

## Statistics

### Random Samples & Beyonce's Crazy in Love

When Beyonce's hit "[Crazy in Love](#)" came out, people started questioning whether or not she had written the lyrics. In a Vanity Fair article, Beyonce came back at them:

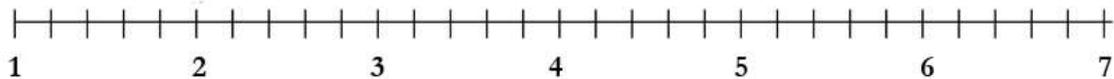
*"Crazy in Love' was really hard to write because there was so much going on ... I mean, I had written — what? — seven, eight number one songs with Destiny's Child, in a row."*

So how do we use statistics to determine if Beyonce wrote the lyrics to "Crazy in Love"?

It is well known that different authors use different styles and word choice. It turns out that the average word length is fairly consistent for each author and can be used as a way to distinguish one author from another. Since we know for sure that Beyonce wrote the lyrics for all of the Destiny's Child songs (average word length 3.64), we should be able to determine her possible authorship of "Crazy in Love" by finding the average word length.

But we don't have time to find the actual word length for all of the words in "Crazy in Love" (population). Instead, we will pick 5 words (sample). The first sampling method will be the "quickly circle 5 words" method (convenience sample).

1. **Quickly** circle a random sample of 5 words (don't over think it, it should only take 20 seconds to choose your 5 words). Write them below. How many letters in each word?
  
  
  
  
  
  
  
  
  
  
2. What is the average word length of your sample?
  
  
  
  
  
  
  
  
  
  
3. Put your average on the dotplot on the white board at the front of the room. Copy the class dotplot below.

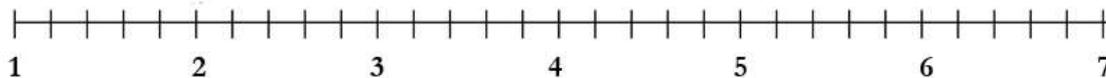


4. Use your calculator to find the 5-Number summary, mean, and standard deviation for the dotplot above
  
  
  
  
  
  
  
  
  
  
5. Describe the dotplot using (SOCS in context)

The type of sample that you just took was a “convenience sample.” It is called a convenience sample because you choose the words without a system or random numbers. You choose numbers that were “convenient”. Now we will look at a “simple random sample” and how it will be different than the convenience sample.

Crazy in Love has 297 words. Use your calculator to find 5 random numbers between 1 and 297.

6. List your 5 random numbers and their corresponding words (ask the sub for the word number list).
  
7. Find the average word length of your sample.
  
8. Put your average on the dotplot on the white board at the front of the room. Copy the class dotplot below.



9. Use your calculator to find the 5-Number summary, mean, and standard deviation for the dotplot above
  
10. Describe the dotplot using (SOCS in context)
  
11. How is the dotplot from #3 different than the dotplot for #8? Which do you think is a better estimator of the true mean word length?
  
12. What do you think the true mean word length is for “Crazy in Love”?
  
13. It is known that Beyonce wrote the lyrics for all of the Destiny’s child songs. The average word length for these songs is 3.64 letters. Based on your samples, do you have good evidence that Beyonce did not write the lyrics for “Crazy in Love.” Explain.