functional explanations
- ♦ Neurological explanations in psychology
- ♦ Cellular / biochemical explanations
- ♦ "turtles all the way down" (Hindu myth of the universe)

### ☞ Domain of a Theory

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## Role of Theory

### ☞ Represent our understanding of a phenomenon

### ☞ Organize & interpret research findings

- ♦ Explains the findings observed to date
- ♦ Provides the logical connection between variables

### ☞ Assist in making predictions

- ♦ Reliably describe future outcomes
- ♦ Good theories stake a claim that is testable

### ☞ Generate questions for future research

- ♦ Fruitfulness or heuristic value of a theory
- ♦ Direct research attention to "important" issues
- ♦ Prediction of novel observations (future tests)

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## Developing and Testing Hypotheses

A rule generates the following series of numbers:

6 8 10

1. *Develop a hypothesis that states the rule.*
2. *Suggest a series of 3 numbers that will test whether you have the correct rule.*

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## Testing Theory

- ☞ **Confirmation Strategies**
- ☞ **Disconfirmation Strategies**
- ☞ **Strong Inference**
  - ♦ *Critical experiments*

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## Theory Development

- ☞ **Data-driven research**
  - ♦ *Emphasis on developing general statements to account for current observations*
- ☞ **Theory-driven research**
  - ♦ *Emphasis on developing an over-arching theoretical system*
  - ♦ *Critical observations may be made only in future experiments*

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## Sources for Research Questions

### ☞ Observation

### ☞ Theory

- ♦ *Does a theory make a testable prediction that has not yet been examined?*
- ♦ *Do competing theories make different predictions?*

### ☞ Prior Research

- ♦ *Extend findings to a new domain*
- ♦ *Resolve a conflict between published findings*

### ☞ Practical Problem

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