

Behavioral Science Overview

CITI Training

- › <https://www.citiprogram.org/>
- › Research Hazards Awareness Training
 - luongo@oakland.edu
 - <https://www.oakland.edu/labsafety/training/>
- › Committee Formed

Requirements

- › Sept. 27 Paper 20%
- › Oct. 11 Exam 20%
- › Nov. 13 Exam 20%
- › Nov. 20 – Dec. 6 Presentations 15%
- › Dec. 13 Proposal 25%

Behavioral Science

- › takes a systematic, scientific approach to knowing
- › is composed of three interrelated aspects
 1. Research that generates knowledge
 2. Theory that organizes knowledge
 3. Application that puts knowledge to use

Four Goals of Behavioral Science

- › Description
- › Understanding
- › Prediction
- › Control of behavior

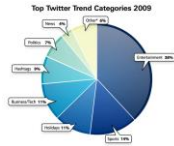
Goals of Science: Description

- › Defines the phenomena to be studied
- › Differentiates among phenomena
 - Example: What does "empathy" mean?

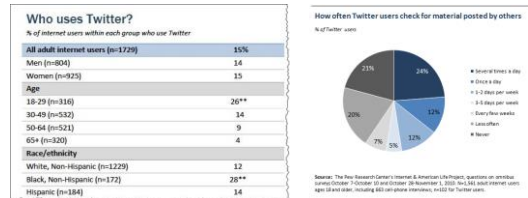


Goals of Science: Description

- › A way to record events that the researcher wants to study
 - Example: What information do people Twitter about?
 - To find out, you could follow tweets related to specific topics, events, or groups and categorize them



Goals of Science: Description



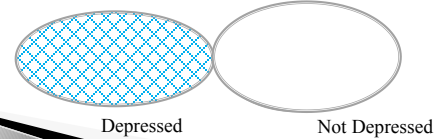
Goals of Science: Understanding

- › Describes the relationships among phenomena
- › Attempts to determine *why* a phenomenon occurs
- › Starts with a set of hypotheses:
 - statements about possible causes for the phenomenon
 - based on sets of general principles called theories

How Do We Know What Causes an Effect?

John Stuart Mill's Three Rules For Causality

1. Covariation
 - The hypothesized cause must be correlated with the effect
 - Presence, absence, and joint presence and absence (experimental and control groups)
 - E.g., gene for depression should occur in all cases of depression but **not** occur in absence of depression



John Stuart Mill's Three Rules For Causality

2. Time Precedence of Cause
 - The hypothesized cause must come before the effect



3. No Plausible Alternative Explanation
 - The hypothesized cause must be the only possible cause



Goals of Science: Prediction

- › Using our understanding of the causes of phenomena and the relationships among them to predict events
 - E.g., individuals with a particular gene will be more likely to develop symptoms of depression

Goals of Science: Prediction

Prediction takes two forms

1. Forecasting events
 - Example: Predicting who will vote for which candidate in an election
2. Deriving research hypotheses from theories
 - Example: Social Impact Theory predicts that individuals are more likely to conform to the greater number of individuals, and those with higher status

Goals of Science: Control

Using knowledge to influence phenomena

- Two important and related issues:
 1. Do behavioral scientists have the ability to effectively control behavior?
 2. Assuming they do, *should* they attempt to do so?

Goals of Science: Control

- ▶ Pavlov:
 - Although politically outspoken, work supported by Soviet Union – spoke to control of actions by control of environment
 - Wiltermuth & Heath (2009) have found that activities performed in unison, such as marching or dancing, exercise increase loyalty to the group (a form of mind control?)



Key Values of Science

Western science reflects four key values

1. Empiricism
2. Skepticism
3. Tentativeness
4. Publicness

Key Values of Science: Empiricism

All decisions about what constitutes knowledge are based on objective evidence

- Decisions are *not* based on ideology or abstract knowledge
- If objective evidence is absent, the scientist reserves judgment

Ideology

- Non-scientific quasi-theory often based on political or religious values with untested assumptions

Theory vs. Ideology

- Certainty of answers
- Type of knowledge system differs
- Type of assumptions differ
- Use of normative statements differ
- Use of evidence differs
- Demand for logical consistency differs
- Transparency differs

Theory vs. Ideology

- | | |
|---|--|
| <ul style="list-style-type: none"> ▸ Theory <ul style="list-style-type: none"> ◦ Conditional ◦ Uncertainty ◦ Expanding ◦ Rigorously tested ◦ Empirical evidence ◦ Neutral ◦ Logical | <ul style="list-style-type: none"> ▸ Ideology <ul style="list-style-type: none"> ◦ Absolute ◦ Fixed ◦ Avoids tests ◦ Partial ◦ Contradictory ◦ Circular |
|---|--|

Theory vs. Ideology

Example – Divorce

- Families are strongest when they have *resources* (income, education, housing, maturity, respect etc.) and *low stress* (constant employment, happy marriage, good health, etc.).
- Society is facing a moral decay leading to divorce, women working outside the home, and loss of the “traditional family”

Key Values of Science: Skepticism

Scientists should question the quality of the knowledge they have

- ▶ Questions include
 - Is there evidence to support a theory?
 - Is the evidence of high quality?
 - Were appropriate data collection procedures followed?
 - Was important information overlooked?

Key Values of Science: Tentativeness

- Knowledge can change as new evidence becomes available
- A principle considered correct today may be considered wrong tomorrow if new evidence appears

Key Values of Science: Publicness

Information is available for review by others

- ▶ Scientists make public
 - their research findings
 - how the research was conducted
- ▶ Publicness benefits science because it lets
 - people use the research results
 - other scientists check the validity of the results
 - other scientists replicate the research

Norms of the Scientific Community

- ▶ Universalism
 - Judge only on merit
- ▶ Organized Skepticism
 - scrutiny
- ▶ Disinterestedness
 - neutral
- ▶ Communalism
 - publicness
- ▶ Honesty
 - ~~deception~~

- ▶ A collection of beliefs or practices mistakenly regarded as being based on scientific method
 - Attachment Therapy
 - Brainwashing
 - Conversion Therapy
 - Graphology
 - Hypnosis
 - Memetics
 - Parapsychology
 - Phrenology
 - Polygraphy
 - Psychoanalysis

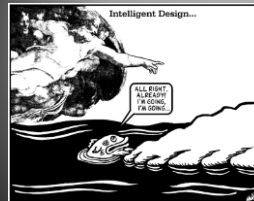
Pseudoscience

- **Hite report on female sexuality**
 - Women in Hite's study were given a survey about marriage satisfaction, where 98% reported dissatisfaction, and 75% reported having had extra-marital affairs, but where only 4% of women given the survey responded.
 - Zimbardo argued that the women who had dissatisfaction may have been more motivated to respond than women who were satisfied and that her research may just have been "science-coded journalism" (sampling bias).



A Scientific Approach

- ▶ **Junk Science**
 - ▶ Used to denigrate actual scientific evidence
- ▶ **Scientific Community**
 - Innumeracy
 - Scientific Literacy



Scientific Approaches to Knowledge

- › Epistemology: A set of beliefs about the nature of science

Scientific Approaches to Knowledge

- › Logical positivism: Knowledge should be developed for its own sake, regardless of its utility
 - The dominant epistemological position in Western science
- › Humanistic perspective: Science should produce knowledge that serves people
 - The humanistic perspective is gaining importance in behavioral science

Logical Positivism	Humanism
Scientists' personal beliefs and values have no effect on science	Personal beliefs and values strongly affect theory, choice of research topics and methods, and interpretation of results
Knowledge is sought for its own sake; utility is irrelevant	Research that does not generate directly applicable knowledge is wasteful
Science aims to generate knowledge that applies to all people	Science should aim to help people achieve self-determination
Scientific inquiry must be a carefully controlled process, as in the traditional experiment	Science should seek naturalism even at the cost of giving up control
There is only one correct interpretation of scientific data	The same data can be interpreted in many ways

Why Epistemology Matters

- › A researcher's epistemology affects
 - whether the researcher thinks a given theory is valid
 - the research questions that a researcher investigates
 - the research methods the researcher uses
 - how the researcher interprets results

Theory

A set of statements about relationships between variables

- In scientific theory, most statements have been verified or are potentially verifiable
- Theory is testable but is NOT truth or fact



Components of Theories

Theories have three components

1. Assumptions
2. Hypothetical constructs and their definitions
3. Propositions



Assumptions

Beliefs that are taken as given and usually not subject to empirical testing

- Some assumptions cannot be subject to testing
- "The silliness of social psychology doesn't lie in its questionable research practices but in the research practices that no one thinks to question. The most common working premise of social-psychology research is far-fetched all by itself: The behavior of a statistically insignificant, self-selected number of college students or high schoolers filling out questionnaires and role-playing in a psych lab can reveal scientifically valid truths about human behavior."



Assumptions

General scientific assumptions

- There is an objective reality that exists separately from individuals' subjective beliefs
- There is order to reality; events are not random
- Everyone experiences the same reality
- People can know and understand that reality with reasonable accuracy
- Events have causes that can be identified, understood, and controlled



Paradigmatic Assumptions

Paradigms: General ways of conceptualizing and studying the subject matter of a scientific field

- › Different paradigms make different assumptions
- › These assumptions are often not testable
 - As a result, disagreements between advocates of different paradigms are difficult to resolve



Paradigmatic Assumptions

- › Example: Evolutionary Theory of Jealousy (e.g., Buss, 1994)
- › Assumptions:
 - both women and men want to pass on their genes
 - sex differences in jealousy due to differences in male/female reproductive system
 - men don't want to raise another man's child, so are jealous of sexual infidelity
 - women need men's long-term support to raise child, so are jealous of emotional infidelity



Paradigmatic Assumptions

- › Can be explicit or implicit
- › Can reflect theorist's personal beliefs and/or cultural norms
- › Shape the content of the theory
- › Influence how research testing the theory is conducted
- › Implicit assumptions should not be taken as established fact



Theories Incorporate the Four Goals of Science

- › Theories define variables and **describe** relationships among them
- › Theories provide **understanding** of why behaviors occur
- › Theories allow **prediction** of future behavior
- › Theories offer insights about how to **control** behavior



Explanation versus Description

- › Logically connects what occurs in specific situation to a more abstract principle to answer a “why” question
- › Good explanations also predict

Note: Association does not imply causality!

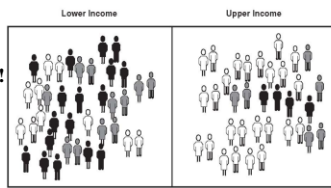


FIGURE 3.2 Association of Income and Race

Essential Characteristics of Theories

- › Logical consistency: The theory does not contradict itself
- › Falsifiability: Hypotheses from theory can be tested by empirical research
- › Agreement with known data: Theory can explain data that already exist within scope of theory

Desirable Characteristics of Theories

- › Clarity: Definitions of constructs and propositions are stated unambiguously
 - › Hypotheses are straightforward and clearly derived
- › Parsimony: The theory is not unnecessarily complicated
- › Usefulness: Theories should be applicable to real world and solve problems relevant to everyday
- › Fertility: Theories should inspire researchers to generate knowledge