Understanding Memory: The Impact of Emotional Arousal and Cognitive Load

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Emotional Arousal and Memory

The impact of emotional film clips on context memory

Anderson & Shimamura (2005)

- Emotional vs. neutral film clips
- Memory performance

Cognitive Load and Memory

The mainstream theory on cognitive load effects

Sweller (1988)

- Cognitive Load Theory
- Working memory limitations

Perspective #1: Emotion as Extraneous Cognitive Load

Emotions compete with cognitive resources

Ellis & Ashbrook (1988)

- Anxiety and cognitive capacity

Perspective #2:
Emotion Affecting Memory

Broadened or narrowed cognitive resources

Whalen et al. (1998)

- Amygdala activation

Perspective #3: Emotion as Intrinsic Cognitive Load

Emotion regulation as part of the task

Fraser et al. (2014)

- Medical students' performance

Perspective #4: Emotion Affecting Motivation and Cognitive Effort

Emotion and Cognitive Effort

Moreno & Mayer (2004)

- Personalization effect

Research Questions: The Impact of Emotional Arousal and Cognitive Load on Context Memory

1. What's the impact of emotional arousal on context memory?
2. What's the impact of cognitive load on context memory?
3. What's the interaction between the effects of emotional arousal and cognitive load on context memory?

Method

Participants

- Recruited through each researcher's informal personal contacts and networks
  - At least 20 participants total
- Demographics
  - Gender
  - Age
  - Vision
- Motivation
  - Driven by personal relationships and individuals' interest within researchers personal and professional circles

Method

Materials

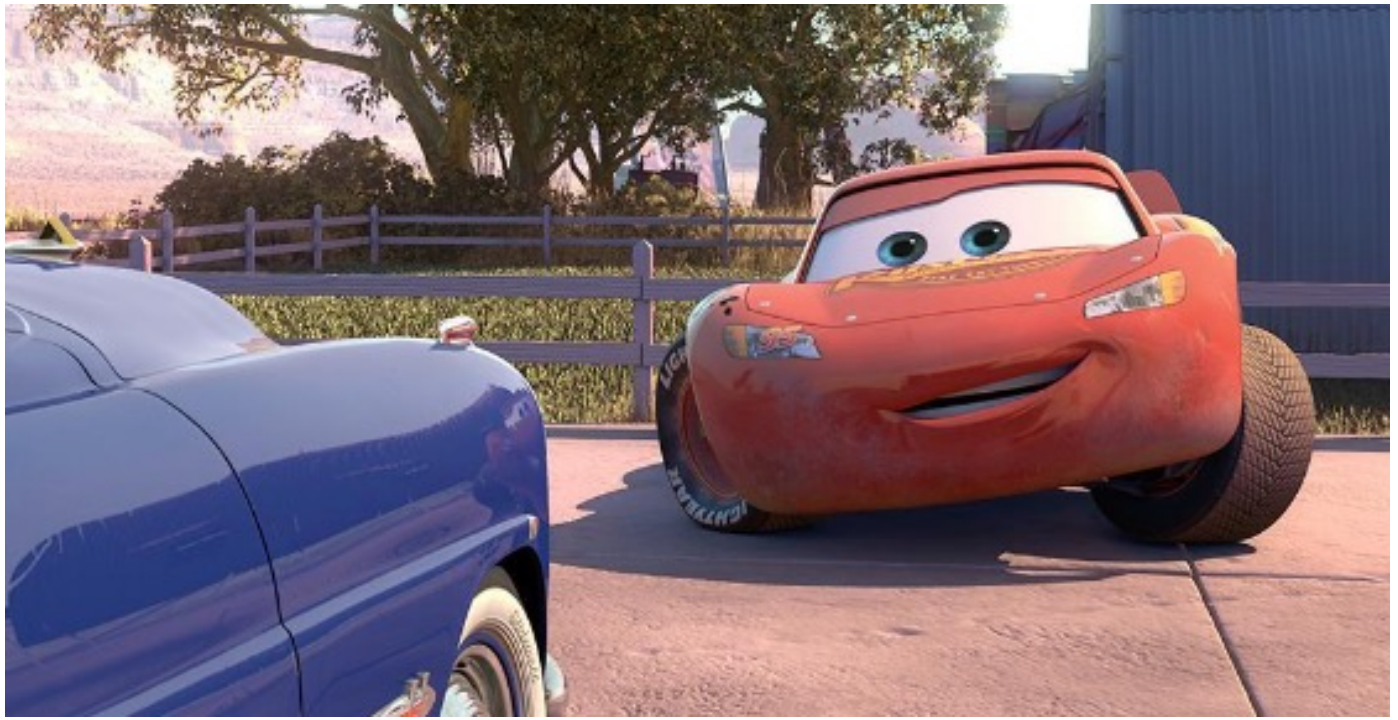
- Participants will complete experiment through Qualtrics accessed on their personal computers
- Film Clips
  - Arousal – Cars Movie (Race Finale)
  - Neutral – Cras Movie (Conversation between Doc and Lightening)
- Word List
  - 2, 15-word lists containing neutral nouns
- Cognitive Load Task
  - Spatial Memory Task – remember distribution of dots in a matrix and reconstruct configuration on numerical keyboard
    - Low Cognitive Load Task - Three dots will be presented in one horizontal or vertical line
    - High Cognitive Load Task - Four dots will be distributed over two or three rows and/or columns of the matrix
- Word Recall task
  - Untimed recall, type in as many words as participants remembers from words list
- Short break
  - Between trials, 3-minute-long neutral video

Method

Film Clip - Arousal

Method

Film Clip - Neutral



Method

Word List 1

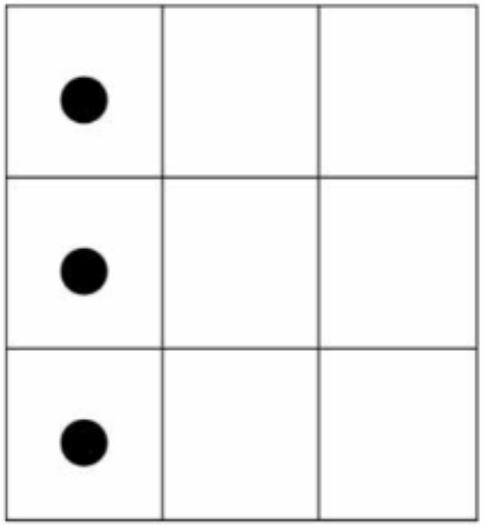
1. Mountain
2. Speaker
3. wheelchair
4. Glass
5. House
6. Fork
7. Spouse
8. Juice
9. Classroom
10. Shoe
11. Bodega
12. Baseball
13. Lumberjack
14. Cloud
15. Armadillo

Word List 2

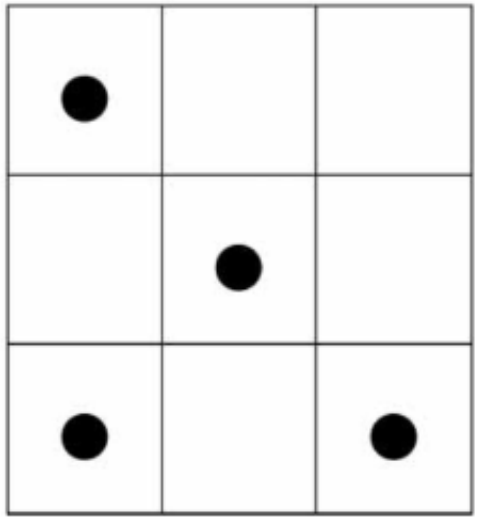
1. Pants
2. Tequila
3. Grass
4. Bell
5. Helmet
6. Tortilla
7. Ambulance
8. Bicep
9. Purple
10. Tornado
11. Recycling
12. Carnival
13. Spectate
14. Giraffe
15. Roommate

Method

Low Cognitive Load Task



High Cognitive Load Task



Method

Design

- Independent Variables
  - **Emotional Arousal**: Determined by the type of film clip shown to participants.
    - tested between subjects to avoid carryover effect
    - Manipulation – arousal vs. neutral film clip
      - Participants randomly assigned to one of the two conditions
  - **Cognitive Load**: Determined by the difficulty of the cognitive load task
    - tested within subjects
    - Manipulation – low vs. high cognitive load task following word recall task.

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

Method

Design cont.

1. Demographic Information
2. Film Clip (arousal vs. neutral dependent on which condition they are in)
3. Word Recall Task
4. Cognitive Load Task
5. 2nd Part of Word Recall Task
6. 3-minute-long Break
7. Repeat steps 2-5

Method

Procedure

1. Demographic Information
2. Film Clip (arousal vs. neutral dependent on which condition they are in)
    1. Participants will watch their designated film clip
3. Word Recall Task
    1. Instructions
    2. 15-word list displayed one word at a time for 4000ms
4. Cognitive Load Task – Low Condition
    1. Instructions
    2. Spatial memory task
        1. Three dots will be presented in one horizontal or vertical line for 3000ms
        2. 1000ms pause with blank screen between each set
        3. Participants recall the distribution and choose from four options displayed on the screen
        4. Repeat for 10 sets
5. 2nd Part of Word Recall Task
    1. Instructions
    2. Untimed, participants recall and write down as many of the previously shown words as they can
6. Short Break – 3-minute neutral film clip

Method

Procedure cont.

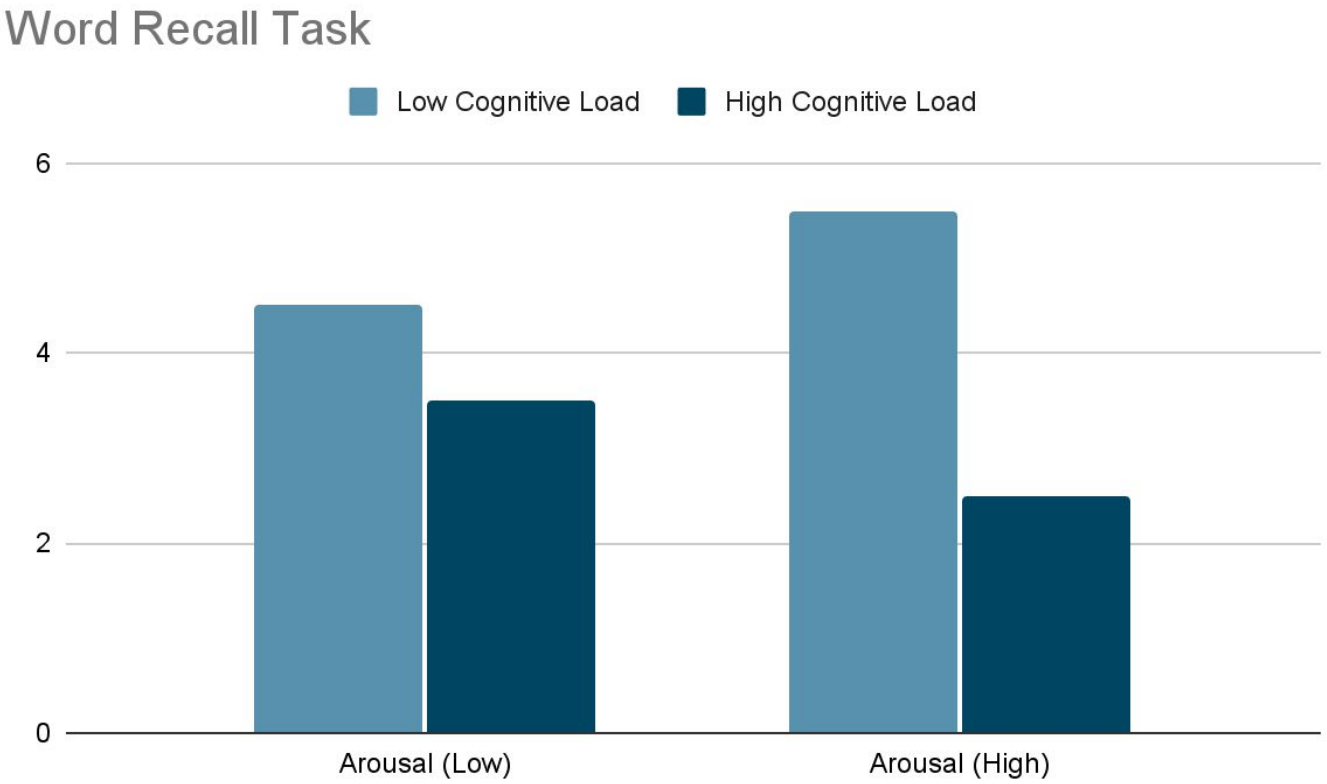
7. Film Clip (arousal vs. neutral dependent on which condition they are in)
    1. Participants will watch their designated film clip
8. Word Recall Task – 2nd Word List
    1. Instructions
    2. 15-word list displayed one word at a time for 4000ms
9. Cognitive Load Task – High Condition
    1. Instructions
    2. Spatial memory task
        1. Four dots will be presented over two or three rows/columns for 3000ms
        2. 1000ms pause with blank screen between each set
        3. Participants recall the distribution and choose from four options displayed on the screen
        4. Repeat for 10 sets
10. 2nd Part of Word Recall Task
    1. Instructions
    2. Untimed, participants recall and write down as many of the previously shown words as they can

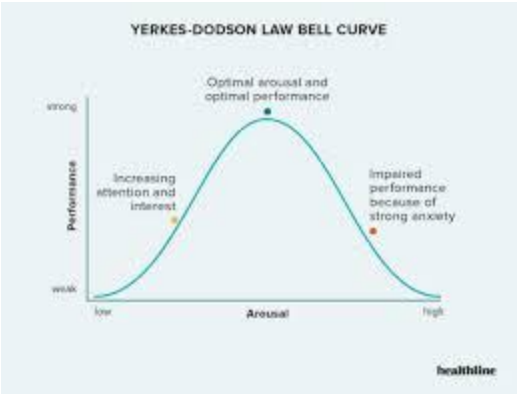
Method

Procedure cont.

- Results of Word Recall Tasks are recorded and analyzed to assess the impact of emotional arousal (IV) and cognitive load (IV) on context memory (DV)

Expected Results





Implications

- Engaging Learning Environments!

- Material Breakdown

- Mental Health

Questions regarding design

- Were the film clips strong representations of high vs low arousal?

- What is the best way to ensure the same emotional arousal persists throughout the trials of the subjects?

- Should the videos be longer than 30 seconds each to have more of an emotional effect on arousal?

Thank you!