

Research project

- Recommended format - 2 independent variables, two levels each
 - At least one must be cognitive variable
 - At least one variable be manipulated within-subjects
 - Some people doing one condition and a different group doing a different condition
- Collectively aiming for 30 total subjects, 10 participants per person in the group
- Some people do condition x and y, and conditions a and b are repeated, everyone did a and b, than you basically just need 15 people each for x and y condition
- Keep the research at a minimum risk level, no sensitive content or questions
 - No access to protected populations

Qualtrics Access

- Access Qualtrics from the Northeastern Qualtrics website, not qualtrics.com
 - qualtrics.northeastern.edu

Film Clip (Arousal):

Pixar Cars (Race finale)

<https://www.youtube.com/watch?v=95fAH-zYIzg&t=3s>

Film Clip (neutral):

Pixar Cars (Lights return to radiator springs)

<https://www.youtube.com/watch?v=Kzy3n-8A-vA>

Word List 1

1. Mountain
2. Speaker
3. wheelchair
4. Glass
5. House
6. Fork
7. Spouse
8. Juice
9. Classroom
10. Shoe
11. Bodega
12. Baseball
13. Lumberjack
14. Cloud
15. Armadillo

Word List 2

1. Pants
2. Tequila
3. Grass
4. Bell
5. Helmet
6. Tortilla
7. Ambulance
8. Bicep
9. Purple
10. Tornado
11. Recycling
12. Carnival
13. Spectate
14. Giraffe
15. Roommate

Independent Variables

1. **Emotional Arousal:** Determined by the type of film clip shown to participants.
2. **Cognitive Load:** Determined by the difficulty of the cognitive load task.

Dependent Variable

- **Context Memory:** Measured by the accuracy of the recall task, specifically the number of words accurately recalled.

Participants

Twenty university students will participate in this experiment. Participants were recruited through informal personal contacts and networks. The motivation for participation was primarily driven by personal relationships and the interest of individuals within the researcher's personal and professional circles. Surveyed on vision - do participants have corrected to

Design and Procedure

Participants will be issued an online survey via Qualtrics, a digital surveying platform used to design, distribute, and collect survey responses. The experiment will follow a mixed design:

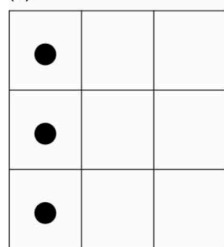
1. **Emotional Arousal:** This variable will be tested between subjects to avoid carryover effects, as emotional arousal states are difficult to inhibit or reset.
2. **Cognitive Load:** This variable will be tested within subjects because it can be more easily controlled and reset.

Participants will be randomly assigned to either a high emotional arousal or low emotional arousal group. Within each emotional arousal block, there will be two trials: one with low cognitive load and one with high cognitive load. The low cognitive load trial will be conducted first, followed by the high cognitive load trial.

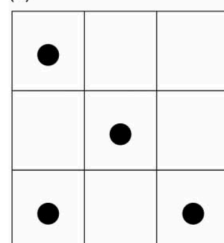
Procedure for Each Trial:

1. **Film Clip:** Participants will watch a predetermined film clip corresponding to their assigned emotional arousal level.
2. **Word Recall Task:**
 - Instructions for the word recall task will be shown.
 - Participants will be shown a list of 15 words, one at a time. Each word will be displayed for 4000 milliseconds in a clear, uniform, large font centered on the screen.
3. **Cognitive Load Task:**
 - Instructions for the cognitive load task will be provided.
 - Participants will engage in a spatial memory task where they must remember the distribution of dots in a matrix and reconstruct their configuration on a numerical keyboard.
 - **Low Cognitive Load Task:** Three dots will be presented in one horizontal or vertical line (a).
 - **High Cognitive Load Task:** Four dots will be distributed over two or three rows and/or columns of the matrix (b).
 - Each set will consist of:
 - Dot distribution shown for 3000 milliseconds.
 - A 1000-millisecond pause with a blank screen.
 - Participants then recall the distribution and choose from four options displayed on the screen (one option will always be correct).
 - This process will be repeated for 10 sets.

(a)



(b)



Second Part of Word Recall Task:

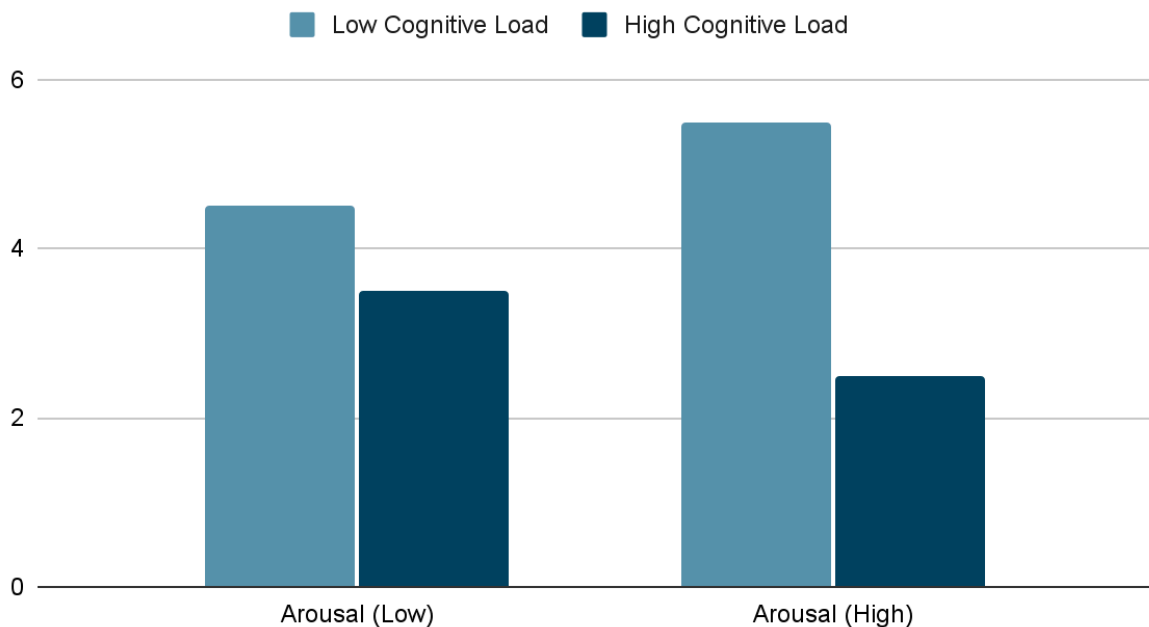
- Participants will be instructed to recall and write down as many of the previously shown words as they can. There will be no time limit for this task.
- Participants will submit their results to end the trial.

Between trials, a 3-minute long neutral video will be shown to reset cognitive load and word list memory. The word lists used between trials will be different. Since each participant will only undergo two trials with different cognitive load tasks, two unique lists of 15 words (with all words being different) will be used.

The results of the recall tasks will be recorded and analyzed to assess the impact of emotional arousal and cognitive load on context memory.

Expected Results

Word Recall Task



For our expected results, as you can see here on the graphs provided, we expect high levels of arousal along with a low cognitive load to lead to the most amount of words recalled as memory theoretically is enhanced during times of higher emotional arousal.

We expect that high levels of arousal paired with a high cognitive load will lead to the least amount of words recalled. According to the Yerkes-Dodson Law, performance increases with arousal only up to a certain point, high arousal levels and in this case with the high cognitive load can be an overwhelming amount of incoming information on the brain and impair the ability for memory recall with those distractions.

These results are expected based on several theories, one such as the cognitive load theory. This theory explains that the human brain has a limited capacity in terms of the ability to process information. In certain scenarios such as this case with the dot memory task, memory recall can be impaired if it is more difficult and a higher cognitive load due to the divided attention and the lesser amount of cognitive resources available to attain information.

There is also the factor of interference. In our experiment, since we have a couple tasks that involve certain levels of attention with the film clips and the dot memory task, it can cause deep difficulty on memory recall of the word lists and can cause dual task interference. Like said before for our expected results, higher cognitive loads paired with higher levels of arousal can lead to poor recall due to the overload of stimuli.

Implications

This study provides several implications. Being able to understand the fact that high (but not too high) levels of arousal can enhance memory recall puts forth that it is important to be able to create an engaging yet low stress-inducing environment that is optimal for student success. Providing material that gets students interested but does not cause anxiety is key for memory retention. This goes along especially with cognitive load amongst students. In an educational environment, tasks should not overwhelm students and so it is important to be able to break down content bit by bit so new information can be retained more easily, if not can lead to high amounts of stress and affect students mental health.

When a student is put into a situation of high arousal paired with a high cognitive load, it can easily cause stress and anxiety, which deeply affects memory retention. This truly amplifies the importance of stress-management and support of mental health is crucial in academic and professional environments, promoting cognitive performance and overall well-being. Strategies can be taken into account mindfulness, relaxation, proper preparation, and any other personal self-help skills can help to improve performance while keeping arousal levels low.

Questions for the Class

- Were the film clips strong representations of high vs low arousal? (Would there be a significant difference in the data showcasing the effects of arousal from the film clips presented by Pixar's Cars?)
- What is the best way to ensure the same emotional arousal persists throughout the trials of the subjects? (We were wondering if the same film clip should be shown or potentially have a different clip or completely omit it for the second trial?)

