Ben Wasserman

My name is Ben Wasserman, and I conducted a study on the effect of language structure on people's sexist attitudes entitled ¿Qué? Quoi? Do Languages with Grammatical Gender Promote Sexist Attitudes?

I made two decisions before the start of 10th grade that had a great impact on the research project that I eventually submitted to the Intel Science Talent Search among other competitions. First was the decision to do something that few other sophomores were doing at that time: taking AP Psychology. The topic of psychology always interested me, and I wanted to take a course that would allow me to explore the way in which people think, develop, and act.

The second decision was the decision to conduct social science research at my high school. I have always been driven by what I did not know, and I thought it was a good idea to utilize the resources that I had in high school to discover something that interested me. During my sophomore year, I learned about Benjamin Whorf and Edward Sapir's linguistic relativity hypothesis in my AP Psychology course. The linguistic relativity hypothesis is the idea that language determines thought. I learned that there were many studies that showed that certain peoples thought in different ways from other peoples because of a discrepancy in the structure of the language spoken by the different peoples.

This made me wonder whether there was a difference in how people thought between my native language, English, and a language that had a different grammatical structure, such as French or Spanish. Both French and Spanish have masculine v. feminine grammatical gender, while English does not have grammatical gender. In both Spanish and French a gendered article precedes every noun, while a gender-neutral article precedes every noun in English. For example, the phrase "the table" in English has the gender-neutral "the" preceding the word "table," while in French and Spanish, the feminine article "la" precedes both "mesa" in Spanish and "table" in French, with "la mesa" and "la table" being the equivalent phrases in Spanish and French, respectively.

These grammatical differences between the languages led me to wonder whether there is a difference in attitudes among countries were Spanish, French, and English are predominantly spoken (Spain, France, US). Since both Spanish and French have grammatical gender, I wondered if people in Spain and France might express more sexist attitudes than people in the United States, since the people in those countries have to constantly differentiate between the masculine and feminine. Studies, have found that people in the United States consistently express less sexist attitudes than people in Spain and France. Other factors besides language may contribute to this discrepancy. I will control for the influence of other factors by conducting the study in the United States and by randomly assigning participants to the experimental and control conditions, further controlling for culture and other factors.

I conducted a series of three experiments to test my hypotheses. I hypothesized that participants who read in the language with grammatical gender (either French or Spanish) will express more sexist attitudes than the participants who read the in English. In addition, I also hypothesized that male participants will express more sexist attitudes than female participants.

I conducted the first to experiments, which tested both French and English speakers and Spanish and English speakers at a high school in Long Island, New York. The third experiment tested bilingual Spanish and English speakers at a different high school in Long Island, New York with a higher fluent Spanish-speaking population than the first school. I created a 10-item likert-type Social attitudes scale from the 11-item Neosexism scale to measure the sexist attitudes of the participants in my study.

I definitely needed to learn additional mathematics in order to conduct this study. While I learned an abundance of research terminology and protocol as well as a foundation for my study in the AP Psychology course I took in 10th grade, I supplemented my mathematical knowledge with an AP Statistics course that I took in 11th grade. This course allowed me to familiarize myself with how to mathematically conduct significance tests such as chi-square tests and t-tests. In my study, I used a 2-way ANOVA (analysis of variance) to analyze my results. The two independent variables were the

language in which the participant read a survey and the gender of the participant, and the dependent variable was the participant's average score on the Social Attitudes Scale, a measure of the participants' sexist attitudes.

In Experiment 1, the participants were selected from the five highest level Spanish classes at a suburban high school on the North Shore of Long Island with approximately 1,100 students. There were 80 total participants in this study. Students who saw the stimulus and survey in Spanish expressed more sexist attitudes than the students who saw the stimulus and survey in English. The F equation for this experiment regarding the main effect for language was $F(1, 73)=6.53$, $p<.01$, $\eta p^2 =.09$. This led me to wonder whether the same effect could be seen in another language with masculine v. feminine grammatical gender, such as French.

In Experiment 2, the study was replicated on French students at the same high school. The 85 total participants were from the 5 highest level French classes at the same high school as Experiment 1. Students who saw the stimulus and survey in French expressed significantly higher sexist attitudes than students who saw the stimulus and survey in English. The F equation for this experiment regarding the main effect for language was $F(1, 84)=16.17$, $p<.01$, $\eta p^2 =.17$. While this does show that the same effect occurred with both the Spanish and French languages, in both experiments the participants were not fluent in the language with the grammatical gender. I realized that it was possible that the frustration-aggression hypothesis may have had an effect on the results of the first two experiments. Since the participants were forced to read in Spanish and French, languages which they were learning and not fluent, they might have become frustrated by the fact that they were being forced to read in a language in which they were not fluent. Those participants may have aggressed in the form of stronger sexist attitudes, which may have amplified the effect the language had on the expressed sexist attitudes of the participant. A third experiment with participants bilingual in English and Spanish was necessary to validate the results of Experiments 1 and 2.

In Experiment 3, the study was replicated on bilingual Spanish and English speaking students at suburban school approximately 40 miles outside of New York City. The school enrolls approximately 3,300 students, and approximately 1,880 (57%) students that attend the high school are Hispanic. The sample included 102 students enrolled in five of the highest level Spanish language classes at the high school, but only the 66 students who identified themselves as bilingual were included in the analysis.

In all three experiments the mean score on the social attitudes scale is higher for the participants who took the survey in the language with grammatical gender than for the participants who took the survey in English. In Experiments 1, 2, and 3, a significant difference was found between the two conditions. In Experiment 3, the F equation for the main effect for language was $F_{(1, 65)}=3.76$, $p<.05$, $\eta p^2 =.06$.

One possible reason for these results is that Spanish and French both are languages that have masculine v. feminine grammatical gender, which means that people who speak and read those languages have to constantly differentiate between the masculine and the feminine, and this may influence the attitudes of those people to become more sexist.

In addition, in all three experiments males consistently expressed more sexist attitudes than females. The ANOVA revealed that $p < .01$, showing a significant difference between male and female average scores through each experiment. The F equations for the main effect for gender in Experiment 1 was $F_{(1, 73)} =13.56$, $p<.01$, $\eta p^2 =.28$, in Experiment 2 was $F_{(1, 84)}=17.01$, $p<.01$ $\eta p^2 =.17$, and in Experiment 3 was $F_{(1, 65)}=7.34$, $p<.01$, $\eta p^2 =.19$. One reason for this is that men are usually the gender that is benefitted by being sexist, while females are usually hurt by sexist policies and are therefore less likely to have sexist attitudes. In addition, this trend was neither enhanced nor diminished by the presence of grammatical gender in a language.

A limitation of this study is that it cannot be generalized to all languages with grammatical gender because all languages with grammatical gender do not have the same noun classes. In addition,

the results of the third experiment should not be generalized to a bilingual French population without replication.

The participants in the experiments were only asked to read, not speak, in the languages with grammatical gender. It would be interesting to have people speak in these languages instead of reading them to see if the same effect on expressed sexist attitudes results. Another possible way to extend this study is to try and see if an unintended effect of learning a language with grammatical gender is an increase in sexist attitudes. The present study suggests that people will express more sexist attitudes when they are reading and therefore thinking in a language with grammatical gender than when they were thinking in English. It would be interesting to see if exposure to such languages ultimately promotes sexist attitudes in the learners, even when they are tested in a language without grammatical gender like English.

It is clear that the grammatical structure of languages can encourage sexism. In conclusion, on the whole people who read a language with masculine v. feminine grammatical gender express more sexist attitudes than when people read in a language without masculine v. feminine grammatical gender, such as English. In addition, males express more sexist attitudes than females regardless of the grammatical structure of the language.

My project definitely made science and math more alive for me because I was able to actually conduct my own experiment. When I learn from my science and math teachers about different subjects, I know that none of that information could have been taught to me without experimentation and research. It truly was a life-changing event to have been able to conduct my *own* experiment that I developed a literary and empirical foundation for by myself. I, just like other researchers such as Newton and Einstein, went on to design an experiment and conduct the experiment to see if what I hypothesized was in fact, true. The most exciting and exhilarating part of the process is not the conduction of the study itself but is the analysis of the results. As a researcher, my goal was not to hope and pray that the

results came out the way that I predicted, but rather it is to interpret and learn from whatever my data says, even if what I hypothesized turned out to be incorrect. It truly was a thrill to be able to conduct my own research and to lead the way in all steps of the research process from developing a background for my hypothesis to drawing conclusions based on my results.

The advice that I have for students who wish to undertake a project that combines science and math in the future is to stay committed to their research. The idea of conducting independent research is extremely enticing for those who, like me, have a great passion for science and mathematics and who wish to discover new things driven by their desires and knowledge. I urge those who want to conduct research to always finish what they started no matter how discouraging others around you may be or how unsupported your hypotheses may be. Even if a researcher is not correct in their hypotheses, the research is still incredibly useful because the results can always be interpreted to show something about the subject of the research. This is, in my opinion, the essence of research; the idea that when a person conducts research in an ethical and methodical manner, no matter what the outcome of the research the researcher has contributed a wealth of knowledge to the scientific community.