

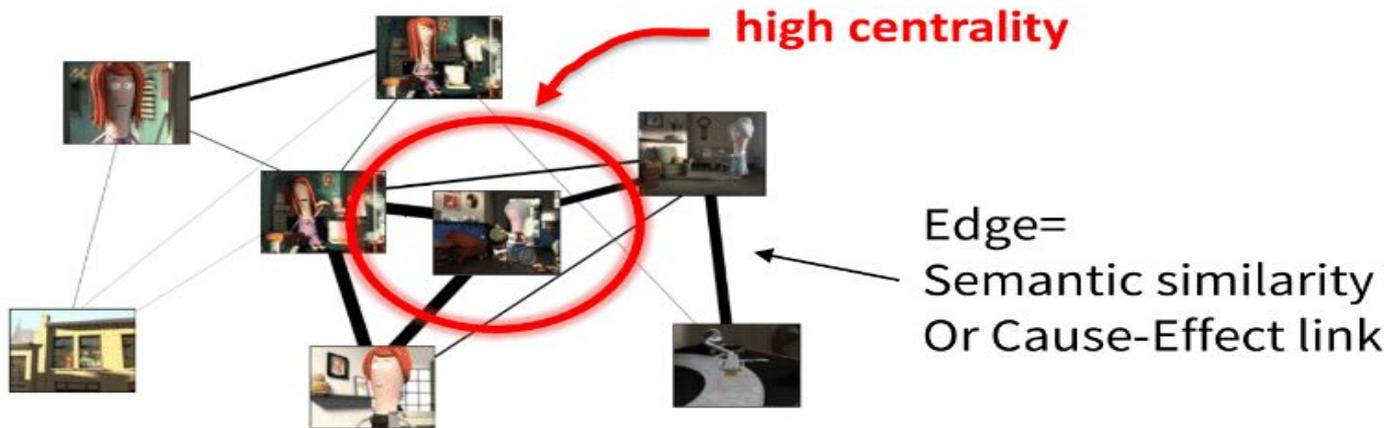
Does narrative network centrality predict both free recall and recognition memory?

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Background

- It has been shown previously that two network measures of narrative structure, causal centrality and semantic centrality, predict later memory in a free recall test.¹
- **Semantic centrality:** reflects the degree to which a given event has shared elements or meaning with other events.
- **Causal centrality:** reflects the degree to which a given event has a cause-effect relationship to other events in the story.



This experiment

Memory Condition



*Watch full movie, events 1-x,
where x is the max number of
events*

Randomized question order



Question 1

- a. b.
- c. d.



Question 2

- a. b.
- c. d.

...

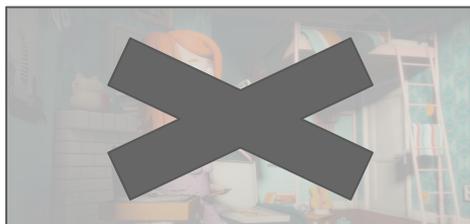


Question x

- a. b.
- c. d.

Hypothesis: We predict that, across events, performance on free recall and **on recognition memory tests** will be correlated (where memory is scored at the event level). Thus, causal and semantic centrality will also positively correlate with accuracy for recognition memory, wherein memory performance is better for more central events.

Naive Condition



Do not watch full movie

Randomized question order



Question 1

- a. b.
- c. d.



Question 2

- a. b.
- c. d.

...



Question x

- a. b.
- c. d.

Considerations when making questions



What happens to Frank as he is trying to escape?

- a. **He falls**
- b. He is shot
- c. He is tackled
- d. He stops to throw up

What does Frank do when he sees the guards approaching?

- a. Runs faster
- b. Gives up
- c. **Keeps crawling**
- d. He tries to unlock one of the cell doors

What do the guards do to catch Frank?

- a. Knock him flat to his stomach
- b. Handcuff him
- c. Force him against the wall
- d. **Put a gun to his head**

What does Frank do after he has been caught?

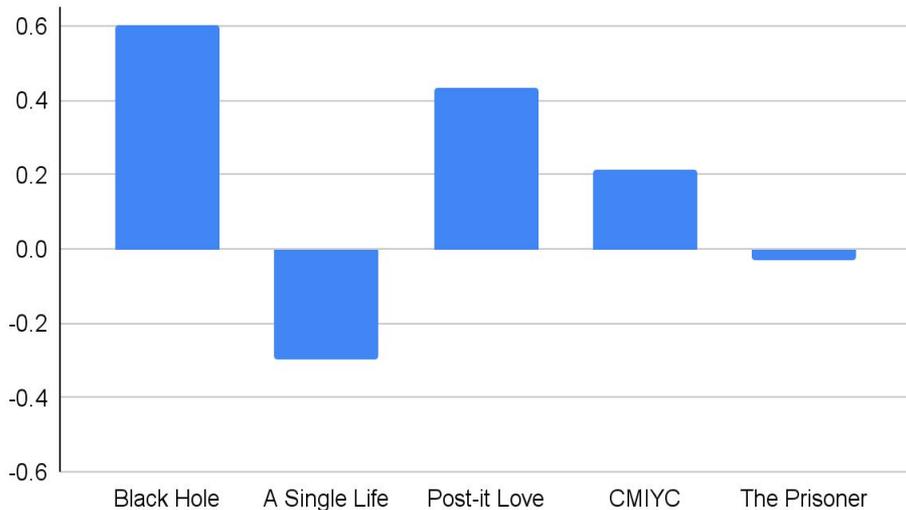
- a. **He gives up**
- b. He tries running away
- c. He begs Carl to let him go
- d. He tries to fight off the guards

What does Frank say to Carl in the final scene?

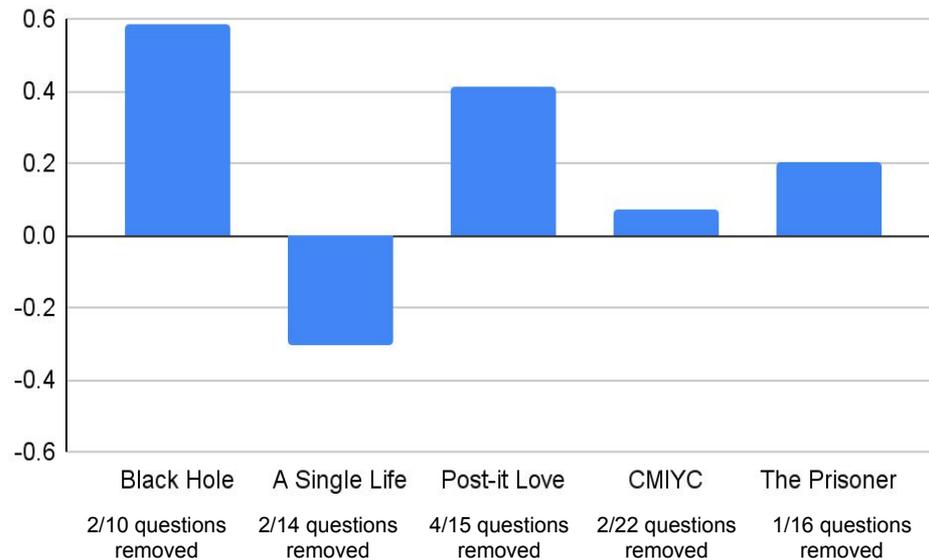
- a. "Well... I tried."
- b. **"Okay Carl, let's go home."**
- c. "So close..."
- d. "Are you happy now?"

Results - Recall and Recognition

Correlation between Free Recall and Recognition Accuracy



Without Biased Questions - Correlation between Free Recall and Recognition Accuracy

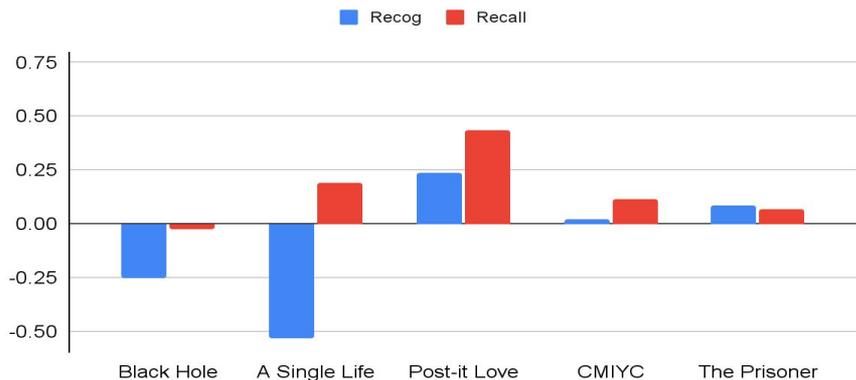


Questions that more than 70% of naive participants got correct were removed

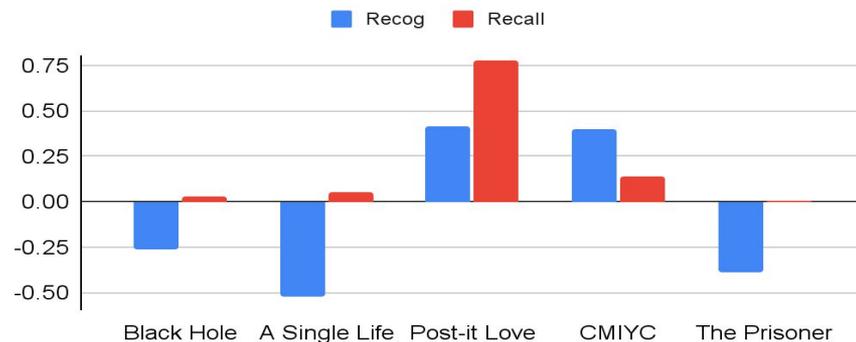
Results - Narrative Structure and Memory Accuracy

Questions that more than 70% of naive participants got correct were removed

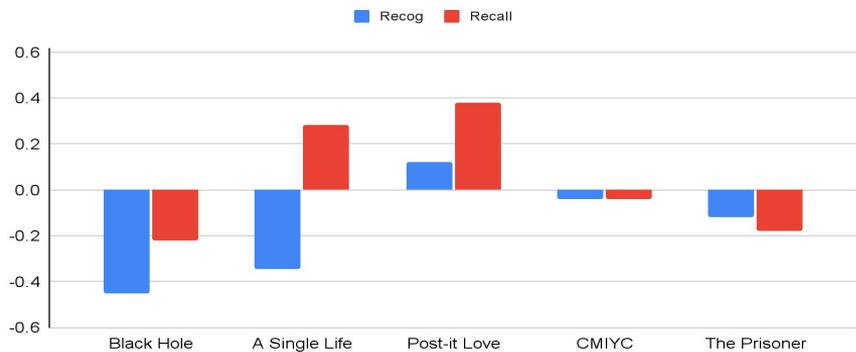
Correlation between Causal Centrality and Memory Accuracy



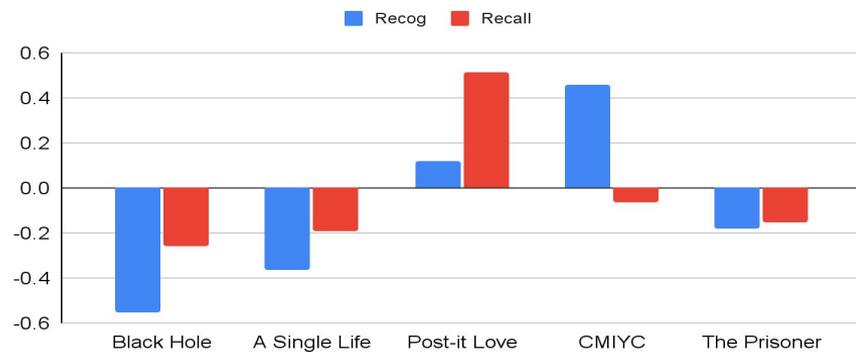
Without Biased Questions - Correlation between Causal Centrality and Memory Accuracy



Correlation between Semantic Centrality and Memory Accuracy



Without Biased Questions - Correlation between Semantic Centrality and Memory Accuracy



Future Directions

- Have 5 more movies that we have fMRI data for that we could do this analysis for
- Change and improve questions that a high number of participants from the memory condition answered incorrectly

Thanks and Acknowledgements



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Paulina Medina