Title: Is there a gender gap on the math and science portion of standardized tests?

# Introduction:

There seems to be an ongoing debate about whether performance gaps between boys and girls on the math and science portions of standardized tests can be attributed to innate intelligence, or societal prejudices (Bryner, 2006). There is also scientific research that shows brains and brain development are different between girls and boys (WebMD, 2005). Being a father of two girls, I would like to see how this debate plays out in the test scores from San Diego County schools. Is there a performance gap between boys and girls K-12 on the science portion of standardized tests and if there is, what demographics most strongly influence the difference? Is this gap affected by age? Is the gap affected by the community surrounding the school? In order to answer this question, we propose taking the results of standardized test scores across San Diego County (California Department of Education, 2012) and merging those with demographics information from the Census bureau[[1]](#footnote-1). By gaining a better understanding of this question, our schools will be better equipped to help our children get the most out of their education.

# Methods:

## Data Collection

Data from two sources will be used: San Diego County test scores (California Department of Education, 2012) and census demographic information from <http://nces.ed.gov/surveys/sdds/>[[2]](#footnote-2).

The data is provided in csv files that will be read directly into R. After the data is appropriately cleaned, the two sets will be merged by zip code.

At this point, from the test scores data we will have results broken down by school, then further characterized by ethnicity, gender, and parent education. From the census information, we will add information about the surrounding community such as average income, and typical household configuration.

## R vs Python

Both of the data files I am using are csv files. In this case I find it easier to use R to read in the data since I am planning on working with data frames and I do not expect to do much text processing in the data cleaning. If gathering the data involved screen scraping or web crawling of some kind, then I would prefer to do that in python.

# Expected results

First I want to see if there really is a gender gap in science scores. If there is, can that variation be explained by cultural norms? Some research suggests that "… when it comes to math, the brain of a 12-year-old girl resembles that of an 8-year-old boy." (WebMD, 2005) If this is reflected in test scores we would expect to see an offset in performance caused by age and we would expect that offset to show up regardless of other characteristics. Bringing in the community information, we can attempt to determine what affect the community has on the subgroups within the school. For instance, we *might* expect to see all groups perform better in areas where the average income is higher, however, if the average household income is higher because there is a larger percentage of dual income families, those families may have less time to focus on reinforcing a child’s education at home which *might* actually have the opposite effect of decreasing test scores.

Another possible learning vector could be to study the outliers in the data. For instance, if we find that generally, Hispanic girls in high income neighborhoods are outperforming Hispanic girls in low income neighborhoods, yet we see a particular school in a low income neighborhood where Hispanic girls are performing very well, we might want to look closer at what that school is doing differently and apply that to other schools.

# References

Bryner, J., 2006. *Men Smarter than Women, Scientist Claims.* [Online]   
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[Accessed 6 10 2013].

1. At present, I am unable to access Census data due to the government shutdown. [↑](#footnote-ref-1)
2. This looks to be the most promising source, but I will know more when I can access it! [↑](#footnote-ref-2)