M & M Activity: Variability and central tendency

This little activity is designed to help you understand concepts related to variability and central tendency – and, it will give you an excuse to buy one of those king-sized bags of M&M's – because you deserve it! So… go get yourself a bag of M&M's (if you like plain, use a teaspoon – if you'd rather have peanut then you'll have to use a tablespoon – just go with it, you'll get what I mean!). Once you have your M&M's, get the appropriate spoon and follow along with the instructions! Enjoy!

1. The first thing you need to do is scoop up a spoonful of M&M's – trying to get as many on the spoon as you can. Repeat this procedure 20 times (you will, of course, have to replace the M&M's in the bag every time so you don't run out – unless you bought a really big bag!). Record the # of M&M's you scooped out each time on the chart below:

n	X
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12.	
13.	
14.	
15.	
16.	
17.	
18.	
19.	
20.	

2. What do you notice about the distribution of numbers? Do they seem to be clustered around a particular number? Is there a big range between the highest and lowest number? Figure the median, mode, and range of your distribution:

   Median = Mode = Range =

3. Calculate the mean for the distribution.

   Mean =

4. I used to think median and mode were dumb descriptors of scores but the example at the top of pg. 416 about salaries helped me see why it can matter which one gets reported – they can be intentionally misleading! Does one of these do a better job describing the central tendency of the distribution? Which one and why?

5. A frequency polygon (or a frequency distribution) is one way we can visually represent a distribution of scores. Check out the frequency distribution I made below for the following scores. First, I put the raw numbers along a number line from lowest to highest, then I made an X every time that score appeared in the distribution. Finally, I drew a "best fit" line over the top of the distribution to get a sense of the "curve" or the shape of the distribution. After taking a look at my example, make a frequency distribution for your M&M's scores.

6. Would your curve look differently if you plotted scores in a range – say all scores between 16-20 in one spot, all scores between 21-25 the next spot, and all scores between 26-30 in the next? Try it and see. What happens to the shape of the curve?

7. Go back to your original frequency distribution and ask yourself if your scores seem to be normally distributed – why or why not (see pg. 418). If the curve is skewed, describe how.

8. Describe the range for these scores. Looking at the range, predict what you think the standard deviation will be.

   Range = Predicted standard deviation =

9. Describe in your own words what the standard deviation is – what does it mean?

10. Calculate the standard deviation (see pg. 429): Stick with it, this is a tough one but you can do it – just takes time and patience. Use my example as a guide – but use your own numbers from your M&M's!

Assume that our scores (# of M&M's) were normally distributed, and using the figure on pg. 419, answer the following questions:

11. What number of M&M's would have a z-score of zero? What does a z-score mean?

12. Say you scooped another spoonful and got 26 M&M's. Convert the raw score into a z-score (see formula on pg. 424). Approximately what percentage of additional scoops would yield a number less than 26?

13. With 95% confidence, predict the number of M&M's on the next spoonful (between what number and what number). Describe how you can say this.

14. What percentage chance is there of coming up with a number equaling –1 standard deviation from the mean or less?

15. If you scooped another spoonful, the number of M&M's on that spoonful would most likely fall in which stanine? How do you know?

16. Why is standard deviation always reported with the mean – never in isolation?

17. In a normal distribution, what is the relationship of the mean, median, and mode?