

3.2: Mode

The **mode** refers to the number or response which occurs most frequently. The mode can be used to summarize quantitative or qualitative data. This makes it more flexible than the median and the mean. In this section the terms “numbers,” “scores,” or “quantitative responses” will be used to refer to quantitative data and the terms “qualitative responses” or “categories” will be used to refer to qualitative data.

There are three important rules to finding the mode:

1. The data must be varied rather than constant.
2. The mode must be the number or qualitative response that occurred the most frequently.
3. The mode must be a number or qualitative response that occurred more than once.

When these three criteria are not met, there is no discernable mode. In this case we can report the results as follows: “There was no mode.” If the first rule is not met, a mode should not be reported. Instead, it should be stated that the data were constant. If the third rule is not met, providing a mode would be useless. This is because all raw score are the mode when rule three is not met and, thus, we would simply be restating the full data set as the mode. When this occurs no simplicity or reduction of information is being gained through reporting the mode.

Sometimes the second criteria is met by two different scores or responses. When this occurs both are considered the mode. If the second criteria is met by three different scores or responses, then all three are considered the mode. Thus, it is possible to have multiple modes in which case all are reported together to as the mode when summarizing a data set.

Modality

If you have data in which two numbers or qualitative responses occur more than once and equally often, your dataset has two modes and is referred to specifically as *bimodal*. If two or more such numbers or qualitative responses occur, you can refer to the data more generally as *multimodal*. Data are often expected to be unimodal for reasons which will be covered in Chapter 5. For now, our focus is on identifying modes and modalities.

Modality

Modality can be defined as the way the data conform to a mode. In other words, the modality is how the mode is seen or experienced. There are different modalities that can be observed in a dataset. Sometimes there is only one mode for a dataset, other times there may be two, three, four, or even one hundred modes! Specific terms are used to refer to the modality of a dataset.

- *Unimodal* means there is only one mode.
- *Bimodal* means there are two modes.
- *Trimodal* means there are three modes.
- *Multimodal* is a broad term that means that there is more than one mode.

Multimodal is often used whenever there are more than three modes but it can also be used in place of bimodal or trimodal.

The Mode for Quantitative Data

The mode is found for quantitative data using the three important rules. Look back to Data Set 3.1 and use the three rules to try to deduce whether there is a mode and, if so, what the mode is.

1. The data were not all the same.
2. The number that appeared the most often was 29.
3. This number occurred more than once.

The mode for age in Data Set 3.1, therefore, is 29. This is considered unimodal meaning there is one (uni) mode. The symbol often used for the mode is *Mo*. The same symbol is used when reporting the mode for a sample as a mode for a population. In addition, APA-format dictates that values should be rounded and reported to the hundredths place in most circumstances. Therefore, the mode for age should be shown to the hundredths place. Therefore, the result for the mode can be written using symbols as:

$$Mo = 29.00$$

The Mode for Qualitative Data

The mode is a bit special because it can be used with many different kinds of data, including qualitative data which are on the nominal scale of measurement. Recall that nominal data refer to responses that represent categories or characteristics rather than amounts. For example, we may want to know what various students chose as their majors. Major is not represented with numbers; instead, it is represented with a word or group of words (such as psychology, nursing, mathematics, biology, child development, or media production). These kinds of data are referred to as *nominal* which means “name.” This makes sense if you think about the fact that when people are asked their majors, which is nominal, they respond by providing the name of their majors.

Data Set 3.2

Gender
Female
Male
Male
Female
Transgender
Transgender
Male
Male

The mode is great for summarizing nominal data. Take a look at Data Set 3.2. These data represent the genders of 8 individuals. Gender data are nominal data because they cannot be meaningfully represented in numbers. Notice that words are used to represent the data for gender. Use the three rules for finding the mode to answer the question: What is the *mode* for Gender in Data Set 3.2?

1. The data were not all the same.
2. The qualitative response that appeared the most often was *Male*.
3. This qualitative response occurred more than once.

Thus, the mode is Male. This is considered *unimodal* because there is only one mode for gender. We can also write this using the symbol for mode as:

$$Mo = \text{Male}$$

Reading Review 3.1

1. What are the two competing goals statisticians consider when creating summaries?
2. What are the three rules to finding a mode?
3. Find the sample size, mode, and modality for each dataset:

Daily Hours of T.V.			
8.00	4.25	0.00	5.75
3.50	1.00	6.25	7.00
1.00	5.50	4.00	2.00
2.50	0.00	3.50	4.00
0.00	4.00	1.50	0.50
5.00	2.50	2.75	10.00
4.00	3.50	0.00	1.00
0.00	1.25	4.00	2.00

Test Scores	
96	82

Test Scores	
94	80
91	79
90	73
89	71
88	65
85	52
84	47

Favorite Dessert
Oatmeal Cookies
Fruit
Chocolate Cake
Carrot Cake
Chocolate Cake
Ice Cream
Apple Pie
Chocolate Cake
Brownies

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