

Objective

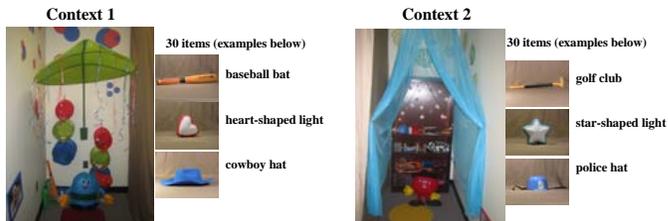
To develop a novel source memory paradigm for use with young children in order to examine recollection and familiarity processes at both behavioral and neural levels.

Introduction

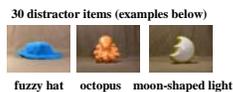
- Dual-process models of recognition memory suggest that successful retrieval of previously learned information relies on two distinct cognitive processes (e.g., Yonelinas, 2002):
 - Familiarity ("knowing" that something has been seen before)
 - Recollection ("remembering" associated contextual details)
- In adults, these processes have been shown to engage separable networks within medial temporal lobe and prefrontal regions (Yonelinas et al., 2005) and generate different temporospatial patterns of electrical activity that can be recorded at the scalp (Duarte et al., 2004).
- Research during middle childhood suggests that these processes show different developmental trajectories at both the behavioral and neural level (e.g., Cycowicz, et al., 2001; Czernochowski et al., 2005; Drummey & Newcombe, 2002).
- Unfortunately, due to the high demands of many existing source memory paradigms, few studies have examined the developmental trajectories of recollection and familiarity in early childhood (cf. Riggins et al., 2009).
- This study presents pilot data from a novel behavioral source memory paradigm designed to incorporate both behavioral and electrophysiological indices of memory-related processing in early childhood.

Method

- Children visited the laboratory on 2 different occasions approximately 1-week apart
 - Mean delay = 7 days (range 6-9 days)
- Visit 1 - Encoding:** Children were shown 2 sets of novel items (30 in each set) in 2 different contexts. Items were matched across sets. During this encoding session, each item was associated with an action the child imitated. Order of items was randomized and order of the contexts was counterbalanced.



- Visit 2 - Retrieval:** Children were shown the 60 previously-viewed items and 30 distractor items (15 matched, see examples below) in random order.
- Children were asked to behaviorally sort the items to the appropriate context (Context 1 or Context 2) or to a "new" item bin if they had never seen the item before.

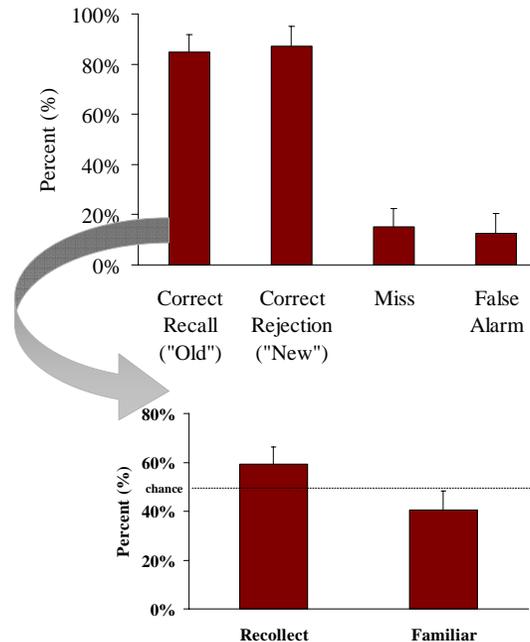


Participants

- 15 children (8 male, 7 female) between 5 and 6 years of age participated in the study.
 - Mean age = 5 years, 8 months (Range: 5 years, 1 month - 6 years, 6 months)
- All participants were born full term and had no history of brain injury, cognitive impairment, or diagnosis of developmental disorders.
- All procedures were approved by the University Institutional Review Board. Prior to testing, consent was obtained from parents and all procedures were explained to the children.

Results

- Overall, children recalled 84.67% of the "old" items (Correct Recall) and Correctly Rejected 87.11% of the "new" items.
 - Miss and False Alarm rates were quite low (15.33% and 12.67% respectively).
- Out of the items the children recalled, 59.44% were sorted to the correct context indicating accurate memory for the source of the item (i.e., recollection), $t(14) = 4.38, p < .001$.



Discussion

- This study presents a novel behavioral memory paradigm that can be used to examine recollection and familiarity in early childhood.
- Results indicated that, after a 1-week delay, children were able to judge previously seen items as "familiar" and reliably "recollect" contextual information (i.e., source location) associated with the items.
- Future directions of this work include:
 - Using this paradigm to examine developmental trajectories of recollection and familiarity across the early childhood years.
 - Combining behavioral recall performance with electrical brain responses (event-related potentials, ERPs) generated to the stimuli in order to index activity of the neural systems underlying recollection and familiarity across development.

References

- Cycowicz, Y. M., Friedman, D., Snodgrass, J. G., & Duff, M. (2001). Recognition and source memory for pictures in children and adults. *Neuropsychologia, 39*, 255-267.
- Czernochowski, D., Mecklinger, A., Johansson, M., Brinkmann, M. (2005). Age-related differences in familiarity and recollection: ERP evidence from a recognition memory study in children and young adults. *Cognitive, Affective, & Behavioral Neuroscience, 5*(4), 417-433.
- Drummey, A.B. & Newcombe, N.S. (2002). Developmental changes in source memory. *Developmental Science, 5*, 502-513.
- Duarte, A., Ranganath, C., Winward, L., Hayward, D., & Knight, R. T. (2004). Dissociable neural correlates for familiarity and recollection during the encoding and retrieval of pictures. *Cognitive Brain Research 18*, 255-272.
- Riggins, T., Miller, N. C., Bauer, P. J., Georgieff, M. K., & Nelson, C. A. (2009). Electrophysiological indices of memory for temporal order in early childhood: Implications for the development of recollection. *Developmental Science, 12*(2), 209-219.
- Yonelinas, A. (2002). The nature of recollection and familiarity: A review of 30 years of research. *Journal of Memory and Language, 46*, 441-517.

Acknowledgements

- The authors would like to thank the families who participated in this study and the members of the Neurocognitive Development Lab for assistance with data collection (AJ Cherenzia, Martin Folkoff, Leslie Hainley, Katherine Lopez, Meredith Polm, Maria Massiani, Graciela Mujica, Victoria Smith, Lauren Shuck).
- Support for this research was provided by the Department of Psychology at the University of Maryland, College Park.
- For more information please email the first author at: riggins@umd.edu or visit our website at: <http://www.bsos.umd.edu/psyc/riggins>

