

Philosophy of Science

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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

Goals of Research

☞ Description

- ♦ *Naturalistic Observation*

☞ Prediction & Control

- ♦ *Correlational Research*

☞ Explanation & Understanding

- ♦ *Experimental Research*

☞ Evaluate Proposed Solutions to Problems

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 (pseudoexplanations)*
- ♦ *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

Developing Good Research Questions

☞ Characteristics of good research questions

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

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)*

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.*

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**

Testing Theory

☞ **Confirmation Strategies**

☞ **Disconfirmation Strategies**

☞ **Strong Inference**

- ♦ *Critical experiments*

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*