Part II: Lecture Outlines and Examples Corresponding to Textbook Chapters

Introduction to the Student
and
Chapter 1
Displaying the Order in a Group of Numbers Using Tables and Graphs

Instructor's Summary of Chapter

Difficulty of course. We have never had a student who could do well in other college courses who could not also do well in this course—though for many students this course requires more work.

Reasons for behavioral and social science students to learn statistical methods: Reading the research literature, conducting research, and developing analytic and critical thinking.

How to gain the most from this course: Attend to the concepts (not just the numbers), master each concept before going on to the next (do the *How Are You Doing?* self-tests), keep up with reading and assignments, study especially intensely during the first half of the course, and study with other students.

Descriptive statistics summarize and make understandable a group of numbers collected in a research study.

Some basic concepts. Variables, values, and scores are defined and differentiated.

Kinds of variables. Variables used in the behavioral and social sciences are numeric (usually equal interval), rank-order (ordinal), or nominal (categorical).

Frequency tables organize the numbers into a table in which each of the possible values is listed along the left from highest to lowest, accompanying each value by the number of cases that have that value, and the percentage of cases that have that value. Grouped frequency tables are used when there are a large number of different values.

Histograms and frequency polygons. A histogram is a kind of bar graph in which the height of each bar represents the frequency for a particular value or interval.

Distribution shapes. The general shape of the histogram or frequency polygon can be unimodal, bimodal, multimodal, or rectangular; symmetrical or skewed (often due to floor or ceiling effects); light-tailed or heavy-tailed in relation to the normal curve.

How the procedures of this chapter are reported in research articles. When frequency tables appear in research articles, it is usually in order to compare distributions and often involves frequencies (and percentages) for various categories. Histograms and frequency polygons rarely appear in articles, though the shapes of distributions are occasionally described in words.

Box 1-1. Math Anxiety, Statistics Anxiety, and You: A Message for Those of You Who Are Truly Worried about this Course. Summarizes research and thinking on various kinds of anxiety associated with studying statistics and methods for coping with these anxieties.

Box 1-2. Gender, Ethnicity, and Math Performance. Reviews research and thinking on gender and ethnic differences in math and statistics performance, emphasizing the lack of evidence for differences in underlying abilities.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

Lecture 1.1: Introduction to the Course

Materials

Lecture outline
Transparencies or PowerPoint slides of syllabus
Questionnaires
Syllabi
Enrollment forms (as appropriate to your institution)

Outline for Blackboard

[Name and number of course and name of instructor]

I. Complete Questionnaires
II. Why Study Statistics?
III. What Will You Learn in this Course?
IV. Introductions
V. Course Structure and Requirements
VI. Administrative Matters
VII. Review this Class

Instructor's Lecture Outline

I. Complete Questionnaires

NOTE: The questionnaire and description of its content are provided in Chapter C of this *Manual.*

A. Distribute questionnaires as students enter classroom.
B. Collect questionnaires when nearly all are done (the remainder can finish during class).
C. Explain briefly content of questionnaire and how it will be used for data for examples throughout the course (see material in Chapter C of this *Manual*).

II. Why Study Statistics?

A. It is required for behavioral and social science majors! But why is it required?
B. Statistical methods are essential tools used in most behavioral and social science research. Therefore:
    1. This course prepares you for later courses, which usually require reading research articles.
    2. This course prepares you for more advanced statistics courses, which equip you to use statistics in research you conduct yourself.
C. This course often meets a general education requirement in quantitative reasoning. But why is there such a requirement, and how does statistics fulfill this requirement?
    1. Social science statistics involves abstract logical and numeric methods.
    2. Mastering these methods develops your ability to think clearly and very precisely about these kinds of abstractions—something every educated person ought to be able to do.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

III. What Will You Learn in this Course?

A. How to *understand* statistical methods. Note: The course is not very math-oriented, but is very logic-oriented.
   1. You will write essays describing statistical procedures as well as carrying them out.
   2. We will emphasize "definitional formulas," which express the concepts, rather than "computational formulas." Computational formulas ease computation but obscure the concepts; they are largely antiquated in the age of computers.

B. Hand out syllabi and systematically go through goals and topics. [An example syllabus is included in Chapter B of this *Manual*.]

IV. Introductions

A. Introduce yourself.
B. Introduce any teaching assistants.
C. Ask students about themselves using the following categories and any others you think are appropriate (if a small class, each introduces self; if a large class, ask students in each category to raise their hands):
   1. What is your major?
   2. Year?

V. Course Structure and Requirements: Read and discuss each section of the syllabus—be sure to discuss any aspects involving using statistics software, any discussion or laboratory sections, and the policies regarding late and missing assignments and missing exams.

VI. Administrative Matters

A. Instructor's and teaching assistants' office hours.
B. Organizational matters such as enrollment, etc., as required by your institution.

VII. Review this Class: Use blackboard outline.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

Lecture 1.2: Basic Concepts and Frequency Tables

Materials

Lecture outline
Transparencies 1.1 through 1.4
Questionnaires (for those who missed first class)
Syllabi (for those who missed first class)

Outline for Blackboard

I. Organizational Matters
II. Roles of Statistics in Research
III. Basic Concepts
IV. Frequency Tables
V. Review this Class

Instructor's Lecture Outline

I. Organizational Matters

A. Be sure each student has a syllabus; answer questions on course structure, etc.
B. Arrange for those who missed the first class to complete the questionnaire.
C. Complete any remaining administrative matters.

II. Roles of Statistics in Research

A. Describe data—"descriptive statistics." Focus of beginning part of course and foundation of rest of course.
B. Make inferences based on data—"inferential statistics." Focus of most of course after beginning, but builds on beginning material.

III. Basic Concepts

A. Variables, values, and scores. Show TRANSPARENCY 1.1 (table of variable, value, and score from text) and discuss:
   1. A person's score is that person's value on the variable.
   2. Example: A 20-year-old has a score of 20 on the variable age; that is, this person's score of 20 is one of many possible values the variable age can have.
B. Kinds of variables. Show TRANSPARENCY 1.2 (table of kinds of variables) and discuss:
   1. Numeric, usually equal interval. Examples: GPA, stress rating, age.
   2. Rank-order. Examples: Class standing, place finished in a race, birth order.
   3. Nominal (categorical). Examples: Gender, religion, marital status.
   4. Emphasize importance—different procedures used for each kind—but that most of this course focuses on the most common kind, numeric.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

IV. Frequency Tables

A. General question: Given a set of numbers, how can we make sense of them? Show TRANSPARENCY 1.3 top (example of data from horn-honking study) and discuss.

B. Show TRANSPARENCY 1.3 middle (frequency table for horn-honking study) and discuss:

1. Key terms:
   a. Frequency: Number of scores with a particular value.
   b. Frequency distribution: The pattern of frequencies over different values.
2. Points in constructing a frequency table:
   a. Go from lowest to highest.
   b. All cases are included.
   c. Percentages.
   d. Sometimes cumulative frequency is included as an additional column.

C. Show TRANSPARENCY 1.4 (steps of making a frequency table).

D. Grouped Frequency Tables

1. Needed to make large distributions more comprehensible.
2. Show how grouped frequency tables are derived. Show TRANSPARENCY 1.3 bottom (grouped frequency table from horn-honking study) and discuss.

V. **Review Class:** Use blackboard outline.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

Lecture 1.3: Describing a Distribution Graphically

Materials

Lecture outline
Transparencies 1.5 through 1.11

Outline for Blackboard

I. Review/Last Assignment
II. Histograms
III. Shapes of Distributions
IV. Review this Class

Instructor's Lecture Outline

I. Review

A. Descriptive statistics.
B. Frequency tables.
C. Kinds of variables.

II. Histograms

A. Purpose: Provides a picture of the distribution.
B. Show TRANSPARENCY 1.5 top (stress-ratings histogram from text) and use it to explain steps of constructing a histogram.

III. Shapes of Distributions

A. Unimodal, bimodal, and rectangular.
   1. Show TRANSPARENCIES 1.6 and 1.7 (examples of these three shapes) and discuss.
   2. Show TRANSPARENCY 1.5 top (histogram of stress-rating examples) and discuss.
B. Symmetric vs. skewed: Show TRANSPARENCIES 1.8 and 1.9 (examples of these shapes from text) and discuss.
C. Normal vs. light-tailed or heavy-tailed distributions.
   1. Show TRANSPARENCY 1.10 (examples of these shapes from text) and discuss.
   2. Show TRANSPARENCY 1.11 (examples of skewed distributions from class questionnaire ratings) and discuss.

IV. **Review this Class:** Use blackboard outline.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.1

TABLE 1-1 Some Basic Terminology

Term	Definition	Examples
Variable	Condition or characteristic that can have different values	Stress level, age, gender, religion
Value	Number or category	0, 1, 2, 3, 4, 25, 85, female, Catholic
Score	A particular person's value on a variable	0, 1, 2, 3, 4, 25, 85, female, Catholic

Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.2

Levels of Measurement

Level	Definition	Example
Equal-interval	Numeric variable in which differences between values correspond to differences in the underlying thing being measured	Stress level, age
Rank-order	Numeric variable in which values correspond to the relative position of things measured	Class standing, position finished in a race
Nominal	Variable in which the values are categories	Gender, religion

Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.3

Interpersonal hostility measured as delay in seconds for 29 cars before honking horn at stalled car after the light has changed to green. (Fictional data based on Kenrick & McFarland, 1986)

3.5, 2.0, 0.0, 5.0, 0.5, 1.0, 4.0, 3.5
3.0, 1.5, 1.5, 2.0, 2.5, 3.0, 3.0, 3.5,
4.5, 2.0, 2.5, 4.5, 4.0, 3.5, 3.0, 2.5,
2.5, 3.5, 3.5, 4.0, 3.0

Frequency Table

	Delay in seconds	Frequency	Percent
0.0-/	0.0	1	3.45
0.5-/	0.5	1	3.45
1.0-/	1.0	1	3.45
1.5-//	1.5	2	6.90
2.0-///	2.0	3	10.35
2.5-////	2.5	4	13.80
3.0-/////	3.0	5	17.25
3.5-//////	3.5	6	20.70
4.0-///	4.0	3	10.35
4.5-//	4.5	2	6.90
5.0-/	5.0	1	3.45

Grouped Frequency Table

Delay in Seconds Interval	Frequency	Percent
0.0–0.9	2	6.90
1.0–1.9	3	10.34
2.0–2.9	7	24.14
3.0–3.9	11	37.93
4.0–4.9	5	17.24
5.0–5.9	1	3.45

Copyright © 2011 Pearson Education, Inc. All rights reserved.

Steps for Making a Frequency Table

❶ Make a list of each possible value down the left edge of a page, starting from the lowest and ending with the highest.

❷ Go one by one through the scores, making a mark for each next to its value on your list.

❸ Make a table showing how many times each value on your list was used.

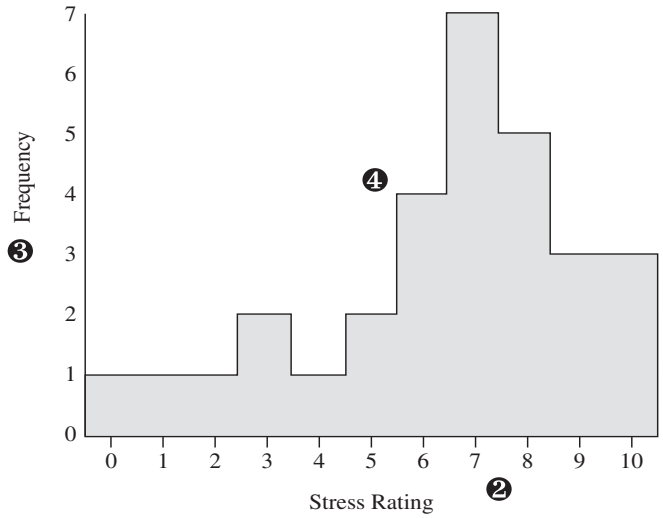
❹ Figure the percentage of scores for each value.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.5

(a) Frequency Table

STRESS RATING ❶	FREQUENCY
0	1
1	1
2	1
3	2
4	1
5	2
6	4
7	7
8	5
9	3
10	3



❶ Make a frequency table.

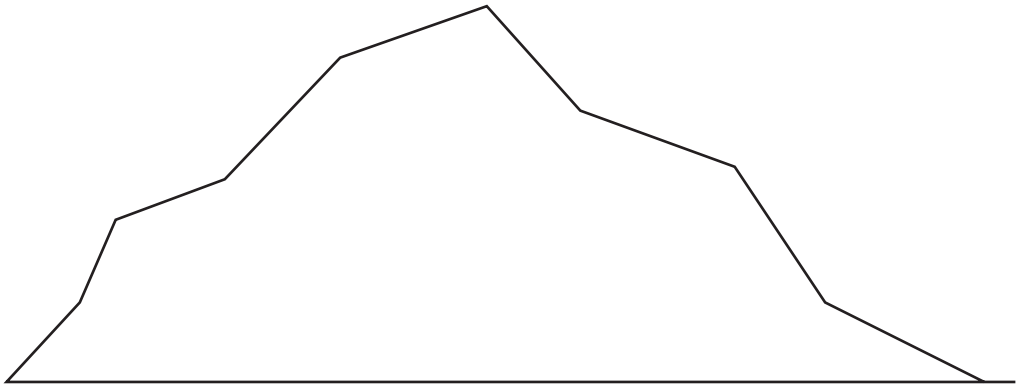
❷ Put the values along the bottom of the page.

❸ Make a scale of frequencies along the left edge of the page.

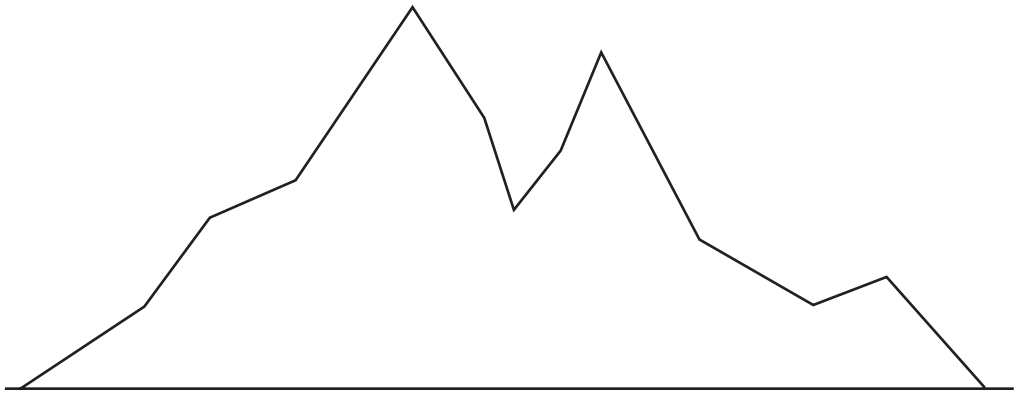
❹ Make a bar for each value.

Copyright © 2011 Pearson Education, Inc. All rights reserved.

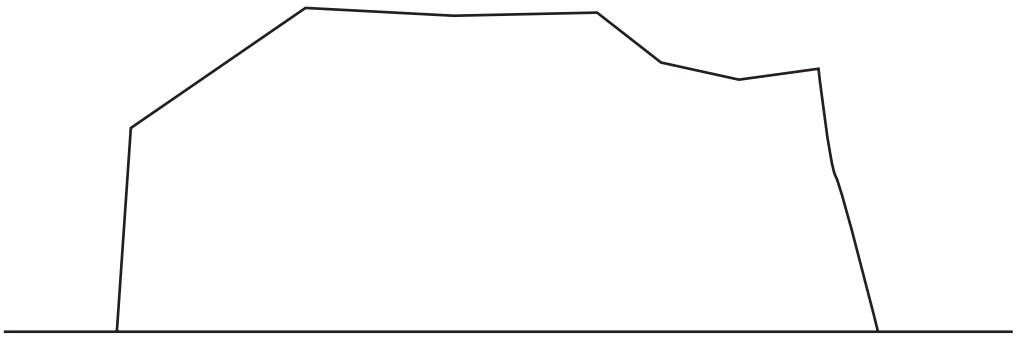
TRANSPARENCY 1.6



(a) Unimodal



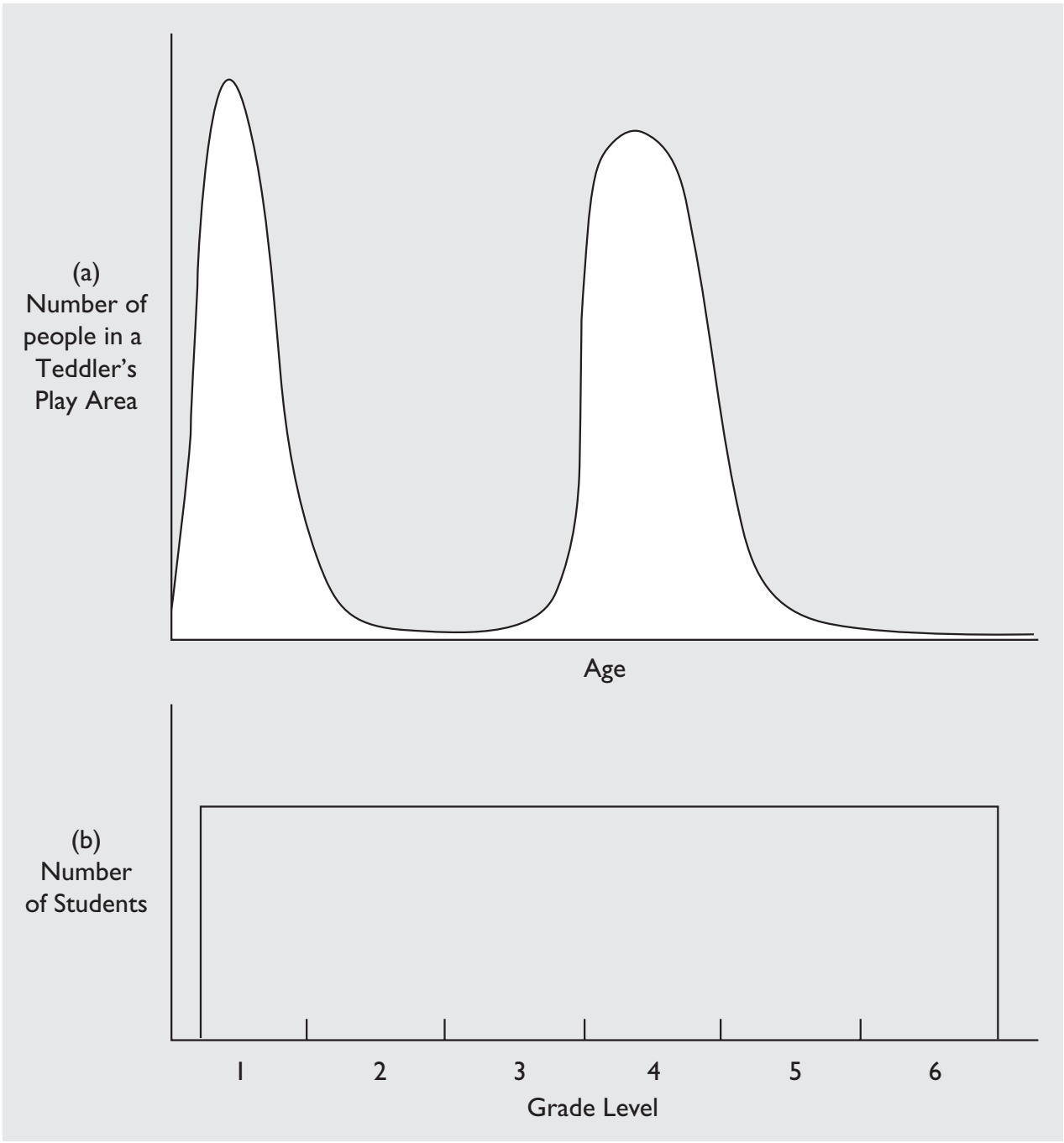
(b) Approximately Bimodal



(c) Approximately Rectangular

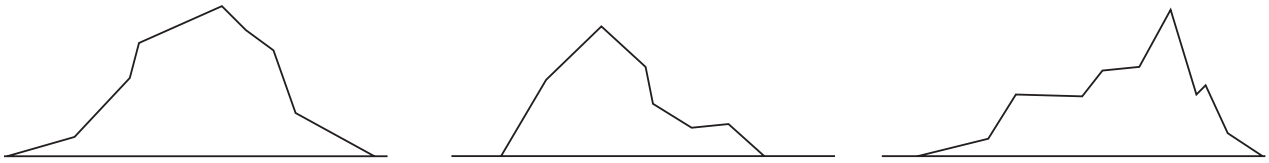
Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.7



Copyright © 2011 Pearson Education, Inc. All rights reserved.

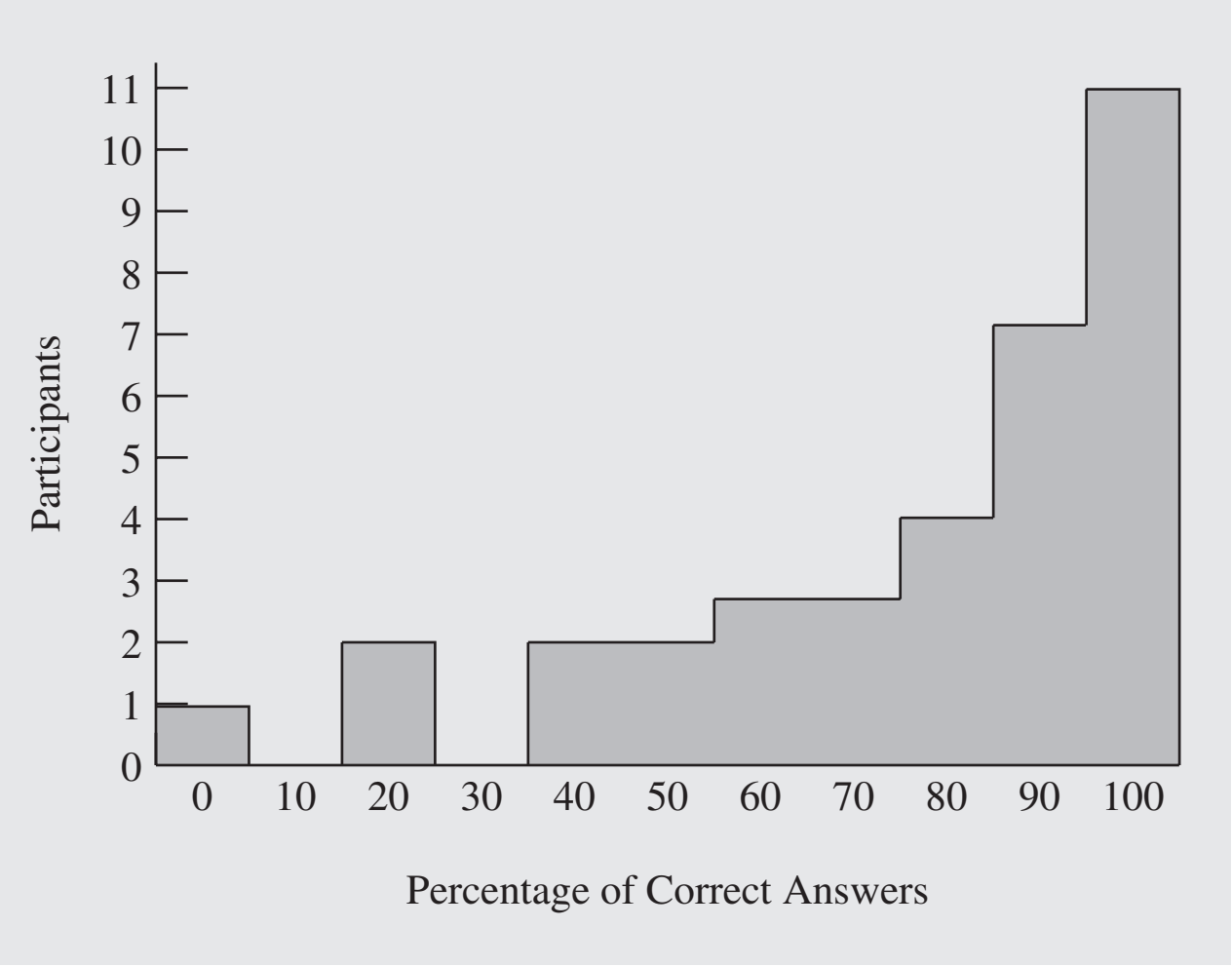
TRANSPARENCY 1.8



(a) (b) (c)

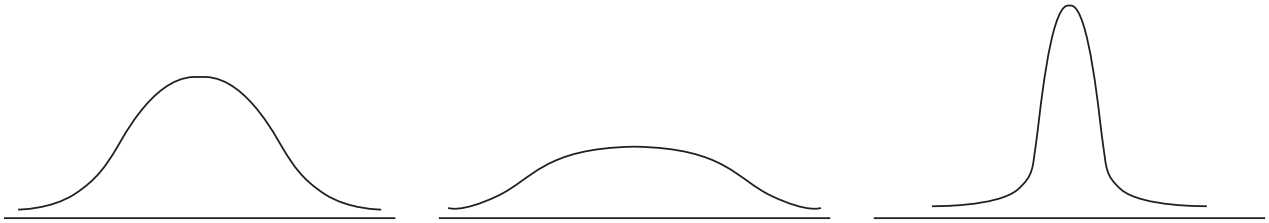
Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.9



Copyright © 2011 Pearson Education, Inc. All rights reserved.

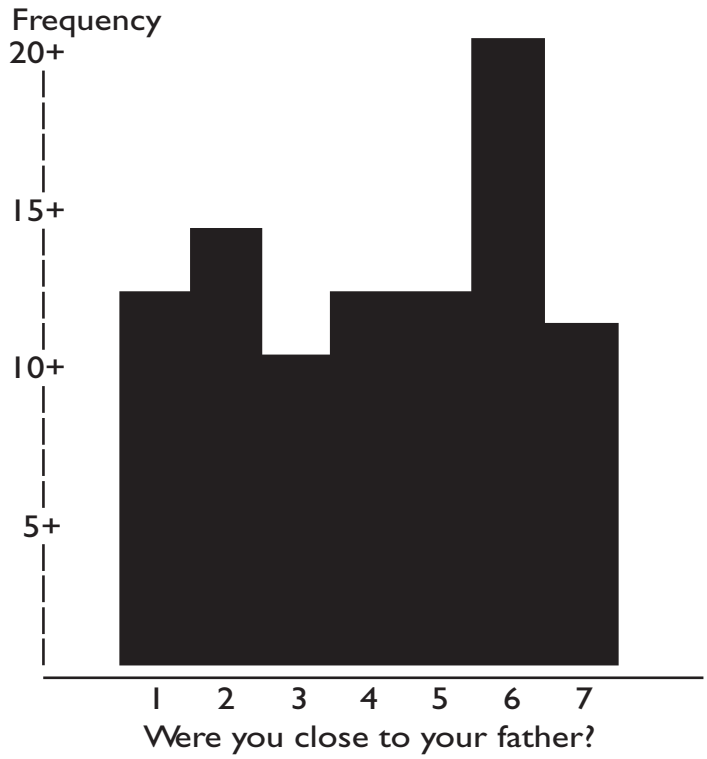
TRANSPARENCY 1.10

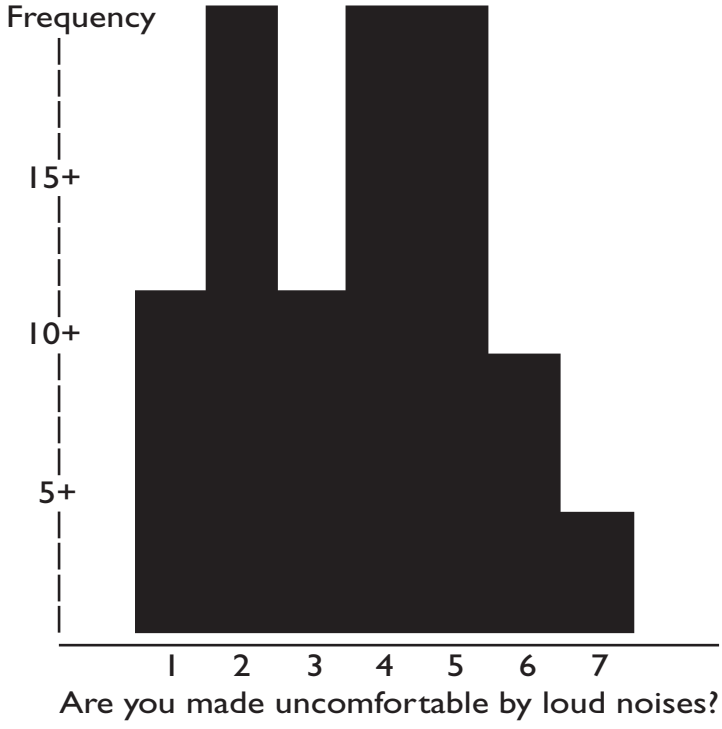


(a) (b) (c)

Copyright © 2011 Pearson Education, Inc. All rights reserved.

TRANSPARENCY 1.11





Copyright © 2011 Pearson Education, Inc. All rights reserved.