

Background

People tend to remember emotional events more vividly than affectively neutral events

However, what kinds of information are preferentially remembered remains an open question

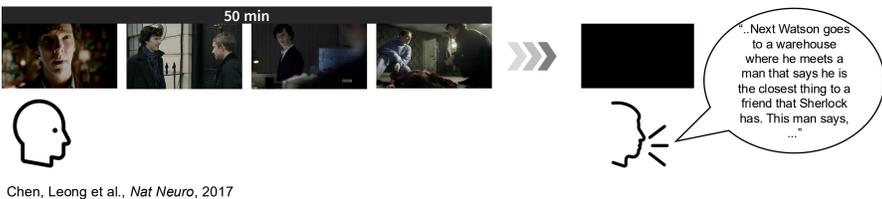
Here, we test how emotional arousal influences memory of **central information** core to an experience and **peripheral information** that are incidental

We take advantage of **Large Language Models (LLMs)** as computational assistants to score naturalistic free recall at scale

Datasets

Two publicly available datasets where participants **watched movie clips** and **verbally recalled** the plot afterwards.

Sherlock (50-min episode)



FilmFest (10 movie clips, ~5 minutes each)



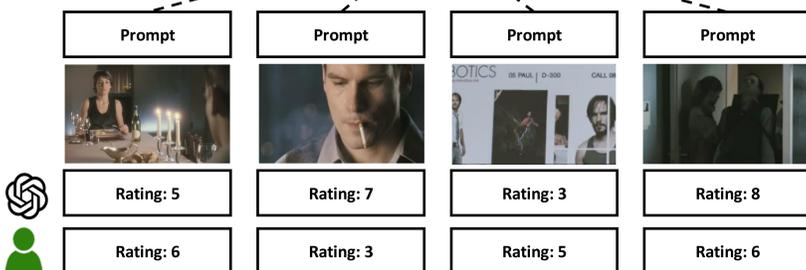
Automated Scoring for Emotional Arousal

Arousal refers to when you are feeling very mentally or physically alert, activated, and/or energized.

Read the following description of a scene and rate the arousal level of the scene on a scale of 1 to 10, with 1 being low arousal and 10 being high arousal.

Please give a numeric rating. Only give the rating; no need to provide explanations.

Scene: {annotation}



Arousal ratings are collected from behavioral experiments (n=30) and large language models for each event.

Validation of Arousal Rating

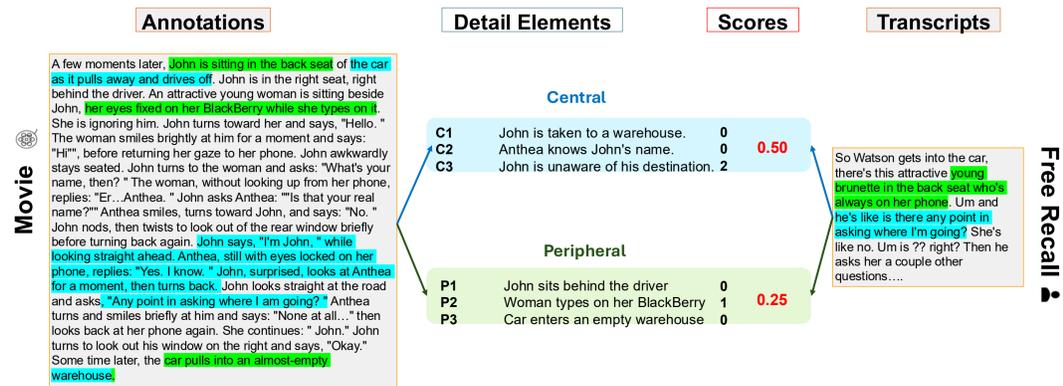
Human behavioral arousal ratings showed strong consistency across participants (Film Festival: one-to-average $r=.72$, $p<.01$; Sherlock: range = 1.39-4.67).

Human behavioral arousal ratings and LLM-generated ratings were positively correlated ($r = .74$, $p<.001$).

Automated Scoring for Memory Fidelity

Central information are **causally essential** elements of a narrative that sustain the storyline.

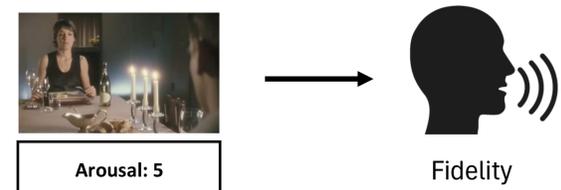
Peripheral information are **descriptive** elements that enrich the narrative context but not essential to its causal structure.



The automated memory fidelity scoring pipeline consists of two parts:

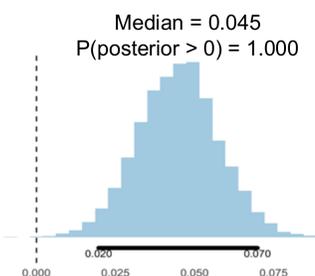
- 1) **Generating elements** for central and peripheral for each event
- 2) **Scoring the memory** performance by comparing participants' free recall with those elements

Effects of Arousal on Memory Fidelity

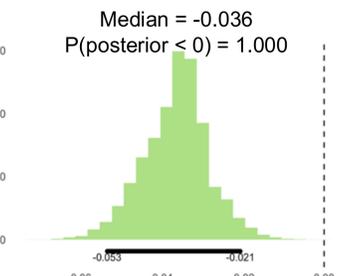


On average, participants recalled significantly **more central details** ($M = 0.75$, $SD = 0.22$) than peripheral details ($M = 0.27$, $SD = 0.15$, $t(31) = 28.8$, $p < .001$).

Central information



Peripheral information



Emotional arousal **enhances central information at the expense of peripheral information**.

Conclusion

Results support **attention-narrowing hypothesis** of emotional memory.

LLM-based scoring provides a **scalable, reproducible** approach to measuring narrative memory fidelity.

Future work will expand to **larger datasets** and **autobiographical memories** to test generalizability.