



Aging effects on perceptual and conceptual memory: transformations from short-term to long-term memory

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Research Purpose

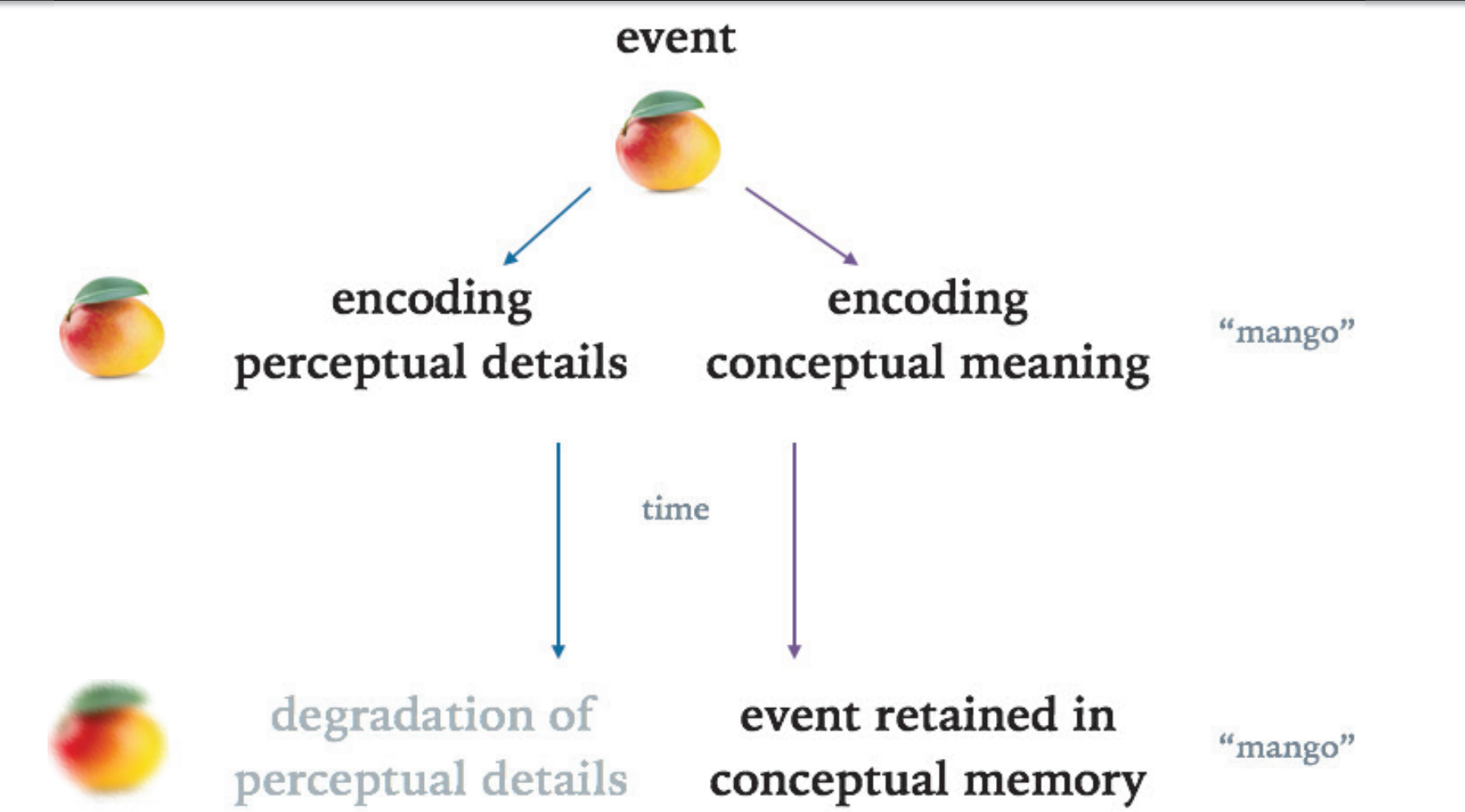
To determine if memories transform from perceptual to conceptual over time and to identify the effect of aging on this transformation

Abstract

Conceptual and precision memory are two functions of healthy and adaptive memory. Conceptual memory retains the gist of events. Precision memory allows memory of specific perceptual details of events, contrasting them from other similar experiences. Precision and conceptual memory may be differentially important for short-term memory and long-term memory. Long-term memories may have a tendency to retain meaning but lose details. This is adaptive in daily life, but may be a problem in certain situations, like during eyewitness testimonies, where details rather than generalities are essential. Loss of memory precision also characterizes normal aging, but it is unclear whether this occurs because details are lost in long-term memory or they are not encoded in short-term memory. The purpose of the study was to determine if memories transform from perceptual to conceptual over time and identify the effect of aging on this relationship.

Subjects' memory were tested for general meaning (conceptual memory) or specific details (perceptual memory) either immediately (short-term) or after thirty minutes (long-term). Preliminary results show that short-term memory supports quicker and more accurate judgments of perceptual details, whereas long-term memory supports quicker and more accurate judgments of meaning. Future testing will assess whether older adults are quicker and more accurate in judgments of meaning in both long and short-term memory, suggesting that older adults process events on a conceptual level even when information is maintained over very short delays.

Theory



Methods

Experimental Design

- Thirty subjects shown images
- Tested for:
 - General meaning (conceptual memory)
 - Specific details (perceptual memory)
- Tested either immediately (short-term) or after thirty minutes (long-term)

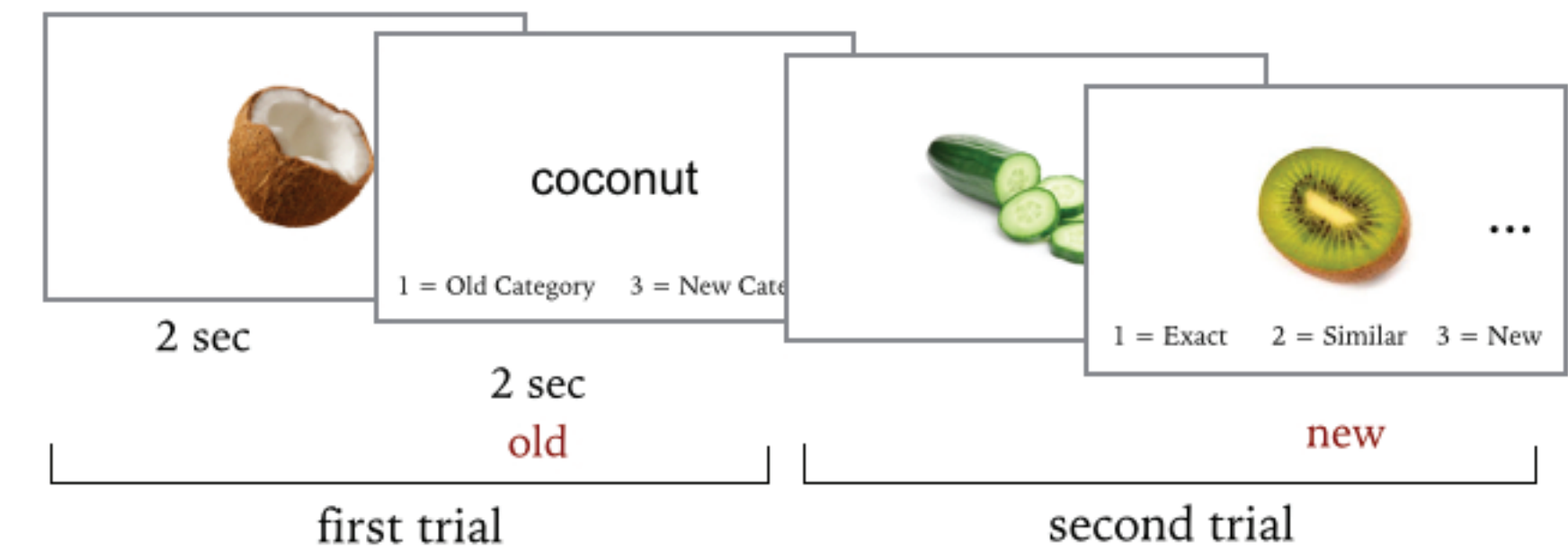
Stimuli fell into one of five conditions:

	Condition	Study	Test
Perceptual memory	Exact		
	Similar		
	New	—	
Conceptual memory	Old Concept		coconut
	New Concept	—	pineapple

For both long-term and short-term memory tasks, there were 27 stimuli for each condition.

Short-term Memory Task

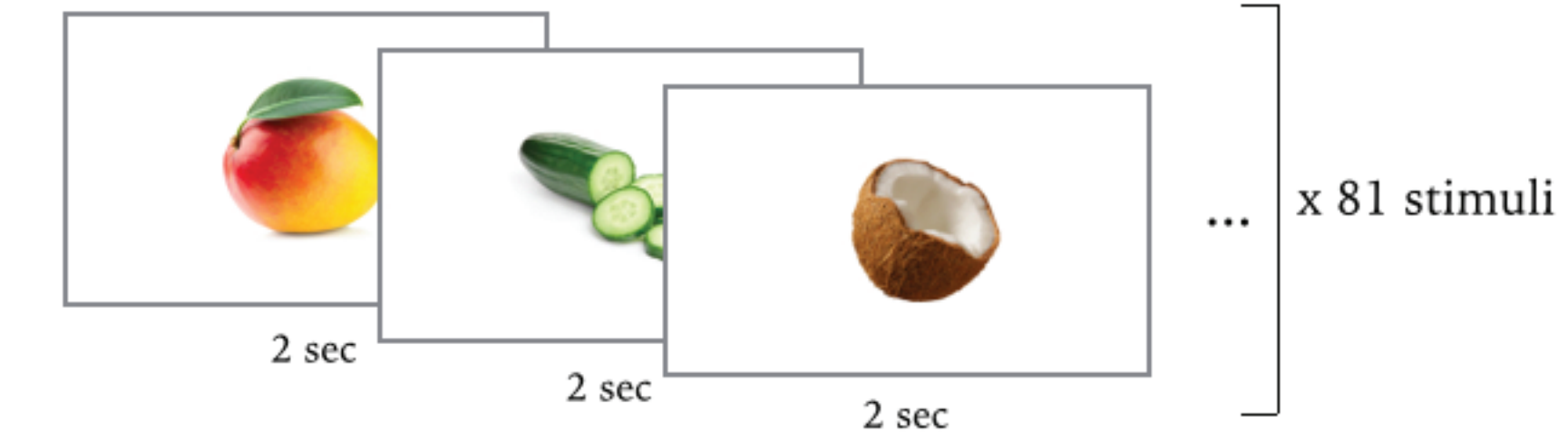
Combined Study & Test



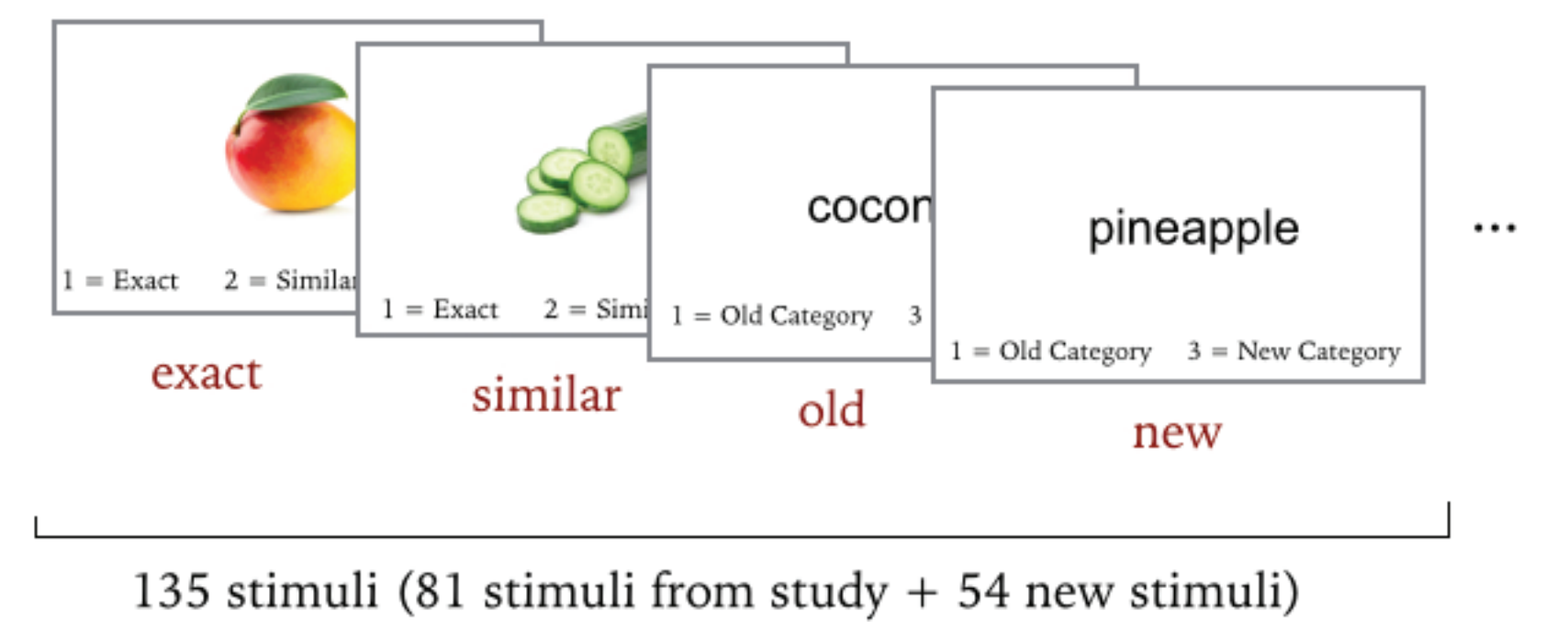
- View stimuli for 2 seconds, tested after a 2 second delay (fixation cross)
- 135 trials of conceptual and perceptual memory tasks intermixed

Long-term Memory Task

Study Phase

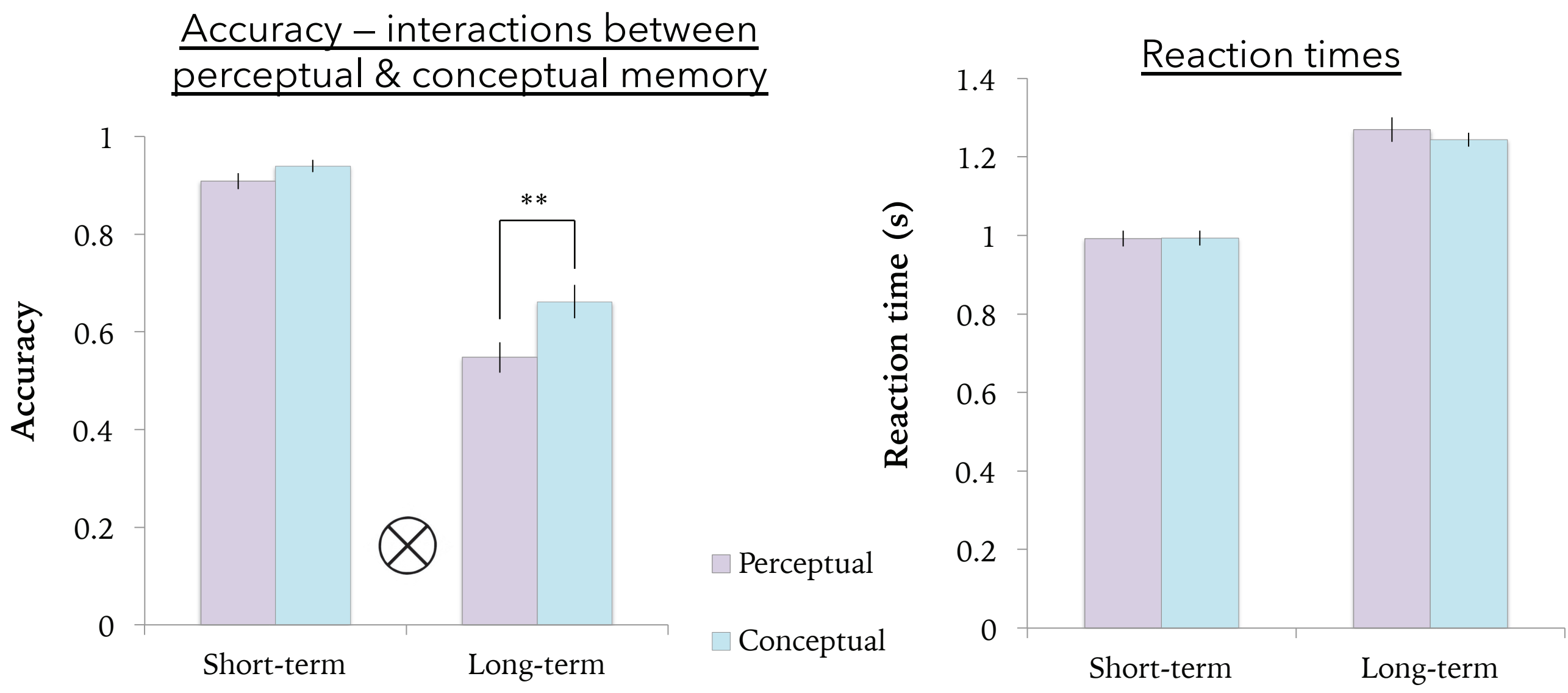


Test Phase



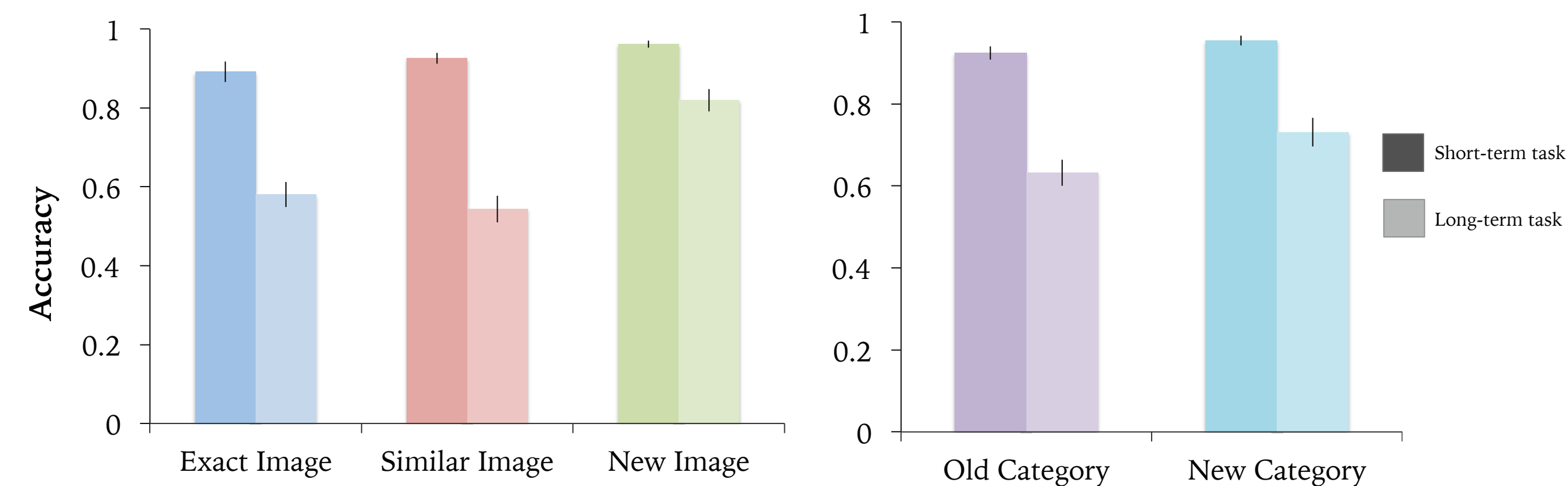
- View all 81 stimuli for 2 seconds, with a 4 second delay
- Tested on all images with conceptual and perceptual tasks intermixed

Results

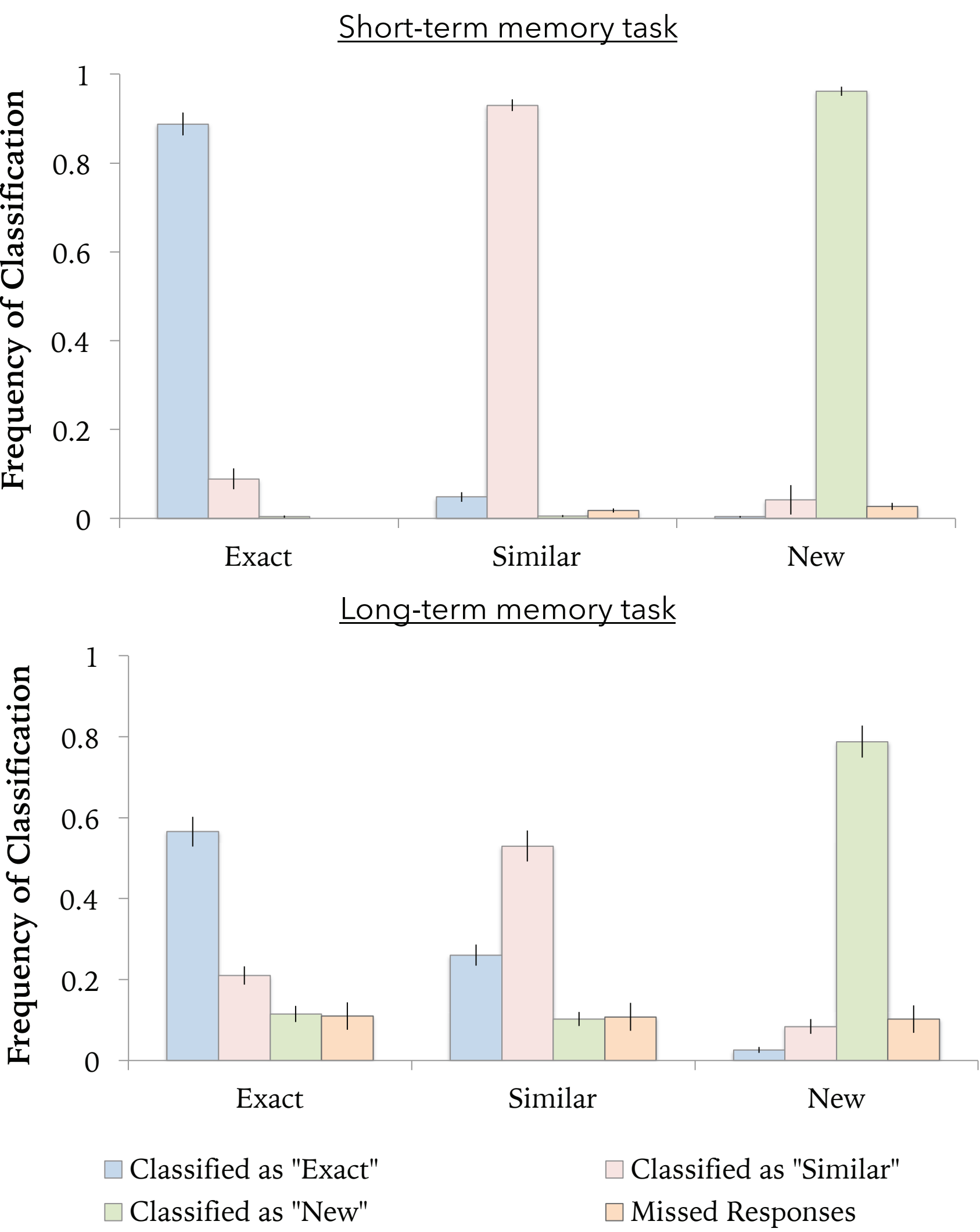


- The decay in perceptual memory over time is significantly greater than the decay in conceptual memory over time.
- There are no differences in accuracy or reaction times between perceptual and conceptual memory in the short-term tasks.

Accuracy Breakdown



Perceptual Memory Task–Response Breakdown



- Within the perceptual task, confusion was between exact and similar images, rather than due to completely forgetting the image

Conclusions

- In healthy young adults, perceptual details are readily perceived and maintained over short delays.
- Immediate judgments about perceptual details and about meaning are equally fast and accurate.
- With time, memories retain the gist but lose perceptual details.
- The loss of perceptual detail over time is greater than the loss of conceptual memory.

Future Directions

Aging Study

- Prior studies showed that older adults remember disproportionately less perceptual details than young adults, even when they retain the gist of experiences.
- I will be testing whether this effect is because there is greater perceptual decay over time or because the details are not encoded in the first place.

Acknowledgements:

Funding provided by the Office of the Vice President for Research & Innovation. Special thanks to the Brain & Memory Lab, particularly Dr. Dasa Zeithamova-Demircan, Dr. Caitlin Bowman, and Alex de Araujo for the guidance and to Anthony Resnick, Stefani Aleman, Zoey Hu, and Hanna Hostick for data collection.

References

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