Phenomenology of thought during memory encoding for verbal and visual material

Brecken Marome

Faculty/Graduate Advisors: Dr. Jonathan W. Schooler & Shivang Shelat

Department of Psychological & Brain Sciences, University of California, Santa Barbara

META LAB
Memory Emotion Thought Awareness

Background

Our inner experience and the focus of our thoughts changes from moment to moment [1], and this is affected by stimuli in our surroundings [2].

Internal and external experience are processed by the same modality-specific brain regions [3], suggesting a competition for resources [4].

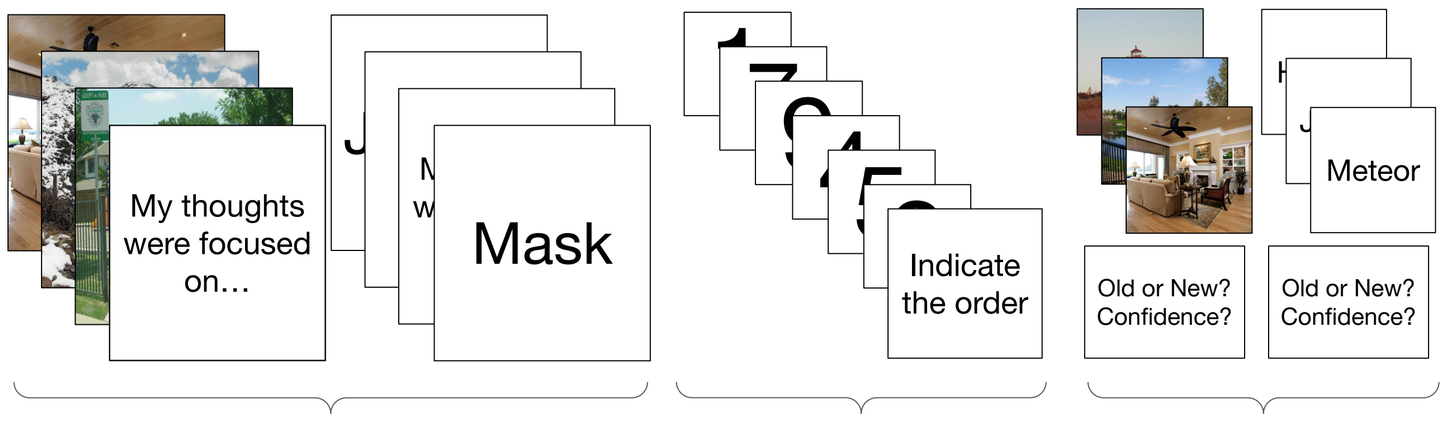
Here, we test for the first time whether qualities of thought interact with task-related/unrelated focus to predict memory encoding for words and images. We also test how task-relatedness of thought and the material being studied differentially affect inner experience.

Research questions:

1. Which thought qualities correlate with one another?
2. Are thought qualities different when studying words vs. images?
3. Are thought qualities different when on-task (OT) vs. task-unrelated thinking (TUT)?
4. Does OT vs. TUT affect memory encoding?
5. Do thought qualities interact with OT vs. TUT to affect memory encoding?

Methods

Procedure



Study Phases
order randomized

Digit Span Task

Test Phases
order matches study

Stimuli: 60 words [5] and 60 complex visual scenes [6] (½ for study phase, ½ for foils during test)
→ stimuli matched for memorability (0.67 to 0.71) and images matched for vibrance/brightness

Participants: n = 67 (M_{age} = 19 ± 0.94)
Metrics: hits, false alarms

Task-relatedness: *on-task* vs. *task-unrelated* (everyday things, a current state of being, personal worries, daydreams, or external environment) [7]

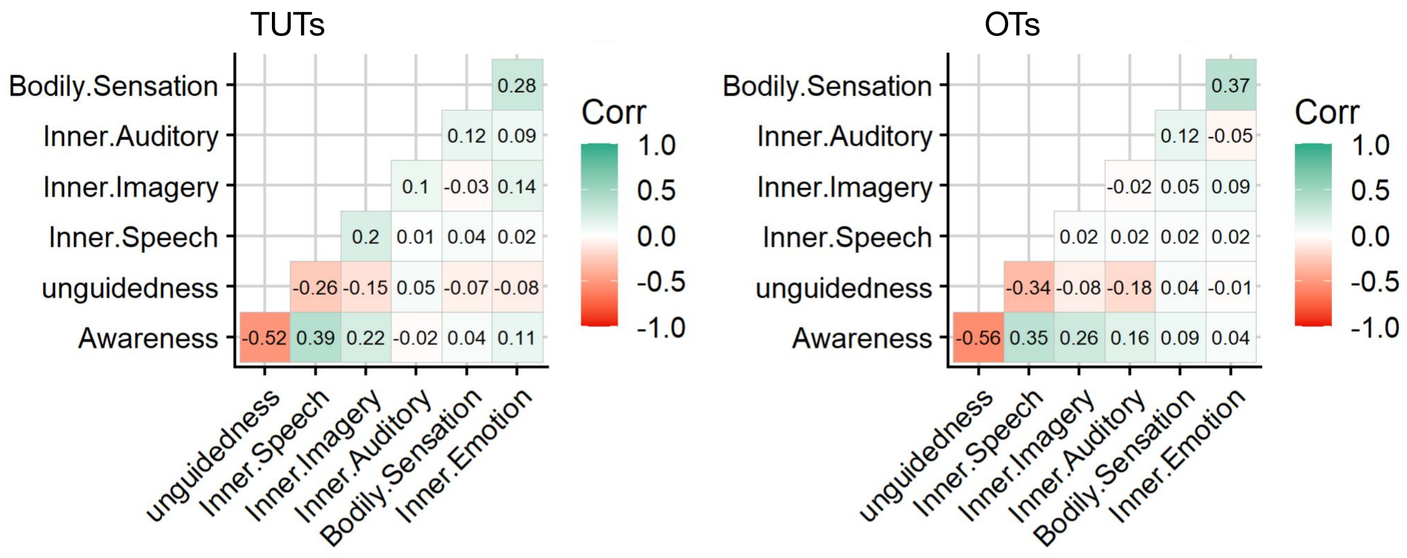
Thought qualities

Unguidedness: thoughts that you are not controlling
Awareness: thoughts that you had explicit knowledge of
Speech: internally talking to yourself
Imagery: visual experience of a mental image
Auditory: sound quality, like a tune in your head
Bodily: focusing on a pain or itch in your foot, for example
Emotion: strongly valenced thought (e.g., sad or happy)

Results

*p<.05, **p<.01,***p<.001

Thought qualities correlate with one another

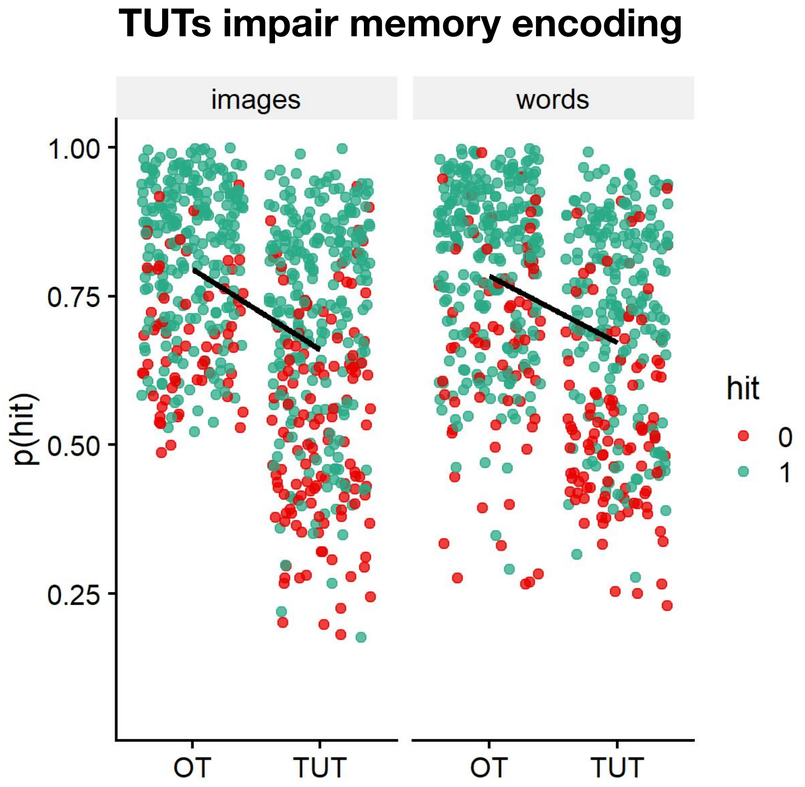


Thought qualities are influenced by the stimuli being studied and the task-relatedness of thoughts

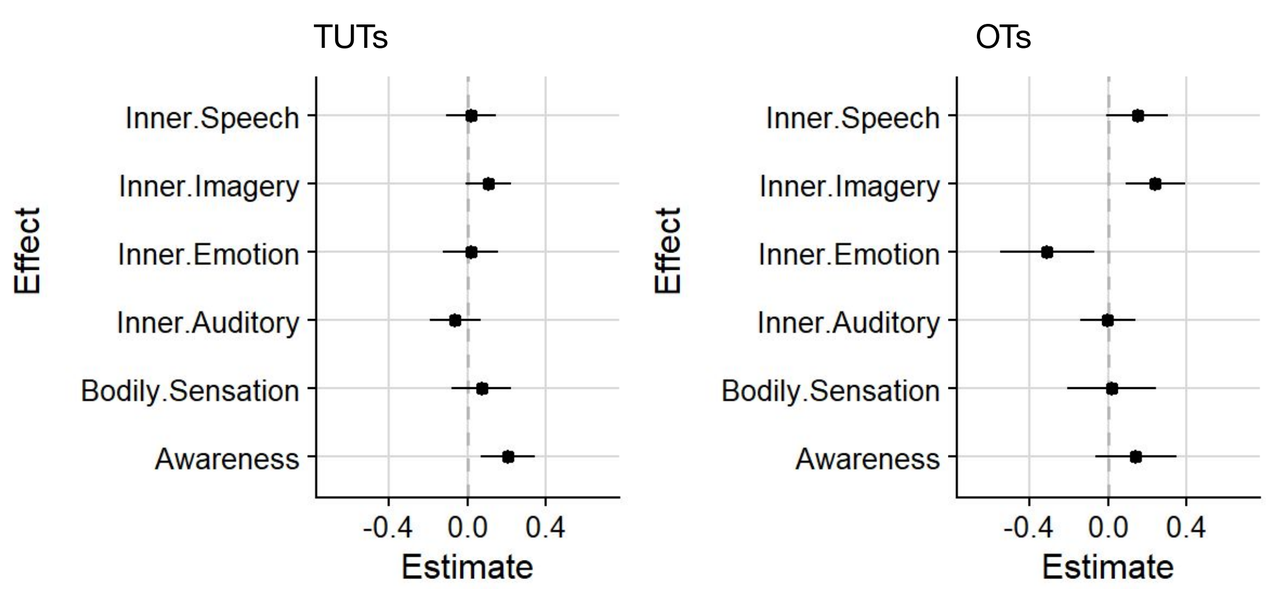
Thought Quality	Model Parameter	Beta
Unguidedness	Words = Images	-0.14
Awareness	Words = Images	0.11
Speech	Words = Images	0.17
Imagery	**Words < Images**	**-0.75*****
Auditory	**Words > Images**	**0.57*****
Bodily	Words = Images	-0.09
Emotion	**Words < Images**	**-0.33*****

Thought Quality	Model Parameter	Beta
Unguidedness	**TUT > OT**	**1.14*****
Awareness	**TUT < OT**	**-0.97*****
Speech	**TUT < OT**	**-0.55*****
Imagery	**TUT < OT**	**-0.79*****
Auditory	**TUT > OT**	**0.30***
Bodily	**TUT > OT**	**0.27****
Emotion	**TUT > OT**	**0.50*****

TUTs impair memory encoding



Awareness decreases negative effects of TUT encoding; Imagery improves and emotion worsens OT encoding



References: [1] Blondé et al. (2022) [2] Choi et al. (2017) [3] Gorgolewski et al. (2014) [4] Villena-González et al. (2016) [5] Madan (2020) [6] Bylinskii et al. (2015) [7] Kane et al. (2021)

Acknowledgements:
I would like to extend a gracious thank you to Dr. Jonathan W. Schooler for overseeing this project and Dr. Barry Giesbrecht for agreeing to be my faculty reader.
Thank you to Shivang Shelat for his continued support and guidance throughout this process.
Funding was provided by the Undergraduate Research and Creative Studies (URCA) Grant.