GLOBAL EDITION

Marketing Research

An Applied Orientation

SEVENTH EDITION

Naresh K. Malhotra

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would you recommend? Why would you recommend this type of design?

5. If a duck commercial is to tested against two nonduck commercials to determine which ad generates more favorable attitudes toward Aflac, what type of experimental design would you recommend?

References

1. http://www.aflac.com, accessed February 20, 2017.
2. http://www.wikipedia.org, accessed February 20, 2017.
3. Suzanne Vranica, "AFLAC Duck's Paddle to Stardom: Creativity on the Cheap," *Wall Street Journal* (July 30, 2004): B1–B2.

CHAPTER

8 Measurement and Scaling: Fundamentals and Comparative Scaling

"When we analyze research results, we must believe that the measurements provide realistic representations of opinions and behaviors and properly capture how a respondent's data relate to all other respondents."

Tim Hoskins, President, Quester

Courtesy of Tim Hoskins

Objectives

After reading this chapter, the student should be able to:

- **8.1** Introduce the concepts of measurement and scaling and show how scaling may be considered an extension of measurement.
- **8.2** Explain the characteristics of description, order, distance, and origin and how they define the level of measurement of a scale.
- **8.3** Discuss the primary scales of measurement and differentiate nominal, ordinal, interval, and ratio scales.
- **8.4** Classify and discuss scaling techniques as comparative and noncomparative, and describe the comparative techniques of paired comparison, rank order, constant sum, and Q-sort scaling.
- **8.5** Discuss the considerations involved in implementing the primary scales of measurement in an international setting.
- **8.6** Explain how social media can be used to implement measurement and scaling.
- **8.7** Elucidate the implementation of primary and comparative scales in mobile marketing research.
- **8.8** Understand the ethical issues involved in selecting scales of measurement.

Overview

Once the type of research design has been determined (Chapters 3 through 7) and the information to be obtained specified, the researcher can move on to the next phase of the research design: deciding on measurement and scaling procedures. In this chapter, we describe the concepts of scaling and measurement and explain the fundamental scale characteristics of description, order, distance, and origin. We discuss four primary scales of measurement: nominal, ordinal, interval, and ratio. We next describe both comparative and noncomparative scaling techniques and explain comparative techniques in detail. Noncomparative techniques are covered in Chapter 9. The considerations involved in implementing the primary scales of measurement when researching international markets, using social media, and conducting mobile marketing research are explained. Several ethical issues that arise in measurement and scaling are identified.

Real Research

The World's and America's Most Admired Companies

The value of the World's Most Admired Companies rankings, as with *Fortune*'s list of America's most admired, lies in their having been bestowed by the people who are closest to the action: senior executives and outside directors in each industry, and financial analysts who are in a position to study and compare the competitors in each field. *Fortune* asked them to rate companies on the eight criteria used to rank America's most admired: innovativeness, overall quality of management, value as a long-term investment, responsibility to the community and the environment, ability to attract and keep talented people, quality of products or services, financial soundness, and wise use of corporate assets. For global ranking, *Fortune* added another criterion to reflect international scope: a company's effectiveness in doing business globally. A company's overall ranking is based on the average of the scores of all criteria attributes. The 2017 top two World's Most Admired Companies were Apple and Amazon.com, in that order, and all top ten companies were U.S. companies, as can be seen from the table that follows.

ID	Company	Rank
A	Apple, U.S.	1
B	Amazon.com, U.S.	2
C	Starbucks, U.S.	3
D	Berkshire Hathaway, U.S.	4
E	Walt Disney, U.S.	5
F	Alphabet, U.S.	6
G	General Electric, U.S.	7
H	Southwest Airlines, U.S.	8
I	Facebook, U.S.	9
J	Microsoft, U.S.	9

In this example, the ID alphabets used to identify the companies represent a nominal scale. Thus, "E" denotes Walt Disney and "F" refers to Alphabet. The ranks represent an ordinal scale. Thus, General Electric, rank 7, received higher evaluations than Southwest Airlines, rank 8. The company score, the average rating on all the criteria attributes, represents an interval scale. These scores are not shown in the table. Finally, the annual revenue for these companies, also not shown, represents a ratio scale.[1]

Ian Dagnall Commercial Collection/Alamy Stock Photo

Measurement and Scaling

measurement
The assignment of numbers or other symbols to characteristics of objects according to certain prespecified rules.

Measurement means assigning numbers or other symbols to characteristics of objects according to certain prespecified rules.[2] Note that what we measure is not the object but some characteristic of it. Thus, we do not measure consumers—only their perceptions, attitudes, preferences, or other relevant characteristics. In marketing research, numbers are usually assigned for one of two reasons. First, numbers permit statistical analysis of the resulting data. Second, numbers facilitate the communication of measurement rules and results.

The most important aspect of measurement is the specification of rules for assigning numbers to the characteristics. The assignment process must be isomorphic: There must be one-to-one correspondence between the numbers and the characteristics being measured. For example, the same dollar figures are assigned to households with identical annual incomes. Only then can the numbers be associated with specific characteristics of the measured object, and vice versa. In addition, the rules for assigning numbers should be standardized and applied uniformly. They must not change over objects or time.

scaling
The generation of a continuum upon which measured objects are located.

Scaling may be considered an extension of measurement. **Scaling** involves creating a continuum upon which measured objects are located. To illustrate, consider a scale from 1 to 100 for locating consumers according to the characteristic "attitude toward department stores." Each respondent is assigned a number from 1 to 100 indicating the degree of (un)favorableness, with 1 = Extremely unfavorable to 100 = Extremely favorable. Measurement is the actual assignment of a number from 1 to 100 to each respondent. Scaling is the process of placing the respondents on a continuum with respect to their attitude toward department stores. In the opening example of most admired companies, the assignment of numbers to reflect the annual revenue was an example of measurement. The placement of individual companies on the annual revenue continuum was scaling.

Scale Characteristics and Levels of Measurement

The level of measurement denotes what properties of an object the scale is measuring or not measuring. An understanding of the scale characteristics is fundamental to understanding the primary type of scales. All the scales that we use in marketing research can be described in terms of four basic characteristics: description, order, distance, and origin. Together they define the level of measurement of a scale.

Description

description
The unique labels or descriptors that are used to designate each value of the scale; all scales possess description.

By **description**, we mean the unique labels or descriptors that are used to designate each value of the scale. Some examples of descriptors are as follows: 1. Female, 2. Male; 1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Strongly agree; and the number of dollars earned annually by a household. To amplify, Female and Male are unique descriptors used to describe values 1 and 2 of the gender scale. It is important to remember that all scales possess this characteristic of description. Thus, all scales have unique labels or descriptors that are used to define the scale values or response options.

Order

order
The relative sizes or positions of the descriptors on a scale; order is denoted by descriptors such as greater than, less than, and equal to.

By **order**, we mean the relative sizes or positions of the descriptors. There are no absolute values associated with order, only relative values. Order is denoted by descriptors such as "greater than," "less than," and "equal to." For example, a respondent's preference for three brands of athletic shoes is expressed by the following order, with the most preferred brand being listed first and the least preferred brand last.

Nike

New Balance

Adidas

For this respondent, the preference for Nike is greater than the preference for New Balance. Likewise, the preference for Adidas is less than the preference for New Balance. Respondents who check the same age category, say 35 to 49, are considered to be equal to each other in terms

of age, and greater (older) than respondents in the 20 to 34 age group. All scales do not possess the order characteristic. In the gender scale (1. Female, 2. Male) considered earlier, we have no way of determining whether a female is greater than or less than a male. Thus, the gender scale does not possess order.

Distance

distance
Characteristic of scales indicating that absolute differences between the scale descriptors are known and may be expressed in units.

The characteristic of **distance** means that absolute differences between the scale descriptors are known and may be expressed in units. A five-person household has one person more than a four-person household, which in turn has one person more than a three-person household. Thus, the following scale possesses the distance characteristic.

Number of persons living in your household _____

Notice, that a scale that has distance also has order. We know that a five-person household is greater than the four-person household in terms of the number of persons living in the household. Likewise, a three-person household is less than a four-person household. Thus, distance implies order but the reverse may not be true.

Origin

origin
Characteristic of scales indicating that the scale has a unique or fixed beginning or true zero point.

The **origin** characteristic means that the scale has a unique or fixed beginning or true zero point. Thus, an exact measurement of income by a scale such as: What is the annual income of your household before taxes? $ _____ has a fixed origin or a true zero point. An answer of zero would mean that the household has no income at all. A scale that has origin also has distance (and order and description). Many scales used in marketing research do not have a fixed origin or true zero point, as in the disagree-agree scale considered earlier. Notice that such a scale was defined as 1 = Strongly disagree, 2 = Disagree, 3 = Neither agree nor disagree, 4 = Agree, and 5 = Strongly agree. However, 1 is an arbitrary origin or starting point. This scale could just as easily have been defined as 0 = Strongly disagree, 1 = Disagree, 2 = Neither agree nor disagree, 3 = Agree, and 4 = Strongly agree, with 0 as the origin. Alternatively, shifting the origin to −2 will result in an equivalent scale: −2 = Strongly disagree, −1 = Disagree, 0 = Neither agree nor disagree, 1 = Agree, and 2 = Strongly agree. All these three forms of the agree-disagree scale, with the origin at 1, 0, or –2, are equivalent. Thus, this scale does not have a fixed origin or a true zero point and, consequently, does not possess the characteristic of origin.

You may have observed that description, order, distance, and origin represent successively higher-level characteristics, with origin being the highest-level characteristic. Description is the most basic characteristic that is present in all scales. If a scale has order, it also has description. If a scale has distance, it also has order and description. Finally, a scale that has origin also has distance, order, and description. Thus, if a scale has a higher-level characteristic, it also has all the lower-level characteristics. However, the reverse may not be true; that is, if a scale has a lower-level characteristic, it may or may not have a higher-level characteristic. With an understanding of scale characteristics, we are ready to discuss the primary type of scales.

Primary Scales of Measurement

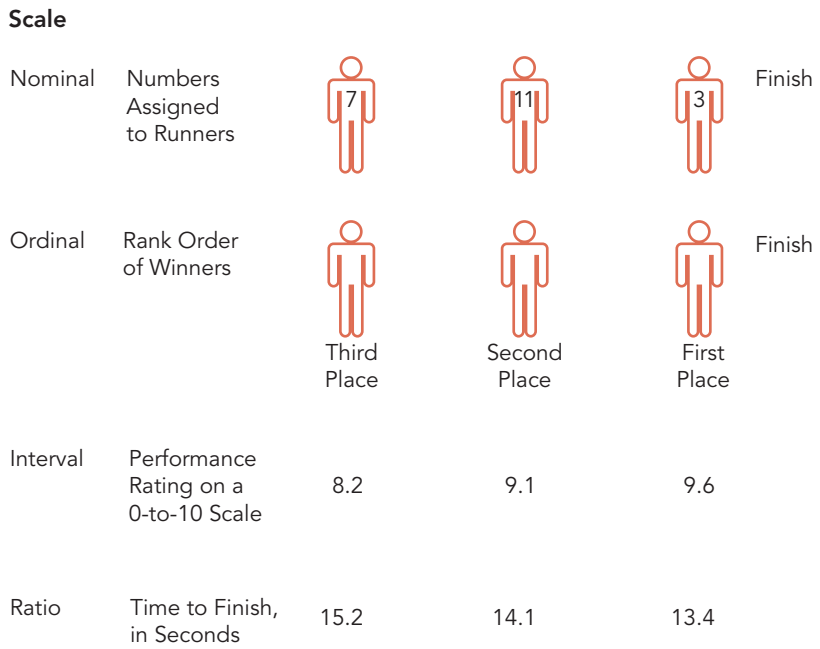
There are four primary scales of measurement: nominal, ordinal, interval, and ratio.[3] These scales are illustrated in Figure 8.1, and their properties are summarized in Table 8.1 and discussed in the following sections.

Nominal Scale

nominal scale
A scale whose numbers serve only as labels or tags for identifying and classifying objects with a strict one-to-one correspondence between the numbers and the objects.

A **nominal scale** is a figurative labeling scheme in which the numbers serve only as labels or tags for identifying and classifying objects. The only characteristic possessed by these scales is description. For example, the numbers assigned to the respondents in a study constitute a nominal scale. When a nominal scale is used for the purpose of identification, there is a strict one-to-one correspondence between the numbers and the objects. Each number is assigned to only one object and each object has only one number assigned to it. Common examples include Social Security numbers and numbers assigned to football players. In marketing research, nominal scales are used for identifying respondents, brands, attributes, stores, and other objects.

FIGURE 8.1
An Illustration of Primary Scales of Measurement



When used for classification purposes, the nominally scaled numbers serve as labels for classes or categories. For example, you might classify the control group as group 1 and the experimental group as group 2. The classes are mutually exclusive and collectively exhaustive. The objects in each class are viewed as equivalent with respect to the characteristic represented by the nominal number. All objects in the same class have the same number and no two classes have the same number. However, a nominal scale need not involve the assignment of numbers; alphabets or symbols could be assigned as well. In the opening example, alphabets were assigned to denote specific companies.

The numbers in a nominal scale do not reflect the amount of the characteristic possessed by the objects. For example, a high Social Security number does not imply that the person is in some way superior to those with lower Social Security numbers or vice versa. The same applies to numbers assigned to classes. The only permissible operation on the numbers in a nominal scale is

TABLE 8.1
Primary Scales of Measurement

				Permissible Statistics	
Scale	Basic Characteristics	Common Examples	Marketing Examples	Descriptive	Inferential
Nominal	Numbers identify and classify objects	Social Security numbers, numbering of football players	Brand numbers, store types, sex classification	Percentages, mode	Chi-square, binomial test
Ordinal	Numbers indicate the relative positions of the objects but not the magnitude of differences between them	Quality rankings, rankings of teams in a tournament	Preference rankings, market position, social class	Percentile, median	Rank-order correlation, Friedman ANOVA
Interval	Differences between objects can be compared; zero point is arbitrary	Temperature (Fahrenheit, centigrade)	Attitudes, opinions, index numbers	Range, mean, standard deviation	Product-moment correlations, t-tests, ANOVA, regression, factor analysis
Ratio	Zero point is fixed; ratios of scale values can be computed	Length, weight	Age, income, costs, sales, market shares	Geometric mean, harmonic mean	Coefficient of variation