Don't Skip a Beat
The Relationship Between Tempo and Heart Rate

Introduction

Have you ever wondered what your heart rate is when listening to different types of music tempos? We are testing the theory that increasing or decreasing the tempo of the songs has an effect on memorization and focus. Based off of our classmates opinions, we thought that listening to music would help us increase our focus and memorization. After looking at our results, we saw that music with a faster tempo (faster than our normal heart rate) was more memorizable for our word list. Our hypothesis was to increase the tempo of music and the music with you heart rate will let us remember the words faster then no music.

Background Research

- Your heart rate can match the tempo of the music your listening to.
- The speed of the tempo can change how fast you think, faster tempos make your feel more energized, and slower music makes your feel relaxed.
- Music with a slow and steady beat can help you ignore distractions.
- Some studies show that there isn't a clear link between focus and the music your listening to.
- How the music affects you is different for everyone.

Testable question

Does music that matches your heartbeat (same BPM) help you concentrate better than other bpm music?

Hypothesis

We thought that increasing the tempo of the music would increase the average words memorized per minute and decreasing the tempo of the music would decrease the average words memorized per minute.

Materials

- Use headphones (if done individually)
- Have a computer to play the music
- Create 3 different list of fifteen words
- Play 3 different songs of different tempos (classical-string)

List 1:
Apple
Honey
Sunset
Simple
Travel
Kitten
Doctor
Purple
Finish
Puzzle
Gentle
Napkin
Coffee
Protect
Mountain

List 2:
Ocean
Golden
Pilot
Garden
Chicken
Forget
Window
Dinner
Happy
Lemon
Manage
Flower
Silence
Perfect
Answer

List 3:
Freedom
Lovely
Hotel
Focus
Listen
Color
Tender
Decide
Mother
Music
Finger
Pretty
Office
Become
Common

List 4:
Quiet
Explain
Waterfall
Chair
Tiger
Brother
River
Robot
Paper
Silver
Dollar
Letter
Winter
Summer
Thunder

Music Choices

Procedure

1. Collect a group of students.
2. Make sure the room is as calm and comfortable as possible.
3. Research the average students heart rate
4. Give students a list of fifteen words and allow them to memorize them for one minute.
5. When the minute is over, take away the list of words and let the students write as many words as they can remember from the paper.
6. Observe and collect data
7. Repeat steps 3-6 playing music of various tempos (Matching average heart rate, below average heart rate, and above average heart rate)

Chart Graph

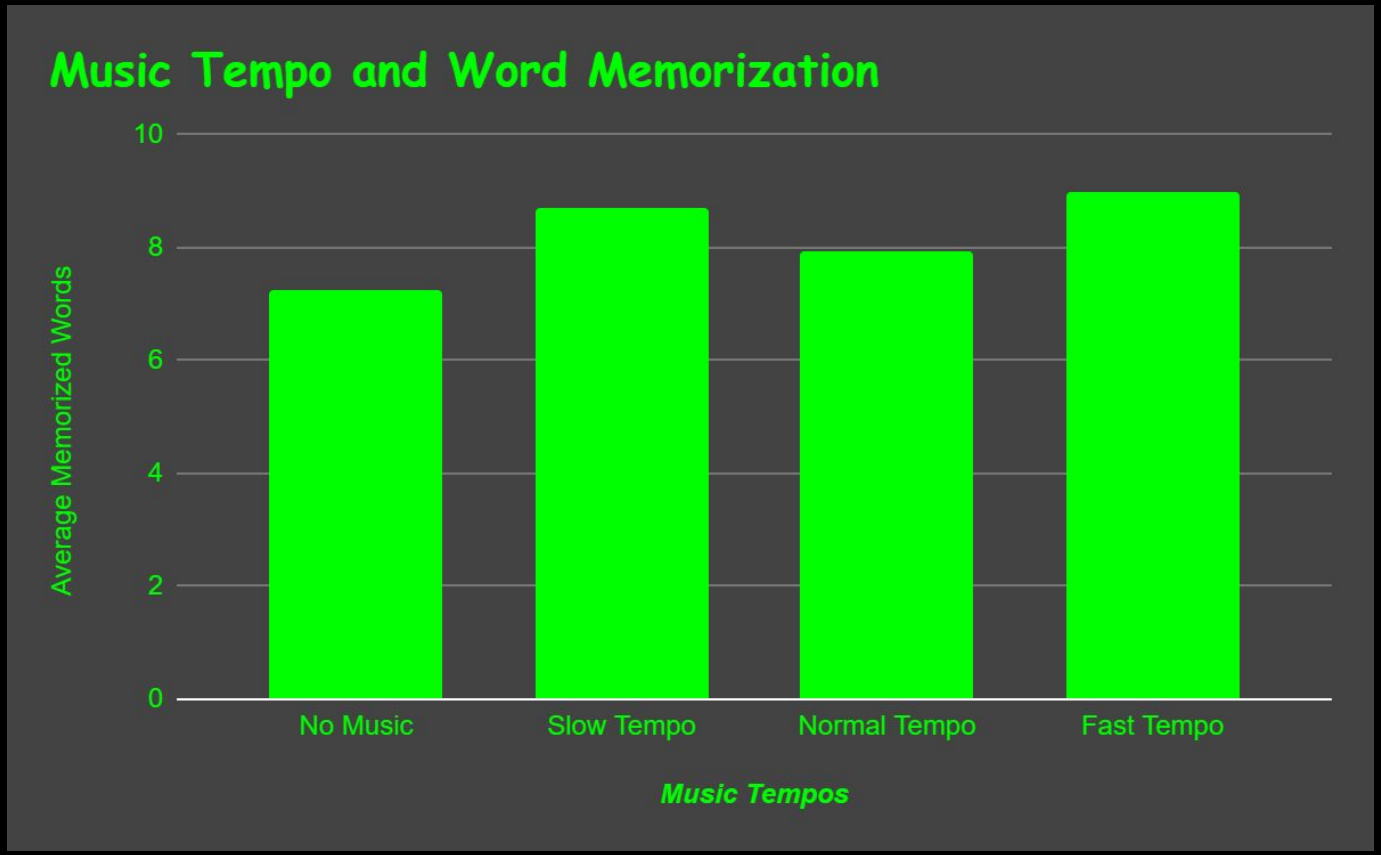
Music Tempo and Word Memorization
10
8
6
4
2
0
Average Memorized Words
No Music
Slow Tempo
Normal Tempo
Fast Tempo
Music Tempos

Chart Graph Information

- This graph shows all of the collected averages of peoples timed averages on memorized words
- Fast tempo and slow tempo are nearly the same
- No music and normal are the collection that has least but both continue to have similar outcomes
- The distortion of the music has an affect on a person's memorization for “Fast & Slow”

How is it important to world and Ideas for Future research?

This is important to the real world because it allows people to listen to the right music depending on what you are doing. According to the statistics, fast tempo music strengthens brain memory.

This could help high school students and college students study for tests.

For future studies and research, we could study -

- Does the genre of music help strengthen memory?
- Does the volume of music help strengthen memory?
- Does the era of music when its released help strengthen memory?

Discussion and Interpretation/ Conclusion.

This experiment resulted with the partial support of our hypothesis. Our hypothesis was that increasing tempo would increase the amount of words memorized per minute and decreasing the tempo would have the opposite results. This was partially supported because increasing the tempo had higher results, but decreasing the tempo did not have results as high as the other tests, in fact the results were pretty good for slower tempos. We were surprised that the least amount of words memorized occurred when no music was playing. This experiment was successful because we collected over 30 sources of data. This gave us the chance to view a wide spread of test subjects and results. One thing we could have done differently was test them separately or testing more people, but we unfortunately didn't have enough time. All in all, this was a good and successful experiment.

References

- De Francesco, L., Schintu, S., Mazza, A., Ricci, R., & Monte, O. D. (2025). What you listen to makes a difference: The impact of music on attention and well-being. Annals of the New York Academy of Sciences, 1552(1), 273–283. https://doi.org/10.1111/nyas.70049
- Hofbauer, L. M., Lachmannn, T., & Rodriguez, F. S. (2024). Background music varying in tempo and emotional valence differentially affects cognitive task performance: experimental within-participant comparison. Journal of Cultural Cognitive Science, 8(2), 139–150. https://doi.org/10.1007/s41809-024-00144-8
- Mollakazemi, M., Biswal, D., Elayi, S., Thyagarajan, S., Evans, J., & Patwardhan, A. (2019). Synchronization of autonomic and cerebral rhythms during listening to music: effects of tempo and cognition of songs. Physiological Research, 68(6), 1005–1019. https://doi.org/10.33549/physiolres.934163