Chapter 2

Science and Social Research

From Theory to Data and Back

Chapter Learning Objectives

1. Define science and describe its characteristics.

2. Distinguish between deductive and inductive logic.

3. Describe how deductive and inductive logic are used in research to move between theory and data.

4. Recognize the possibilities and limits of scientific knowledge.

Chapter Outline

1. Characteristics and Process of Science

2. Deductive and Inductive Reasoning

3. Logics of Inquiry

4. Possibilities and Limits of Scientific Knowledge

What is Science?

Science has four characteristics:

1. Goal of producing knowledge in the form of **theory**: a logically interconnected set of propositions that explains something about how the world works

2. Reliance on **verifiable data**—that is, information observable to both the researcher and others

3. Use of **systematic** procedures in data collection and analysis

4. Application of **logical reasoning** in generating and testing scientific knowledge

Theory is Integral to Science
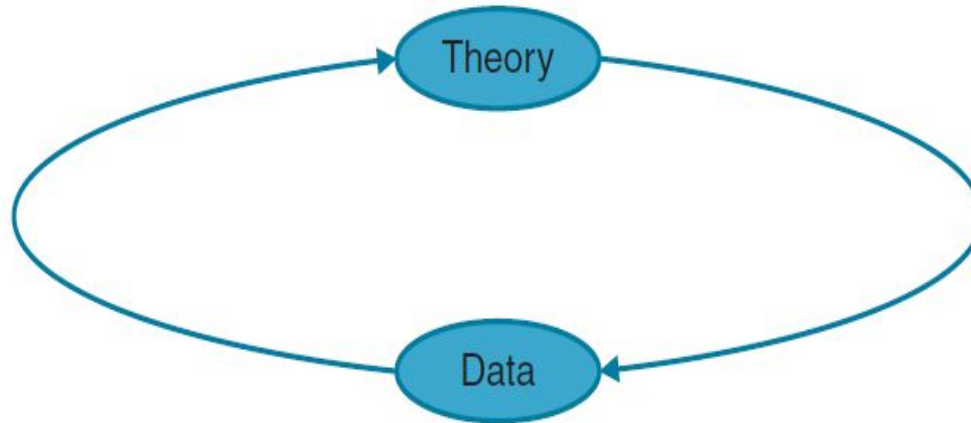
Science involves a constant interplay between theory and data

Theory informs data and data inform theory

Theory underlies the entire research process, guiding
- Formulation of research questions
- Choices about how to conduct a study
- Interpretation of data

Forms of Logical Reasoning

Deductive logic: reasoning in which the conclusion necessarily follows if the evidence is true
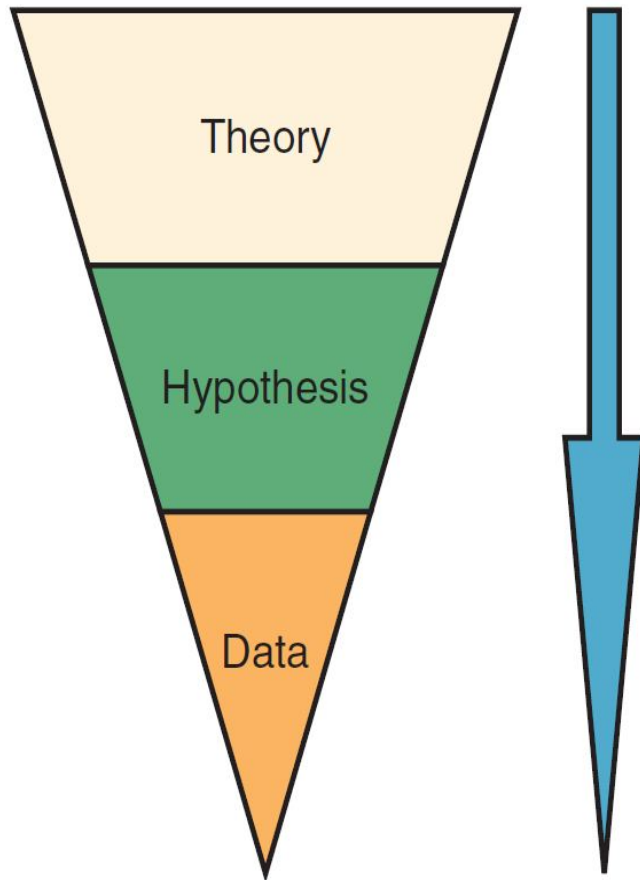
If the evidence is true, the conclusion must be true

Inductive logic: reasoning in which the conclusion is implied by, but goes beyond, the evidence at hand

If the evidence is true, the conclusion may or may not be true

Science uses both forms of reasoning; each represents a different way of moving between theory and data

Deductive Logic of Inquiry

- Process moves from theory to hypothesis to data

- Reflects a top-down approach, from the abstract (theory) to the concrete (data)

- A **hypothesis** is an expected relationship between phenomena derived from theory and tested with data

Inductive Logic of Inquiry
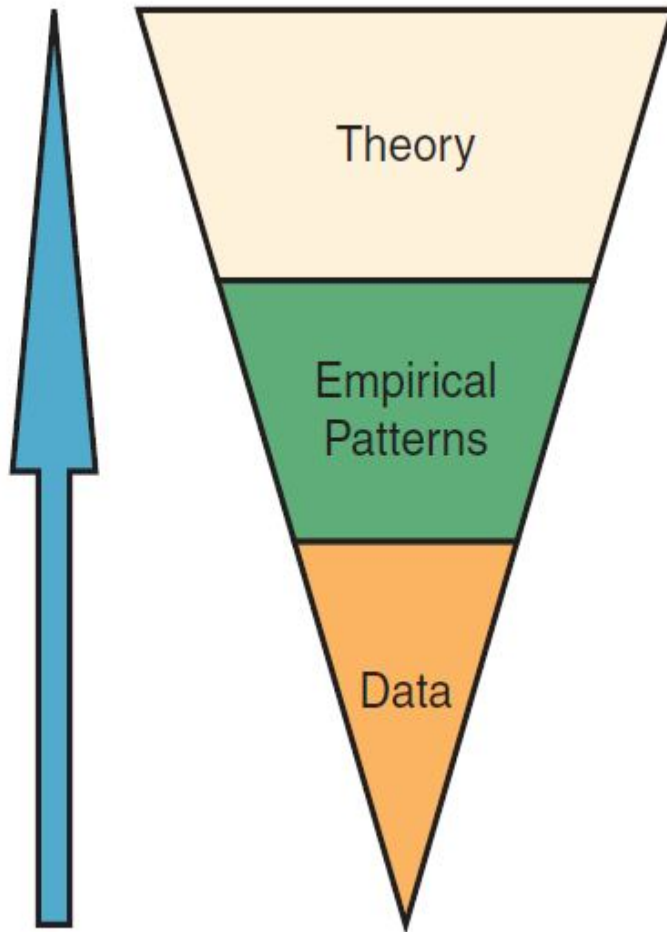
- Process moves from data to empirical patterns to theory

- Reflects a bottom-up approach, from the concrete to the abstract

- An **empirical pattern** is a relationship between phenomena inferred from data

Deductive Logic of Inquiry:
Does Contact Reduce Prejudice?

Hypotheses derived from the contact **theory** of prejudice
- The greater the contact with members of a different ethnic/racial group, the lower the prejudice toward that group
- The impact of contact on prejudice depends on the social setting

Researchers **hypothesized**:
- Whites who have black relatives will be less likely to hold anti-black stereotypes than whites who do not have black relatives.
- Whites who personally know blacks from school will be less likely to hold anti-black stereotypes than whites who do not know blacks from school.

Survey **Data** supported the second hypothesis but not the first

Inductive Logic of Inquiry: How Does Class Matter?

Gathered **data** through direct observation and in-depth interviews to examine social class in everyday lives

Inferred **empirical patterns** in the data related to social class

- Middle-class parents more frequently reason and negotiate with their children.
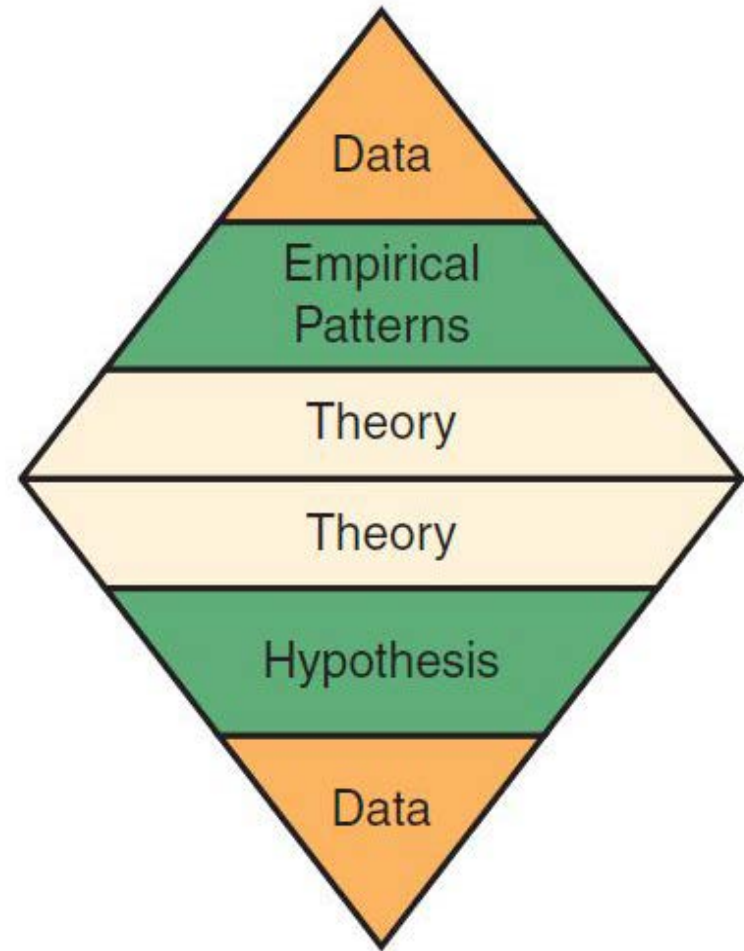- Middle-class children more often participate in organized activities.

Derived a **theory** of child rearing:

Middle-class parents use a strategy of "concerted cultivation"; working-class parents practice "accomplishment of natural growth."

Combining Logics of Inquiry
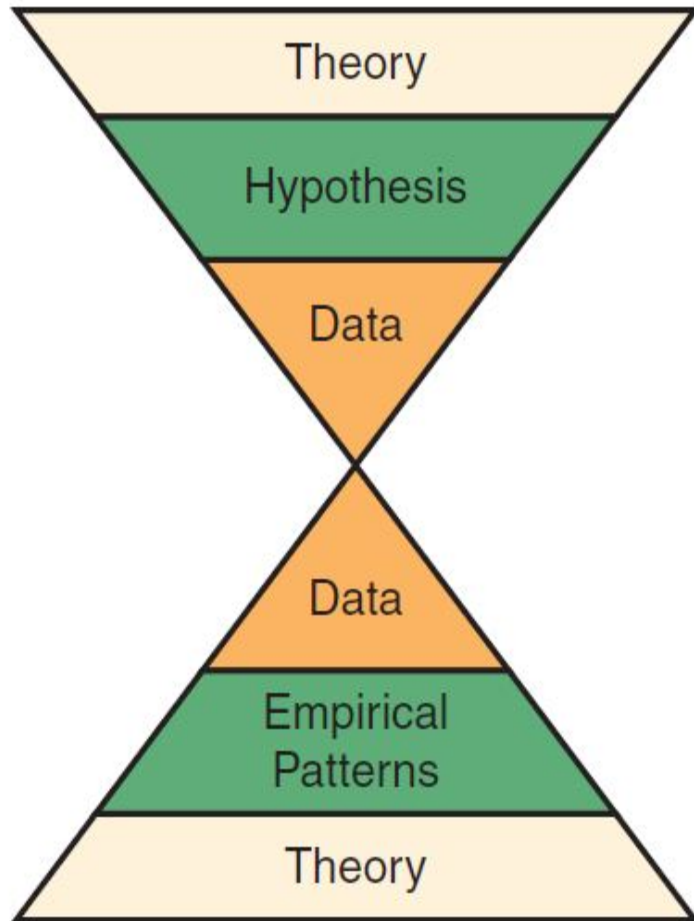
Starting with theory   Starting with data

Combining Logics of Inquiry: Durkheim's Study of Suicide

Beginning with deductive logic, Durkheim **tested psychological theories** of suicide popular at the time

Suicide is the result of insanity

He derived **hypotheses** from these theories:

- As rates of insanity increase, so too will suicide rates.
- Women will have higher rates of suicide than men.
- Jews will have higher rates of suicide than members of other religious.

Data from official statistics on suicide failed to support hypotheses

Combining Logics of Inquiry:
Durkheim's Theory of Suicide (cont'd)

Continuing with inductive logic, Durkheim identified several **empirical patterns** in the data:

- Predominantly Catholic countries and areas of countries with a strong Catholic presence had lower suicide rates than their Protestant counterparts.
- Married people were less likely to commit suicide than unmarried people.
- People with children were less likely to commit suicide than people without children.

From these patterns, Durkheim derived a **theory** of suicide:

"Suicide varies inversely with the degree of integration of the social groups of which the individual forms a part."

Possibilities of Scientific Knowledge

What is possible from scientific knowledge?

- Can dispel "common-sense" ideas that may not be true

- Confirm ideas we're unsure of

- Help us make better choices in our everyday lives

- Improve the human condition

Limits of Scientific Knowledge

In what ways is science imperfect?

- Scientific knowledge is **tentative**: It cannot be proven beyond a doubt

- The scientific process is sometimes **unpredictable and unsystematic**

- Science is a product of the times: Knowledge depends on the **social-historical context**

- The **human element** in science may lead to errors in collecting and interpreting evidence