



# CALIFORNIA STATE SCIENCE FAIR

## 2015 PROJECT SUMMARY

Name(s) <b>Jacob Y. Kim-Sherman</b>	Project Number <b>J0717</b>
<b>Project Title</b> <b>Effects of Inaudible Sounds on Memory Performance</b>	
<b>Objectives/Goals</b> My objective was to learn if memory performance is affected by inaudible sounds with different frequencies. One study found that high frequency sounds audible to non-human animals are stressful, and potentially harmful to those animals, and stress is known to harm working memory. Thus, I reasoned that high pitch sounds would harm memory performance. Other studies found that audible low pitch sounds caused participants to relax, and that relaxation improved memory performance. Finally, a study showing that inaudible sounds prompted brain responses suggests that what happened with audible sounds may hold up with inaudible sounds. Therefore, I hypothesized that if an inaudibly low sound is played while people are taking a memory test, then their performance will be better than people taking the test with no sound, which in turn will be better than the score of people taking the test with a high sound in the background.	<b>Abstract</b> The abstract section is currently empty.
<b>Methods/Materials</b> Thirty-two participants aged eight to sixteen were tested separately with inaudible sounds played on a speaker. Individuals who reported hearing the sounds during a manipulation check were excluded from the data set. All participants received all three conditions: inaudibly high sound (20,000 Hz), inaudibly low sound (30 Hz), and no sound. Participants took a Simon Memory Test (color memory test) nine times, three times under each condition. The condition orders were counterbalanced.	
<b>Results</b> Although not statistically significant, the results show a general trend that high and low frequency sounds have a positive impact on memory performance, both the level (based on accuracy) and the score (based on speed). The inaudibly high sound correlates with higher scores than the low sound, which were better than no sound at all.	
<b>Conclusions/Discussion</b> My results did not support the hypothesis. Instead, my results showed a positive trend of both high and low inaudible sounds on memory performance. It is possible that these results occurred because an inaudibly high sound put gentle pressure on the participants, which made them focus more. This could just have been a coincidence as well. I am currently running a second study that is focused on reducing the problems of the first study. I am going to use a more sensitive memory test, the N-Back test. I am also going to administer the sounds through headphones instead of a speaker, as they will reduce unwanted random background noise.	
<b>Summary Statement</b> This project is about how stimuli that cannot be perceived (inaudible sounds) could still affect our minds (memory performance).	
<b>Help Received</b> Ms. Kim Miller taught research methods in class and gave invaluable feedback; Dr. Michael Miller helped me decide on memory test for Study 2; Goleta Valley Junior High library will lend headsets for Study 2; Dr. Rebecca Schaefer met with me to discuss sounds; Bruce Murdock will test headphones for Study 2.	