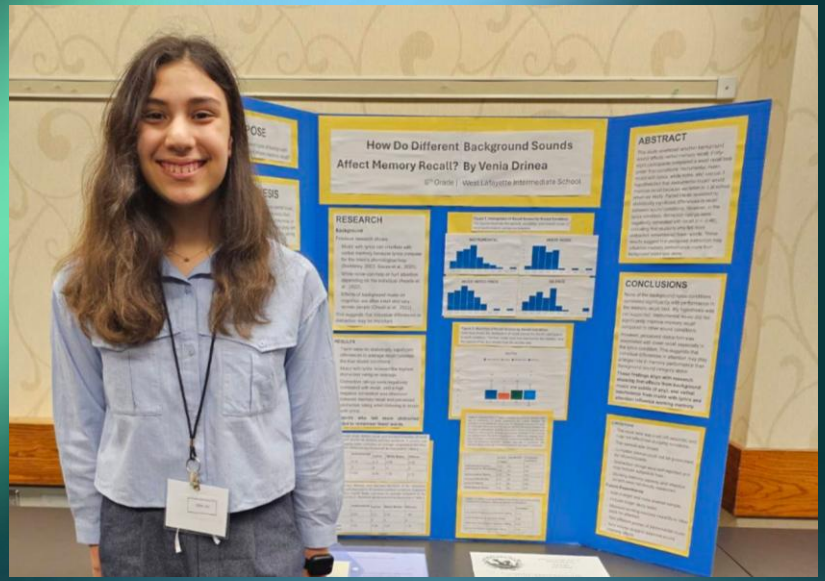

How Do Different Background Sounds Affect Memory Recall?

An experimental study with 48 participants

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Research Question

- How do different types of background sound affect short-term memory recall?

Hypothesis

- If participants study with instrumental music, then they will remember more words than when they study with silence, white noise, or music with lyrics, because we often study with instrumental music at school and it is calming and reduces stress.

Background

Previous research shows:

- In a classic model of how memory works, a system called the phonological loop stores verbal information (Baddeley, 2003).
- Music with lyrics can interfere with verbal memory because lyrics compete for the brain's phonological loop (Baddeley, 2003; Souza et al., 2023).
- White noise can help or hurt attention depending on the individual (Awada et al., 2022).
- Effects of background music on cognition are often small and vary across people (Cheah et al., 2022).

This suggests that results from previous studies are mixed and individual differences in attention may be important.

Procedures

Sample

- **48 participants (25 girls and 23 boys; average age 11 years old) performed a memory-recall task under four conditions**

- instrumental music - music with lyrics - white noise - silence

Memory-Recall Task:

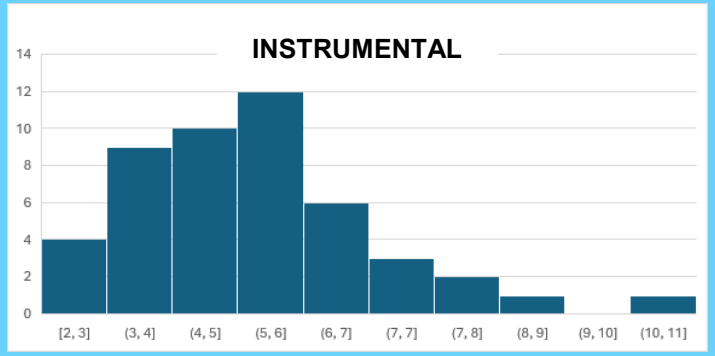
- Participants saw a list of **12 words (4 different lists randomized each time)**
- They had **30 seconds** to memorize the words and **45 seconds** to recall them
- They rated **distraction level (1–5)**
- Order of conditions and list of words were **randomized each time.**

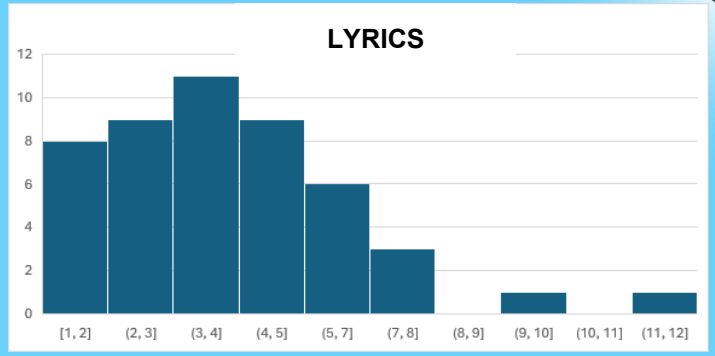
Statistical Analysis

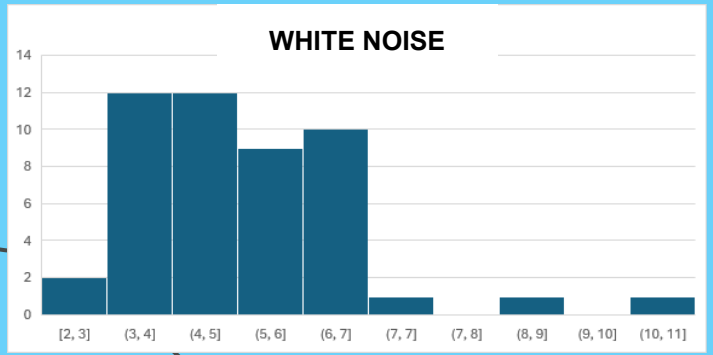
- Summary statistics: **mean, median, standard deviation**
- **Boxplots and histograms** to examine distributions
- **Correlation analysis** between distraction and recall
- **Paired t-tests** to compare recall across conditions

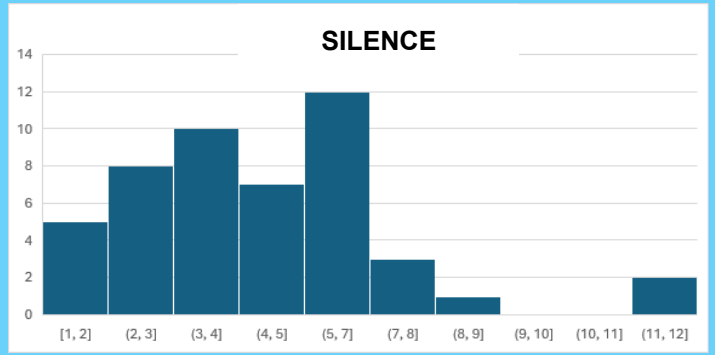
Results I

Distribution of Recall Scores Across 48 Participants and 4 Sound Conditions



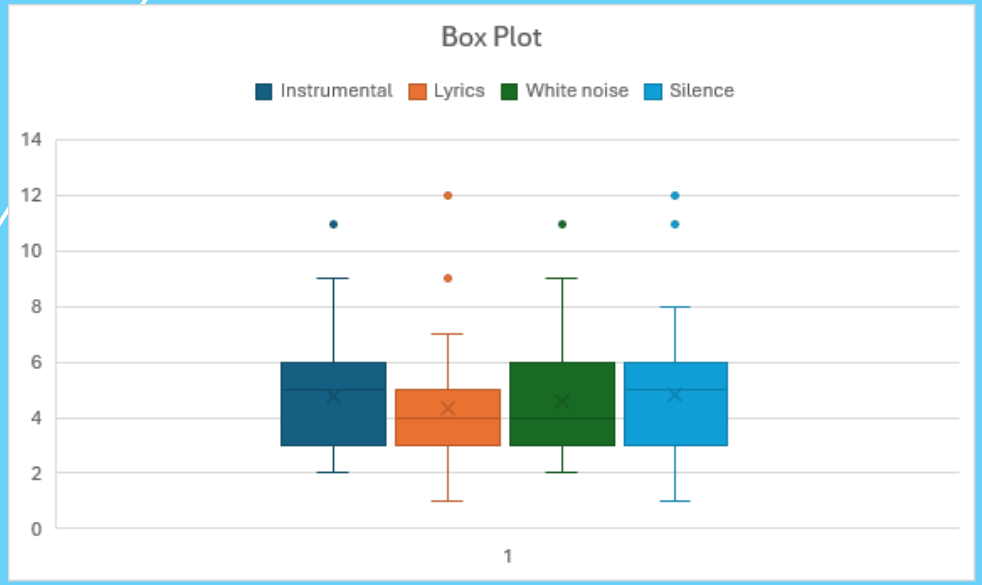






Results II

Memory Recall Was Similar Across Background Sound Conditions



Recall Score	Instrumental	Lyrics	White Noise	Silence
Average	4.75	4.31	4.58	4.83
Median	5	4	4	5
Standard Deviation	1.88	2.06	1.70	2.12

Condition Pairs	p-value(T-Test)	Significant?	Correlation
Instrumental & Lyrics	0.13	No	0.52
Instrumental & Noise	0.53	No	0.48
Instrumental & Silence	0.77	No	0.54
Lyrics & Noise	0.31	No	0.54
Lyrics & Silence	0.10	No	0.48
Noise & Silence	0.33	No	0.60

No statistical significance in paired t-test comparisons.

Results III

Higher Distraction Was Associated With Lower Memory Recall.

Distraction Rating	Instrumental	Lyrics	White Noise	Silence
Average	2.08	3.31	2.42	1.98
Median	2	4	2	2
Standard Deviation	1.15	1.19	1.23	1.14

Relationships investigated	Correlation
Instrumental Recall Rate vs Distraction Rating	-0.10
Lyrics Recall Rate vs Distraction Rating	-0.46
White Noise Recall Rate vs Distraction Rating	-0.47
Silence Recall Rate vs Distraction Rating	-0.04

This was particularly apparent for Music with Lyrics which had the highest distraction rating average and high negative correlation with memory-recall score.

Conclusions

- **Memory recall was similar across all four tested sound conditions**
(Instrumental 4.75, Lyrics 4.31, White Noise 4.58, Silence 4.83)
- **Paired t-tests showed no statistically significant differences** between conditions *($p > 0.05$)*
- **Higher distraction ratings were associated with lower recall**, especially in the **lyrics condition** *($r = -0.46$)*
- **Key Takeaway:** Individual differences in distraction may influence memory performance **more than the type of background sound**

Limitations

- The recall task was brief (45 seconds) and may not reflect real studying conditions.
- The sample was limited.
- Complete silence could not be guaranteed for all participants.
- Distraction ratings were self-reported and may include subjective bias.
- Working memory capacity and attention control were not directly measured.

Future Expiriments

- Use a larger and more diverse sample.
- Include longer study tasks.
- Measure working memory capacity or other tests for attention.
- Test different genres of instrumental music.
- Vary volume levels to examine sound intensity effects

Works Cited

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