

Theory and Hypotheses Formulation

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Concept

- An abstraction encompassing observed events; a word that represents the similarities or common aspects of objects or events that are otherwise quite different from one another.
- The purpose of a concept is to simplify thinking by including a number of events (or the common aspects of otherwise diverse things) under one general heading (Ary 1985).
- Chair, dog, tree, liquid, a doughnut, etc...

Construct

- Constructs are the “highest highest-level abstractions” of complicated objects and events, created by combining concepts and less complex constructs. – used to account for observed regularities and relationships, and to summarize observations and explanations (Ary 1985).
 - A concept with added meaning of having been deliberately and consciously invented or seriously adopted for a special scientific purpose.
- 1)it enters into theoretical schemes and is theoretical related in various ways to other constructs.
 - 2)it is defined and specified so that it may be observed or measured (Kerlinger 1986).

Concepts, Construct

- Concepts are abstract ideas which have been "defined" according to particular characteristics or generalizations (constructs) about them.
- A construct is based on concepts, or can be thought of as a conceptual model that has measurable aspects.
- This will allow the researcher to "measure" the concept and have a common acceptable platform when other researches do a similar research.

Concepts, Construct

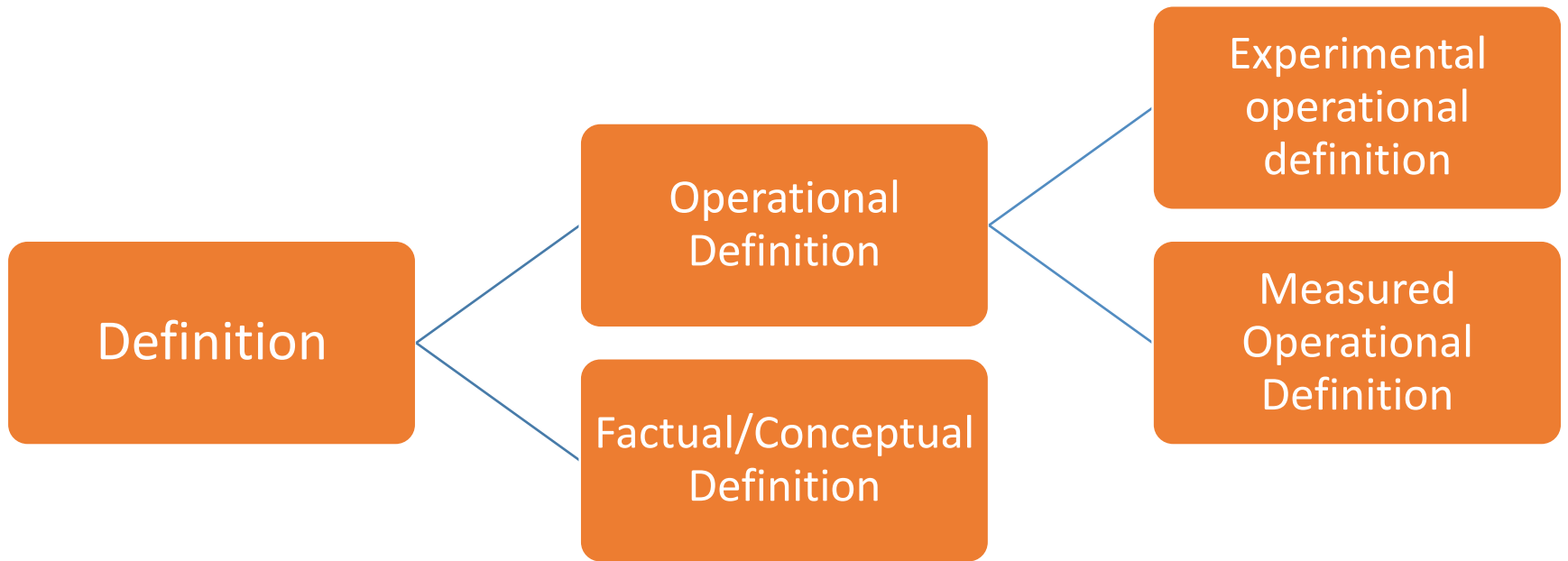
- E.g
- Measuring advertising effectiveness is an construct, and concepts related would be brand awareness and consumer behavior.
- Pain is a concept, a theoretical model of pain would be a construct, and a pain assessment tool would give a measurable variable.

Definitions

- A definition provides a set of terms that is synonymous with the term being defined (Kaplan, 1964).

Operational Definition

- It describes meaning to a concept or construct by specifying the operations that must be performed in order to measure or manipulate the concept, as the data collected during research is in terms of observable events (Ary 1985).
- It defines or gives meaning to a variable by spelling out what the investigator must do to measure it (Kerlinger 1986).
- “Operational definitions are essential to research because they permit investigators to measure abstract concepts and constructs and permit scientists to permit move from the level of constructs and theory to the level of observation” (Ary 1985).



Factual/Conceptual Definitions

Dictionary type definition.

A satisfier might be defined as a reinforcer or a stimulus that produces satisfaction

Operational Definition

A term be defined by the set of manipulations or by measuring operations that identify the presence of the terms referents

How referents are manipulated

Example: hunger may be defined as the length of time without food.

Suppose we ask to define the a chocolate cake for someone. An experimental definition would explain how to produce a cake. A recipe

How referents are measured

Definition of hunger might be the amount of food that a person consumes (weight, volume, calorie)

It would describe the flavor, texture, appearance and other properties of a cake

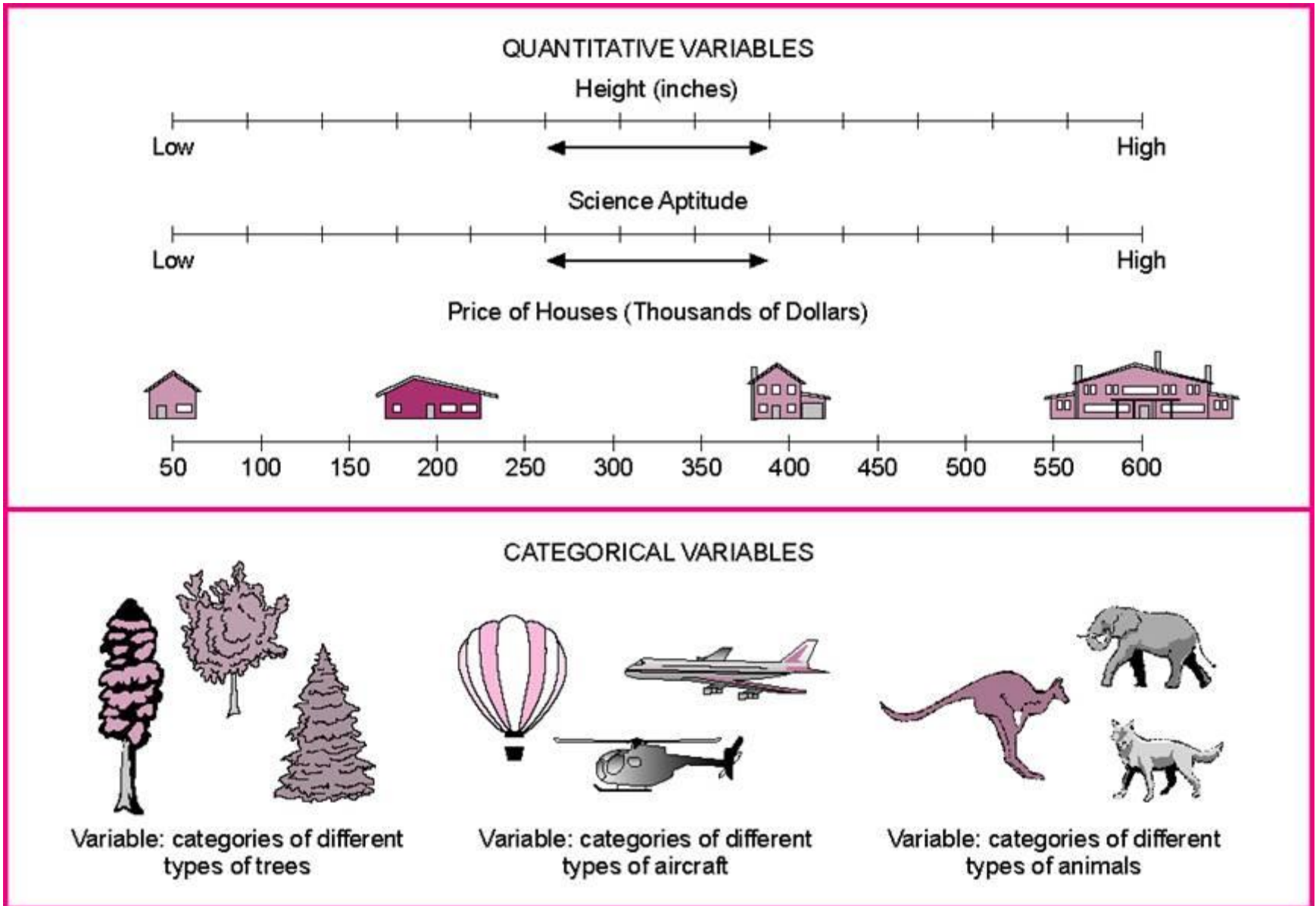
What is a Variable?

- A variable is a variation within a class of objects (i.e., eye color).
- A constant is a characteristic with no variations within a class of objects (i.e., grade level of ninth graders).
- Researchers choose certain variables to study since they are suspected to be related to a possible relationship to be discovered.

Quantitative vs. Categorical Variables

- Variables are classified as either quantitative or categorical
- A quantitative variable is conceptualized and analyzed in distinct categories, with no continuum implied (i.e., height).
 - Can be subdivided into smaller units
- A categorical variable does not vary in degree, amount, or quantity, but are qualitatively different (i.e., political party).
 - There is no middle ground or in-between measurement

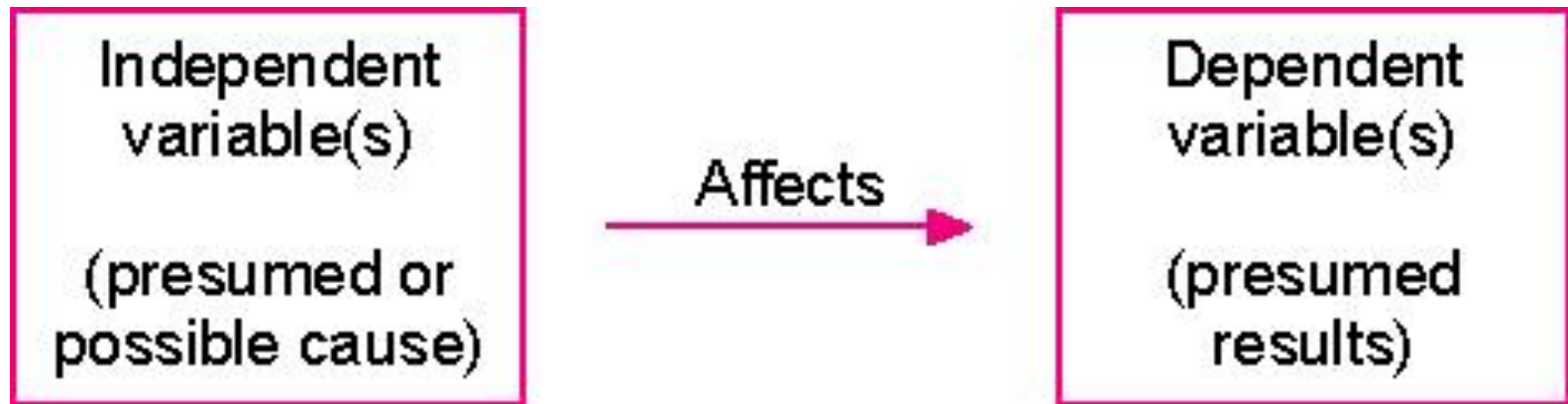
Quantitative vs. Categorical Variables (Figure 3.1)



Independent vs. Dependent Variables

- The independent variable is what the researcher studies to see its relationship or effects.
 - Presumed or possible cause
- The dependent variable is what is being influenced or affected by the independent variable
 - Presumed results
- Independent variables may be either *manipulated* or *selected*
 - A manipulated variable is a changed condition the researcher creates during a study, also known as an experimental or treatment variable
 - A selected variable is an independent variable that already exists

The Relationship between Independent and Dependent Variables



Other Types of Variables

- Outcome Variable

- A dependent variable that is quantitative
- Most studies demonstrating this would have a categorical independent variable
- The investigator is interested in the effects that might lead to differences in methods = outcomes

- Moderator Variable

- Special type of independent variable
- Selected to determine if it affects (modifies) the basic relationship between the primary independent variable and the dependent variable (Figure 3.2)

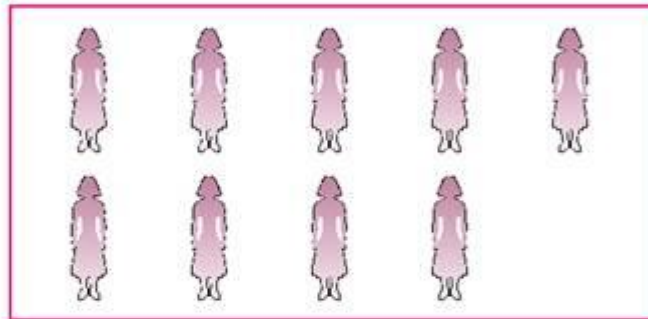
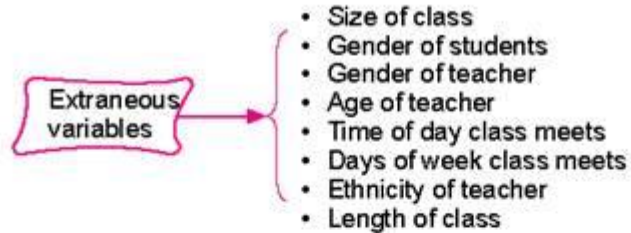
Other Types of Variables (cont.)

- **Extraneous Variable**

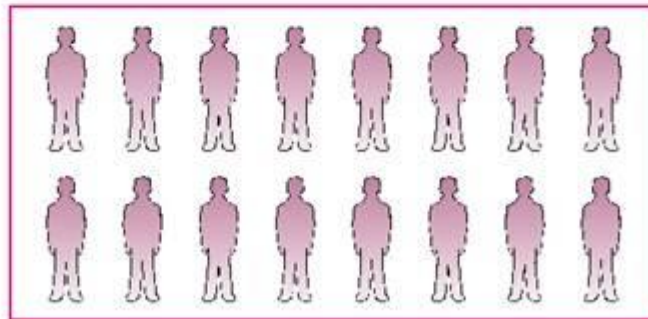
- Independent variables that have not been controlled
- Considered a basic problem in research
- The task is to control these variables by reducing or eliminating their effects
- A method to control extraneous variables is to hold them constant
- Figure 3.3 illustrates the importance of identifying extraneous variables

Examples of Extraneous Variables (Figure 3.3)

The principal of a high school compares the final examination scores of two history classes taught by teachers who use different methods, not realizing that they are also different in many other ways because of extraneous variables. The classes



Ms. Brown's (age 31) history class meets from 9:00 to 9:50 A.M., Tuesdays and Thursdays. The class contains nine students, all girls.



Mr. Thompson's (age 54) history class meets from 2:00 to 3:00 P.M. Mondays and Wednesdays. The class contains 16 students, all boys.

The Nature of Theory

- **A theory in psychology is a set of logically consistent statements about some behavioral**
- **phenomenon that**
- (a) best summarizes existing empirical knowledge of the phenomenon,
- (b) organizes this knowledge in the form of precise statements of relationships among variables (i.e., laws),
- (c) provides a tentative explanation for the phenomenon, and
- (d) serves as the basis for making predictions about behavior.

- Theories differ in terms of their scope. Some aim to cover broad expanses of
- behavior and are general theories—Erik Erikson’s stage theory of how our personality
- is developed and operates throughout the life span is an example. More however, a theory is narrowly focused on some specific aspect of behavior.
- In social psychology, for instance, cognitive dissonance theory concerns how
- people resolve inconsistencies in abnormal psychology, learned helplessness theory
- attempts to account for psychological depression.

- Theories also differ in terms of
- their level of precision, with some being stated in precise mathematical terms and
- others described more simply as a set of logically connected statements.

Attributes of Good Theories

- The most obvious one is **productivity**—**good theories advance knowledge by generating a great deal of research**
- **Falsification:** In fact, a theory that appears to explain everything is seriously flawed.
- good theories are **parsimonious**. This means, ideally, that they include the minimum number of constructs and assumptions that are necessary to explain the phenomenon adequately and predict future research outcomes. If two theories are equal in every way except that one is more parsimonious, then the simpler one is generally preferred.

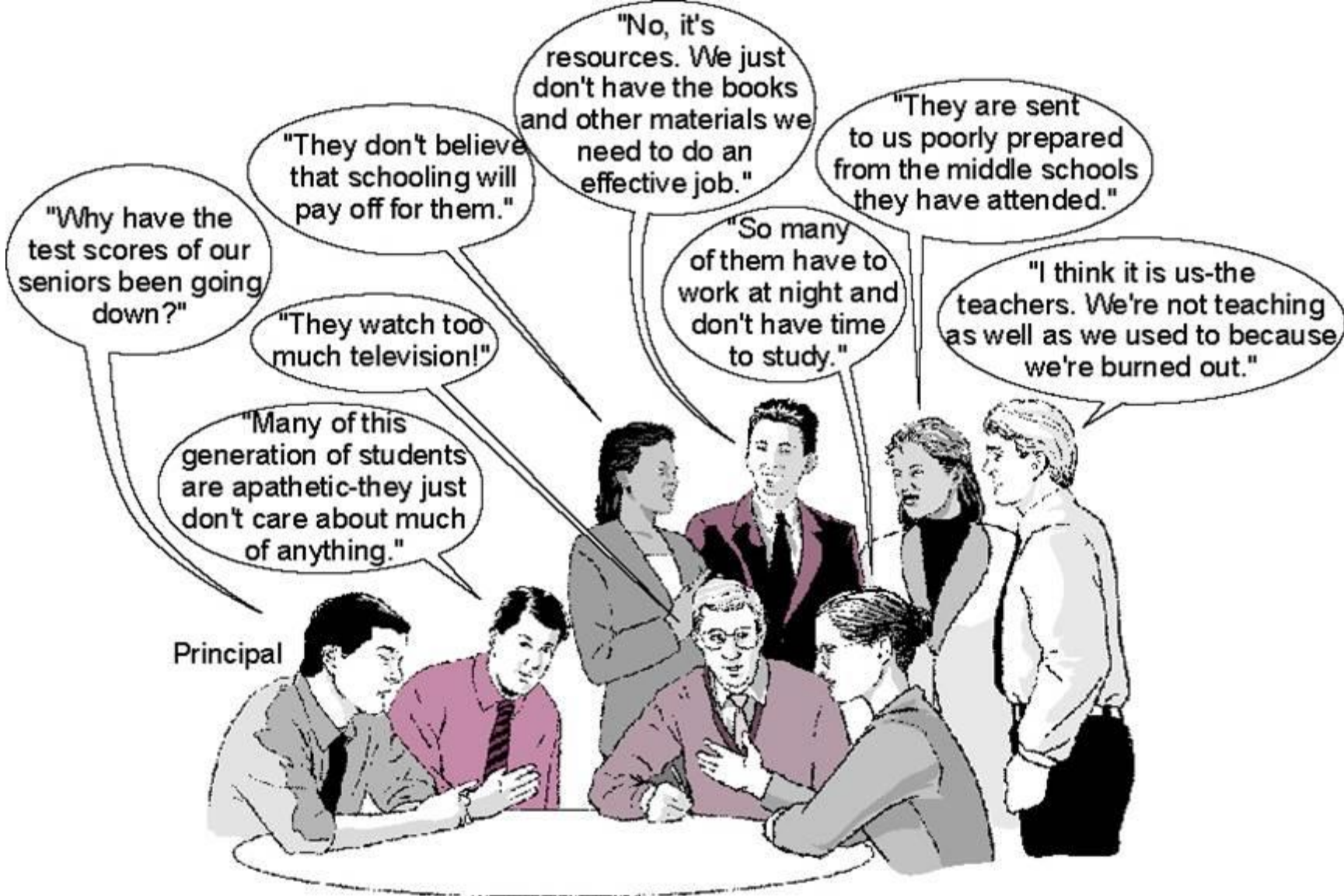
Hypothesis

- The prediction about specific events that is derived this way from a theory is called a **hypothesis, which in general can be considered** a reasoned prediction about some outcome that should occur under certain circumstances.
- These hypotheses lead to the design of a study, which produces results as predicted or fails to produce them.

What is a Hypothesis?

- A hypothesis is a prediction regarding the possible outcome of a study
- Advantages of stating hypotheses include:
 - Forces us to think more deeply and specifically about the possible outcomes of the study
 - Enables us to make specific predictions based on prior evidence or theoretical argument
 - Helps to clarify whether we are or aren't investigating a relationship
- Disadvantages of stating hypotheses include:
 - May lead to a bias on the part of the researcher
 - In some studies, it would be presumptuous to predict what findings would be
 - Focusing on the hypothesis could prevent the researcher from seeing other phenomena that might be important to the study

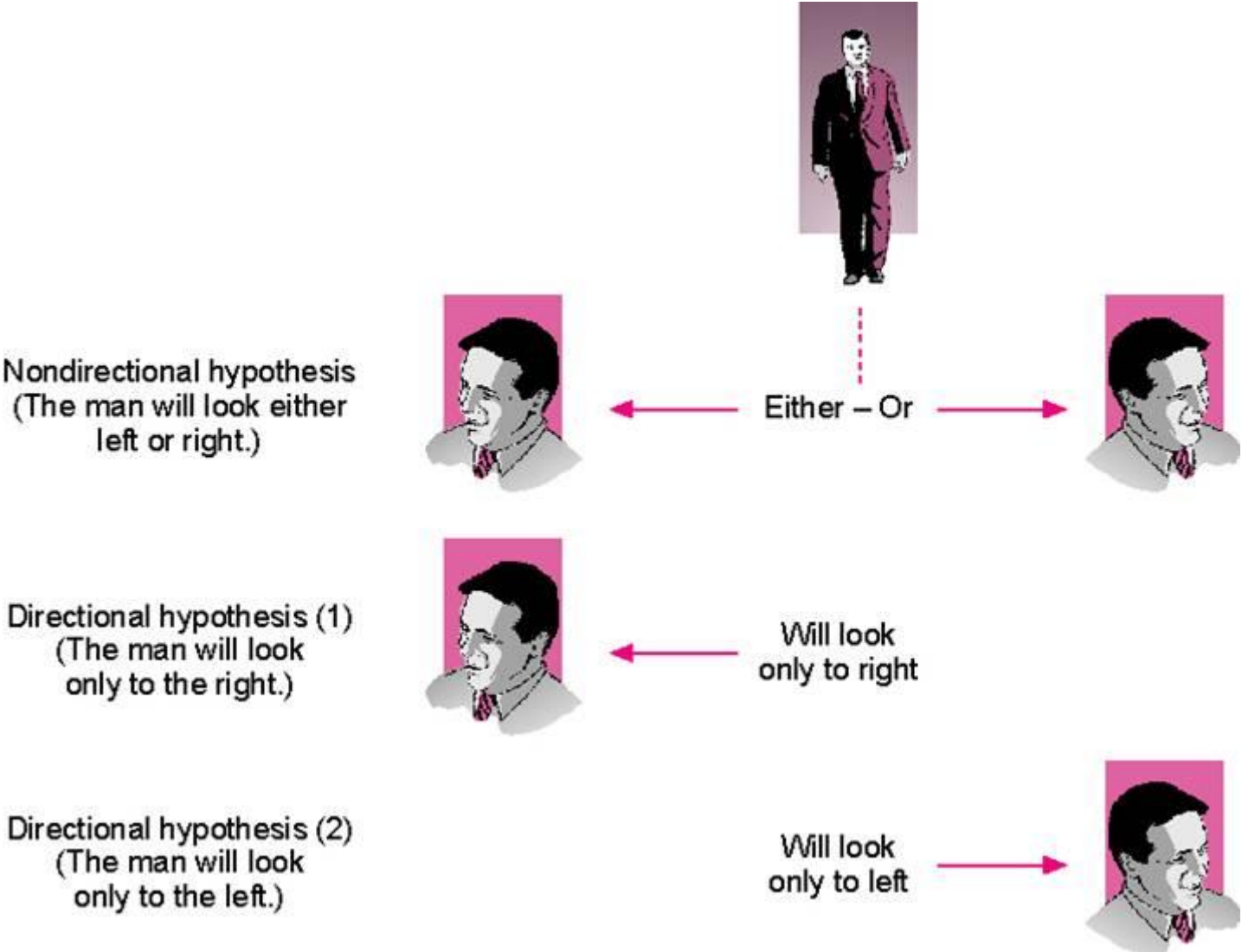
Hypotheses from a Single Research Question (Figure 3.4)



Directional vs. Non-directional Hypotheses

- A directional hypothesis is one in which the researcher indicates the specific direction that he or she expects will emerge in a relationship in the study.
 - The direction is based on what the researcher has found from:
 - Literature
 - Personal experiences
 - Experience from others
- A non-directional hypothesis is when there is no specific prediction about what direction the outcome of a study will take.
 - Sometimes it is difficult to make specific predictions upon a study
 - A study may state that it would point to non-specific directions vs. distinct possibilities

Directional vs. Non-Directional Hypotheses (Figure 3.5)



Characteristics

- Hypotheses has the following characteristics:
 - ✓ a tentative proposition
 - ✓ unknown validity
 - ✓ specifies relation between two or more variables
 - ✓

Functions

- Bringing clarity to the research problem
- Serves the following functions
 - ✓ provides a study with focus
 - ✓ signifies what specific aspects of a research problem is to investigate
 - ✓ what data to be collected and what not to be collected
 - ✓ enhancement of objectivity of the study
 - ✓ formulate the theory
 - ✓ enable to conclude with what is true or what is false

Typologies

Null hypothesis

A null hypothesis is formulated against the working hypothesis; opposes the statement of the working hypothesis

....it is contrary to the positive statement made in the working hypothesis; formulated to disprove the contrary of a working hypothesis

When a researcher rejects a null hypothesis, he/she actually proves a working hypothesis

In statistics, to mean a null hypothesis usually H_0 is used. For example,

$$H_0 \rightarrow Q = O$$

investigation where Q is the property of the population under

O is hypothetical

Typologies

Alternate hypothesis

An alternate hypothesis is formulated when a researcher totally rejects null hypothesis

He/she develops such a hypothesis with adequate reasons

The notion used to mean alternate hypothesis is $H_1 \rightarrow Q > 0$

i.e., Q is greater than 0

Thank You