

## CHAPTER 2

### Frequency Distributions and Graphs

#### Summary \_\_\_\_\_

When you understand the material in this chapter, you will be able to:

1. organize a set of measurements into a frequency distribution
2. construct an appropriate graph
3. identify graphs by name and recognize the direction of skew, if any

This chapter starts by describing a set of unorganized scores and proceeds with methods of organization techniques of descriptive statistics. The unorganized Personal Control scores were compiled into a *simple frequency distribution* table, which was then further compiled into a *grouped frequency distribution* table. Constructing class intervals for grouped frequency distributions is explained in Appendix B in the textbook.

Graphs are a different (and sometimes superior) way to present frequency distributions and other relationships among variables. Frequency distributions give information about one variable and can be presented as a frequency polygon, a histogram, or a bar graph. *Frequency polygons*, which show data points connected by lines, and *histograms*, which have bars raised to the appropriate frequency, are both used for *quantitative* data. Bar graphs, which have separated bars raised to the appropriate frequency, are used for *qualitative* data. A *line graph* is used to present the relationship between two variables.

Several graphs were described with words and figures. The names for *bell-shaped* curves and *J-curves* are descriptive. *Skewed distributions* are unbalanced in one direction, *bimodal distributions* have two humps, and *rectangular distributions* are flat on top.

Remember the caution in the textbook. Drawing a graph requires effort. Draw a graph with a variety of scales and then choose one that conveys the information best. A poorly designed graph gives a false impression of the scores, but a properly constructed graph allows the reader to see the relationship between variables.

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### Multiple-Choice Questions

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1. The graph that is used to present data on two variables rather than one is the
  - (1) frequency polygon;
  - (2) histogram;
  - (3) bar graph;
  - (4) line graph.
  
2. Assume you give a survey to college students examining attitudes towards dress codes in high schools. Students rate their attitudes on a scale of 1-5. When the data are initially collected, the raw scores could be organized into
  - (1) a grouped frequency distribution;
  - (2) a simple frequency distribution;
  - (3) a  $j$  curve;
  - (4) both (1) and (2).
  
3. The best way to determine if a graph is a histogram or a bar graph is to look at
  - (1) the height of the bars;
  - (2) whether the bars are wide or narrow;
  - (3) the kind of variable on the Y axis;
  - (4) the kind of variable on the X axis.
  
4. To present a frequency distribution of nominal data you should use
  - (1) a frequency polygon;
  - (2) a bar graph;
  - (3) a histogram;
  - (4) a line graph.
  
5. Which of the following is *not* used to present a frequency distribution?
  - (1) bar graph;
  - (2) histogram;
  - (3) frequency polygon;
  - (4) line graph.

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6. In psychology, we sometimes measure parenting style. There tends to be general agreement that there are three main types of parenting style: Authoritarian, authoritative, and permissive. If we surveyed every person at the college and determined parenting style, we could put these data in a frequency distribution. This is a frequency distribution of a(n) \_\_\_\_\_ variable.
- (1) nominal;
  - (2) ordinal;
  - (3) interval;
  - (4) ratio.
7. A distribution with two separated peaks is a \_\_\_\_\_ distribution; one that is severely skewed is a \_\_\_\_\_ distribution.
- (1) J curve; rectangular;
  - (2) rectangular; bimodal;
  - (3) bimodal; J curve;
  - (4) J curve; bell-shaped.
8. The fact that the middle of a series of items is more difficult to learn than the beginning or the end is known as the
- (1) series effect;
  - (2) middling effect;
  - (3) bimodal effect;
  - (4) serial position effect.
9. Suppose a frequency distribution with a range of 0 to 100 was positively skewed. The greatest frequency of scores would be expected around
- (1) 25;
  - (2) 50;
  - (3) 75;
  - (4) any of the above are possible for such a distribution.
10. Skewness refers to
- (1) the shape of the curve;
  - (2) the number of items in the curve;
  - (3) the standard error of the curve;
  - (4) none of the above.

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11. When a curve has a shape with two peaks, it is called
  - (1) normal;
  - (2) skewed;
  - (3) rectangular;
  - (4) bimodal.
  
12. The horizontal axis of a graph for a frequency distribution is called
  - (1) a line graph;
  - (2) the ordinate;
  - (3) the abscissa;
  - (4) a histogram.
  
13. Assume you collect data from psychology majors who indicate their favorite class in psychology. Students choose from five classes. What kind of graph should you use to display the data?
  - (1) histogram;
  - (2) bar graph;
  - (3) line graph;
  - (4) not enough information to answer this question.
  
14. Grouped frequency distributions and simple frequency distributions differ in
  - (1) the type of data displayed;
  - (2) the range of scores covered by the distribution;
  - (3) the conclusions that can be drawn about skewness;
  - (4) all of the above.
  
15. Graphs are popular because they
  - (1) allow comparisons to other studies when designing a project;
  - (2) help guide future research;
  - (3) serve as a clear description of previous research;
  - (4) all of the above.

### Short-Answer Questions \_\_\_\_\_

1. In four sentences, distinguish among the frequency polygon, the histogram, the line graph, and the bar graph.

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2. For each situation, decide which of the four types of graphs is most appropriate. After your answer, write your reason.
- a telephone poll of 100 houses to determine what TV show the person is watching;
  - a telephone poll of 100 houses to determine household income;
  - average number of hospital admissions for each day of the week in New York City;
  - numbers reported by each member of a large sociology class when asked, "How many close friends do you have?"
  - number of correct answers on a psychology exam;
  - income level of people who score high on an IQ test.
  - attendance figures at a political debate, a ballet, a dramatic production, and a rock concert, all of which were held on the same night;
  - number of calories you consumed over a four-week period;
  - number of people entering a museum each hour it is open;
  - number of people entering each of four pizza restaurants during one hour.

### Problems \_\_\_\_\_

- For each distribution of scores, 1) compile a simple frequency distribution, and 2) identify the shape of the distribution or the direction of skew.
  - 9, 10, 9, 9, 11, 9, 10, 9, 9, 10
  - 5, 4, 2, 1, 6, 5, 3, 2, 4, 2, 5, 5, 2
- For each distribution of scores, 1) compile a simple frequency distribution, and 2) identify the shape of the distribution of skew, if any.
  - 9, 11, 12, 10, 12, 11, 8, 12, 10, 11, 12
  - 8, 7, 7, 9, 5, 7, 7, 8, 6, 6, 7, 7
- A small group of people in a college town set out to promote greater use of bicycles. One member of the group was eager to measure any progress. Before any promotion activity, she assessed five different modes of transportation by asking people how they got to work or school that morning. Responses were scored as auto---0, bicycle---1, motorcycle---2,

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walk---3, bus---4. Arrange the scores into an appropriate frequency distribution and graph it. Write a sentence or two explaining what your analysis shows.

4	1	0	0	3	0	2	0	4	0
3	1	0	4	0	0	0	2	0	0
0	0	2	0	0	4	0	0	2	0
1	0	4	0	3	0	0	4	0	2

4. The numbers in this problem are weights in pounds of Americans aged 20-29 (<http://usmilitary.about.com/library/milinfo/blcgweightmale.htm>, retrieved, April 27, 2004). Compile one grouped frequency distribution for males and another for females. In both distributions use  $i = 9$ . For men the highest class interval is 237-245 pounds. For women the highest class interval is 217-225 pounds. Graph the men's weights using a histogram and the women's weights using a frequency polygon.

Men:

160	177	132	195	175	157	217	168	168	150
164	172	200	148	122	184	190	130	140	172
181	231	150	178	112	170	161	125	244	165
211	154	137	182	190					

Women:

140	152	129	135	118	159	134	114	146	172
162	132	138	101	140	164	124	123	201	133
124	132	168	154	121	95	142	130	218	151
110	136	191	128	118					

5. The American Psychological Association (*Graduate Study in Psychology*, 2004) publishes a book describing various graduate programs around the country. A random sample of GRE (Graduate Record Exam) scores for admission to clinical Ph.D. programs reveals the following numbers. Construct the appropriate distribution to display the data.

1240, 1210, 1259, 1260, 1225, 1268, 1190, 1150, 1176, 1390, 1150, 1235