

## INTRODUCTION

More than 10 million people in the United States alone suffer from a memory disorder such as dementia or Alzheimer's disease ("Memory and Healthy Aging," 2015).

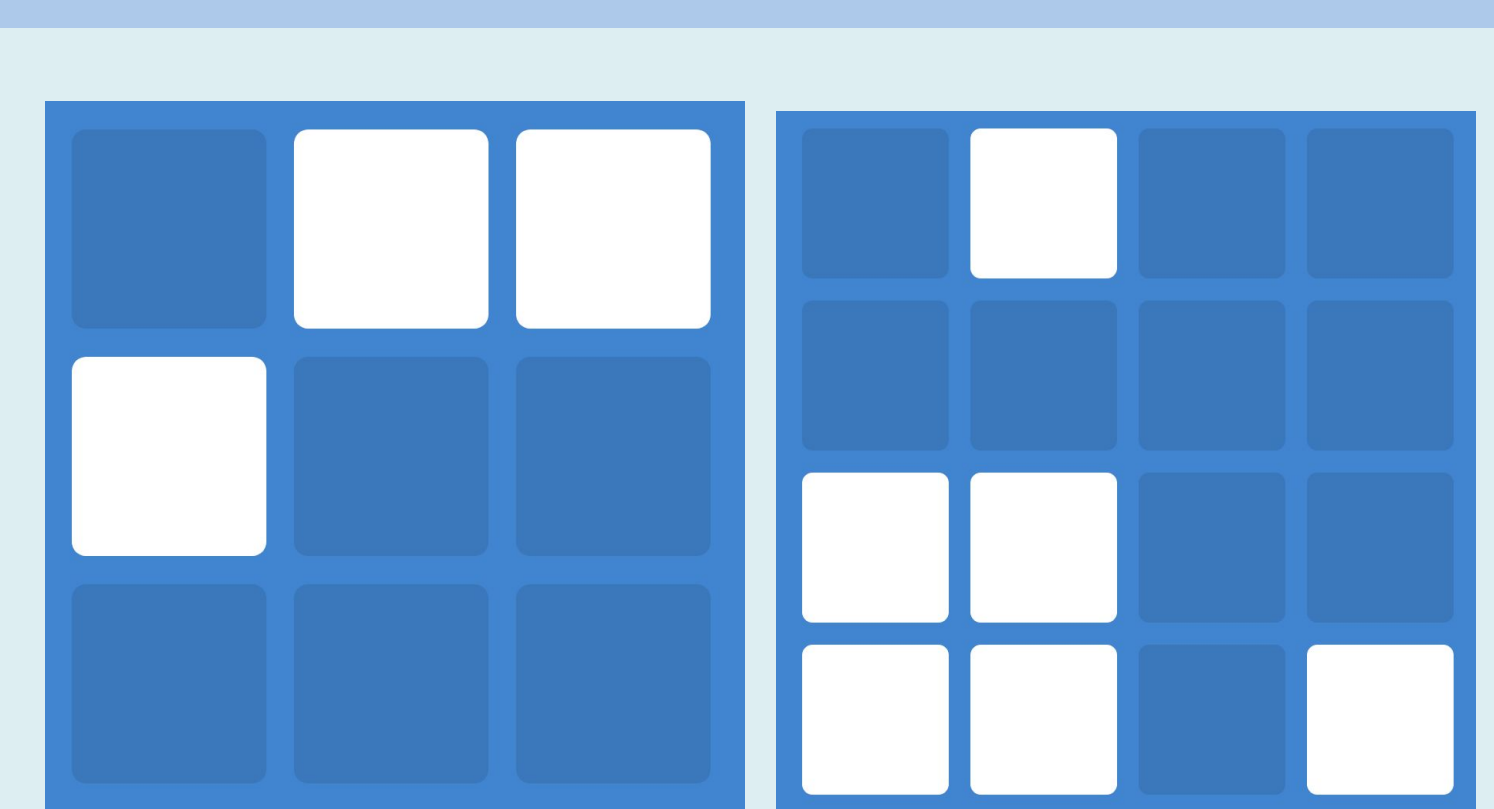
Regaining and restrengthening that memory remains an important problem which scientists have yet to find a solution. However, studies in neuroscience have shed light on many aspects of memory that we did not understand before. For example, "emotional events are often remembered with greater accuracy and vividness (though these two characteristics do not always go together) than events lacking an emotional component" (Buchanan).

Emotional memory could be key in strengthening memory, and knowing which types of emotional memories we remember most (fear, happiness, sadness, etc.) could possibly aid us in utilizing it in memorization techniques. The aim of my research project is to induce an emotion with music and then examine if it affects short term visual memory.

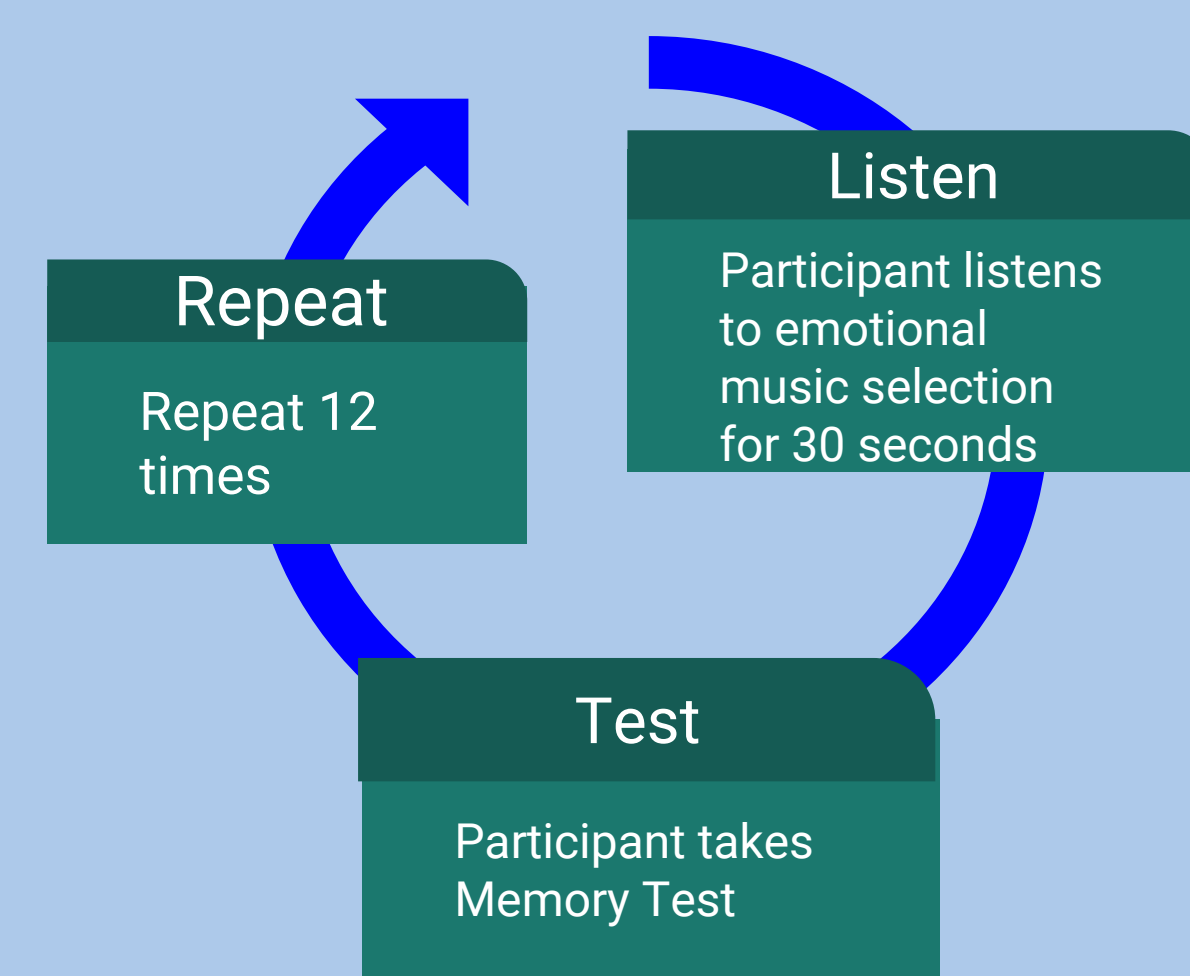
## RESEARCH METHODOLOGIES

### Experimental Procedure

- Sample size: 30 high school students (age 14 - 18; 15 males, 15 females)
- Each of the students listening to music previously identified as eliciting a specific type of emotion (happy, sad, fear-inducing) for 30 seconds. Afterwards, they took a short memory test (Human Benchmark) which tested pattern recall (see Figure 1).
- Students were tested with 3 times with each variable: no music (control), happy, sad, and fear-inducing music. The order in the trials was randomized to reduce bias.



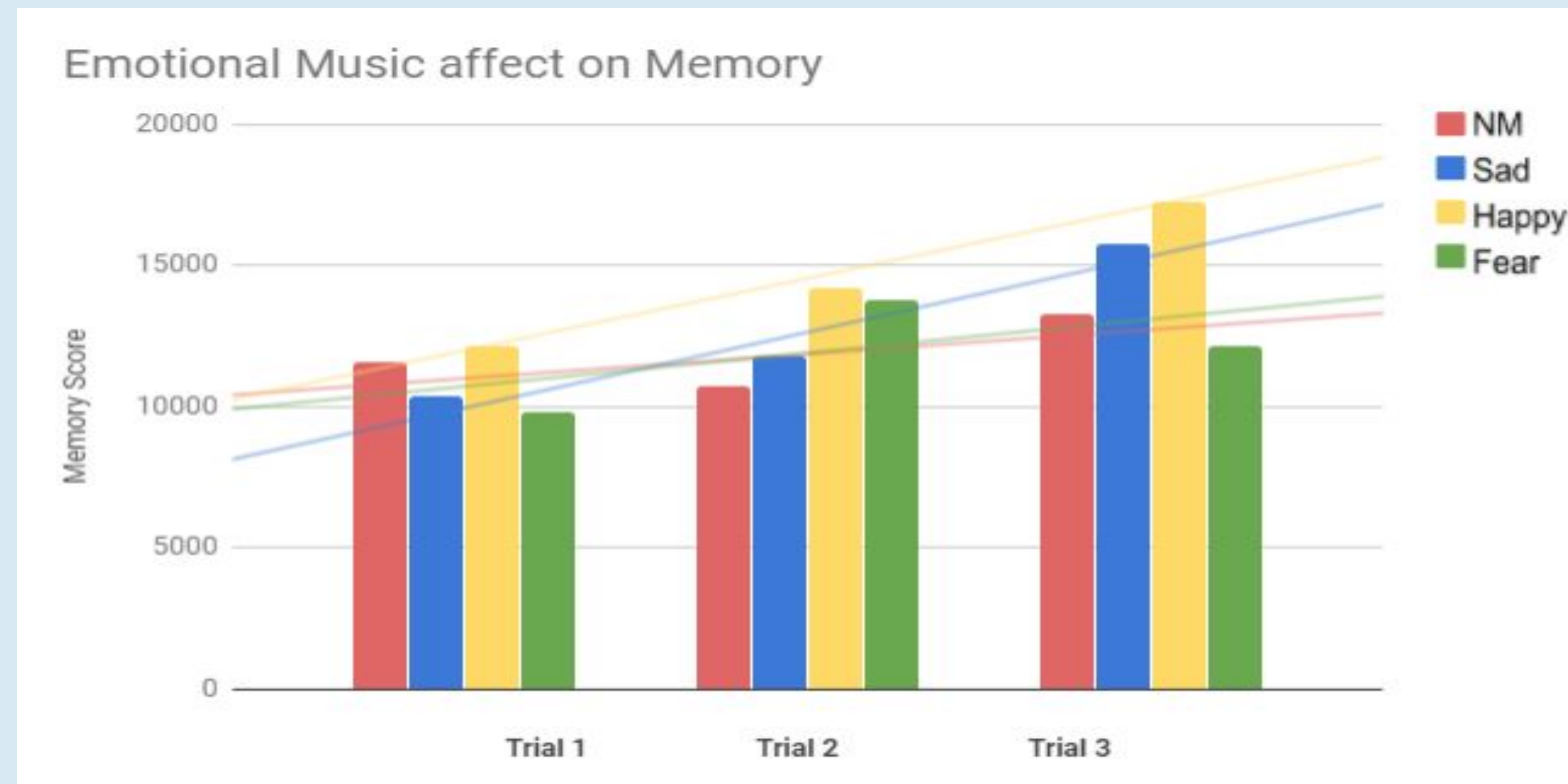
**FIGURE 1**  
These are examples of patterns that subjects had to recall in the Human Benchmark Visual Memory Test



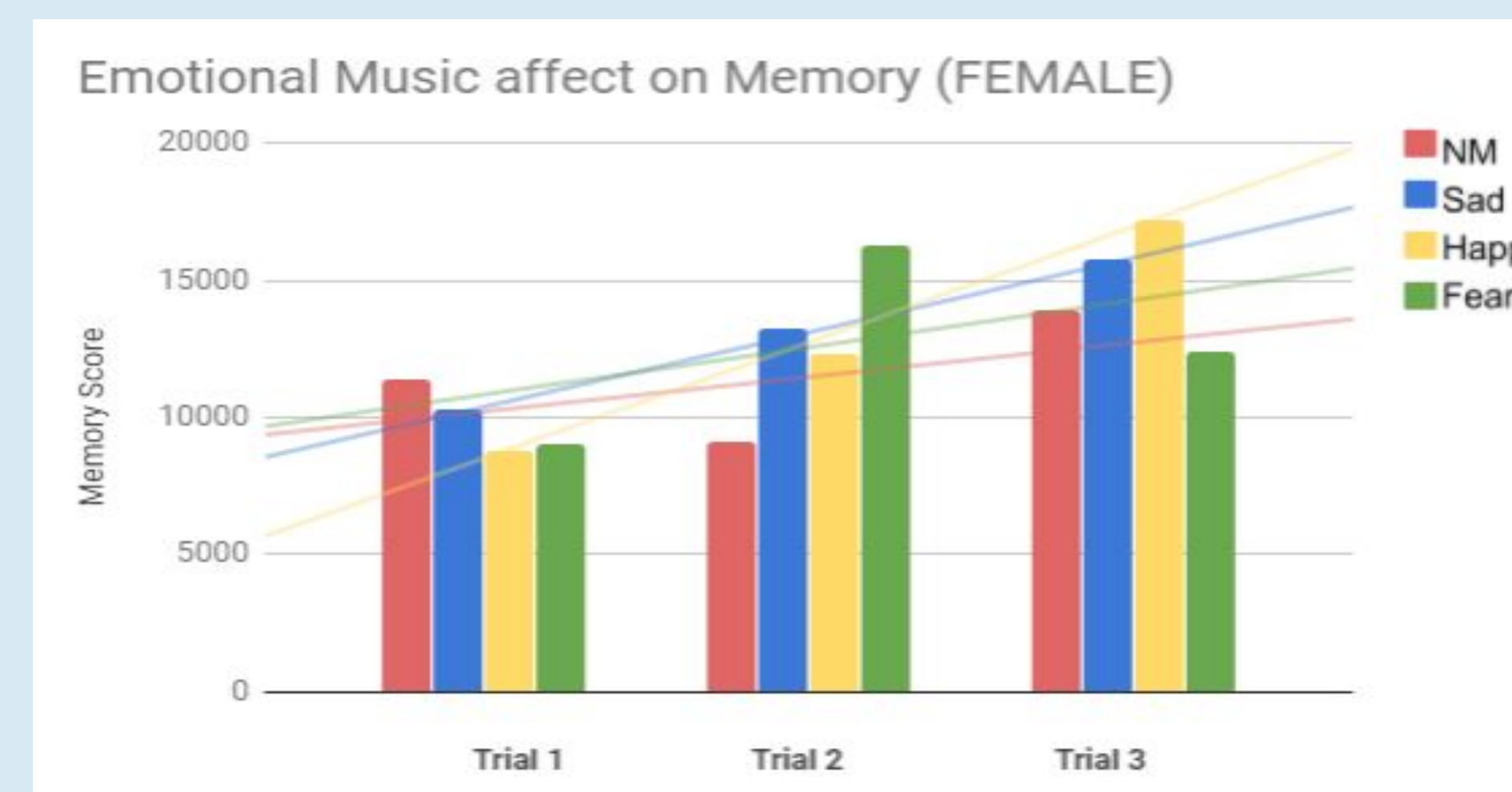
**FIGURE 2**  
This shows the procedure that participants followed during the experiment

## DATA AND FINDINGS

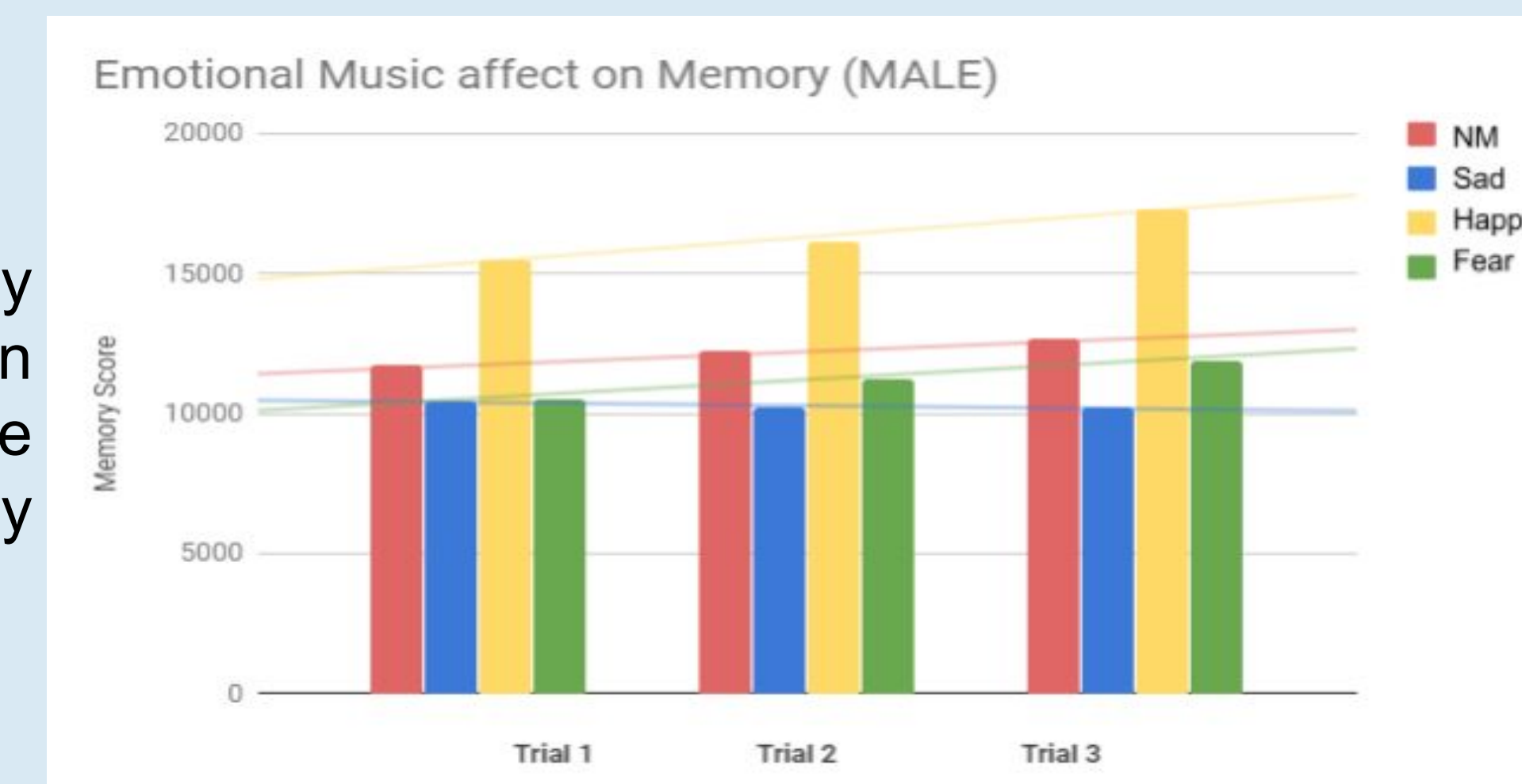
**Research Question:** What emotion is tied to the best memory recall?



The happy emotion was tied to the best memory recall in the high school students that were tested.

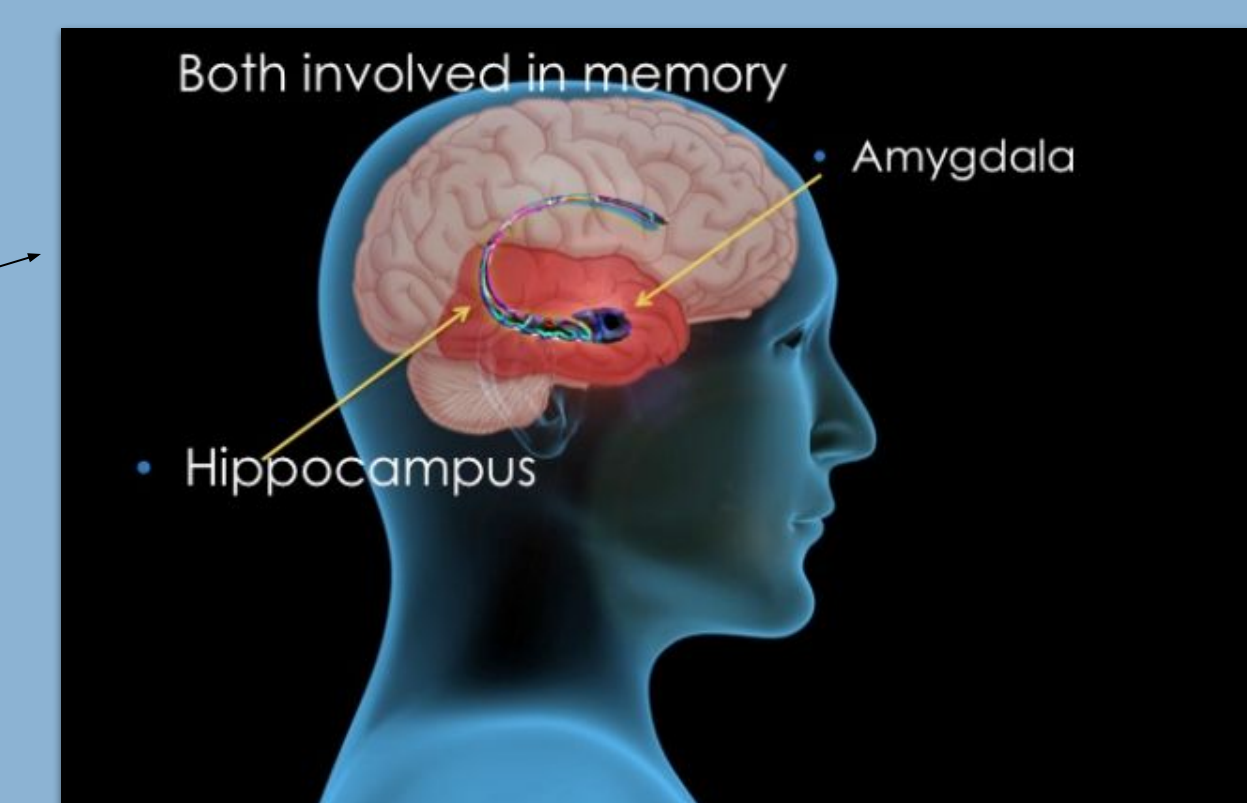


The male data clearly showed the happy emotion as being the highest, while it was close between happy and sad for females.



## DISCUSSION, ANALYSIS, AND EVALUATION

The type of emotional music did have an impact on the memory recall of the high school students. Looking back at the data, the average memory scores with the happy emotion tended to be much higher, and surpassed the averages of the other emotions and no emotion scores. The reason the end of the trend line is used to make the conclusion is because the participants learned how to play the game, similar to how we learn how to memorize a vocabulary word and apply that same thought process to learning other vocabulary words. The end of the trend line shows that participants with a happy emotion had better memory scores. Possible points of error could be the outside distractions, since the environment was not completely ideal when taking the test for all trials. It was also interesting to notice how the happy music clearly led to a better score in males, as compared with females where the happy music had the most impact, but was closely followed by the sad music. The male scores also were more spread out compared to the female scores.



**FIGURE 3**  
This is a picture of the human brain. Although the hippocampus is well known for consolidating memory, the amygdala has a large role in consolidating emotional memory (Amygdala and Hippocampus).

## CONCLUSIONS/ NEXT STEPS

In the future, a larger dataset (such as one hundred subjects with an equal number from each grade) would lead to a more accurate and representative conclusion. Furthermore, it would be much more accurate to utilize participants who are currently in the emotional state of happiness, sadness, and fear to test their memory, although this hypothetical case is not necessarily plausible.

Since it is now known which emotion high school students remember best, this can be directly applied to memorization for tests that high school students encounter day to day. Possibly integrating this emotion into a memory technique, whether it is taking a few moments to remember a happy memory before remembering information or listening to happy music before memorization.

Furthermore, in the cases of memory disorders, surrounding those with the disorder with the happy emotion could help them strengthen their memory since the information is correlated with the happy emotion and thus is efficiently consolidated and recalled.

## ACKNOWLEDGEMENTS / REFERENCES

Special thanks to Ms. Wilson and Ms. Merchant for helping to make this project possible.

### References:

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