

Spatial Reference Frames

- Egocentric (~ 8-12 mo; e.g., Bremner, 1978)
- Allocentric
 - Global (~18-24 mo; e.g., Newcombe, Huttenlocher, Drummey, Wiley, 1998)
 - Local (~5-6 yr; e.g., Nardini, Burgess, Breckenridge, & Atkinson, 2006)



Why does the use of local frames develop so late?

What contexts support the use of local frames for young children?

Three behavioral tasks:

- Memory task – experimenter hides toy under cup, child retrieves after short delay
- Comprehension task – child locates toy based on verbal description

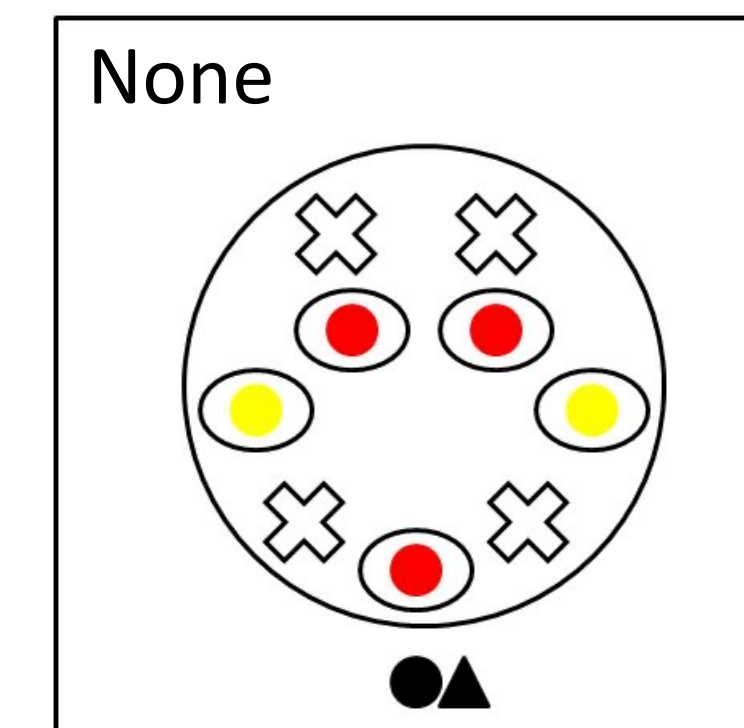
Bremner, J.G. (1978). Egocentric versus allocentric spatial coding in nine-month-old infants: Factors influencing the choice of code. *Developmental Psychology*, 14, 346-355.

Nardini, M., Burgess, N., Breckenridge, K., & Atkinson, J. (2006). Differential developmental trajectories for egocentric, environmental, and intrinsic frames of reference in spatial memory. *Cognition*, 101, 153-172.

Newcombe, N., Huttenlocher, J., Drummey, A.B., & Wiley, J.G. (1998). The development of spatial location coding: Place learning and dead reckoning in the second and third years. *Cognitive Development*, 13, 185-200.

Method

Four rotation conditions (within subjects); global cues were eliminated by curtains



No Rotation:

Maintains alignment of both egocentric and local allocentric from encoding to retrieval

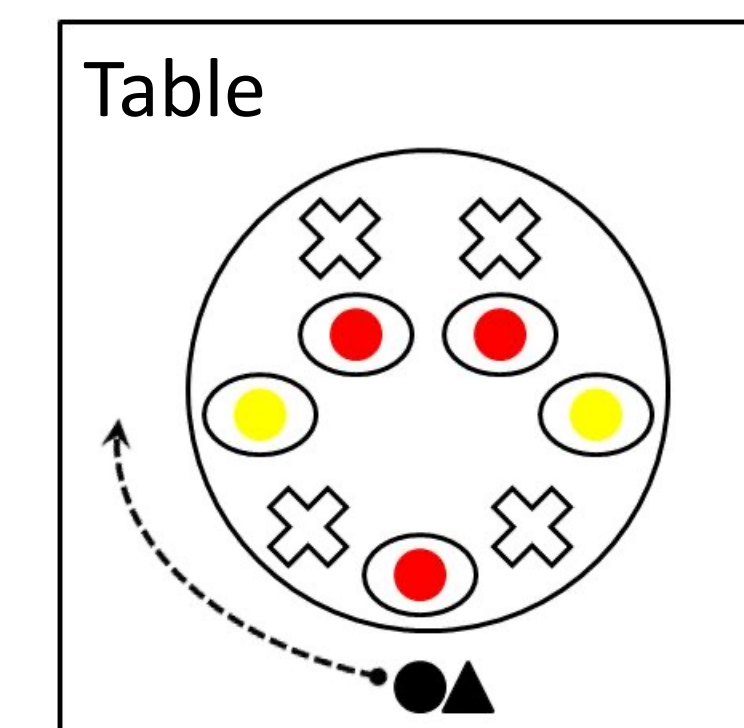
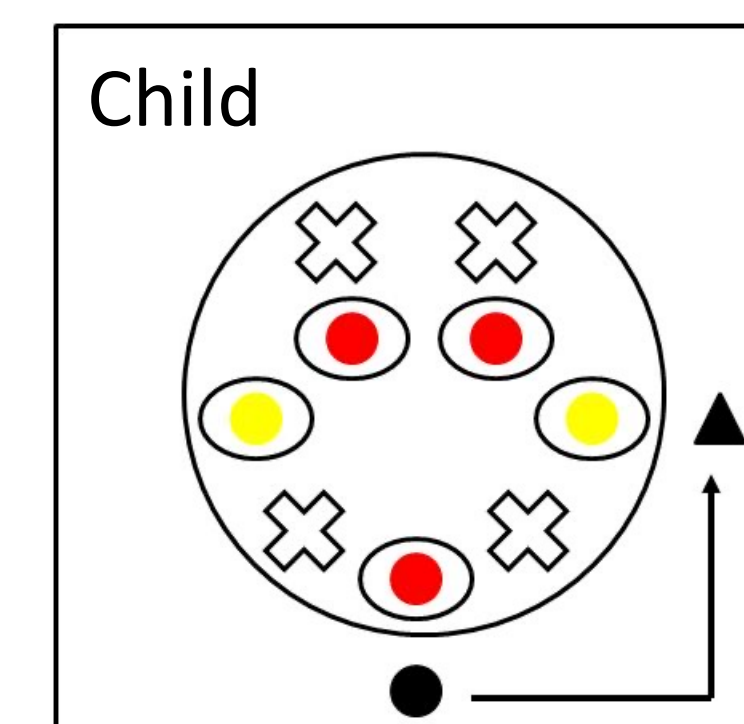


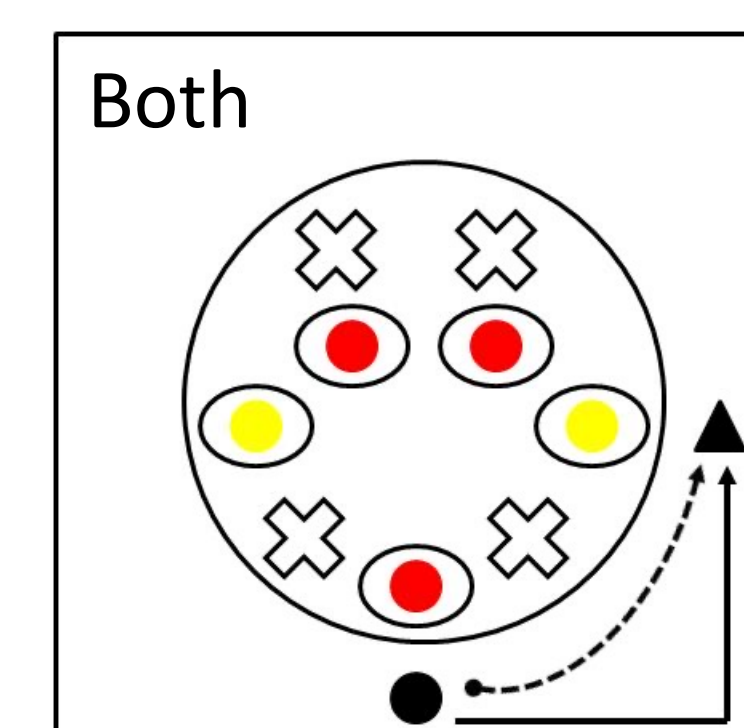
Table Rotation:

Disrupts egocentric alignment, maintains local allocentric from encoding to retrieval



Child Rotation:

Allows for egocentric updating, maintains local allocentric from encoding to retrieval



Both Rotation:

Re-aligns egocentric (ignore updating), maintains local allocentric from encoding to retrieval

Experiment 1:

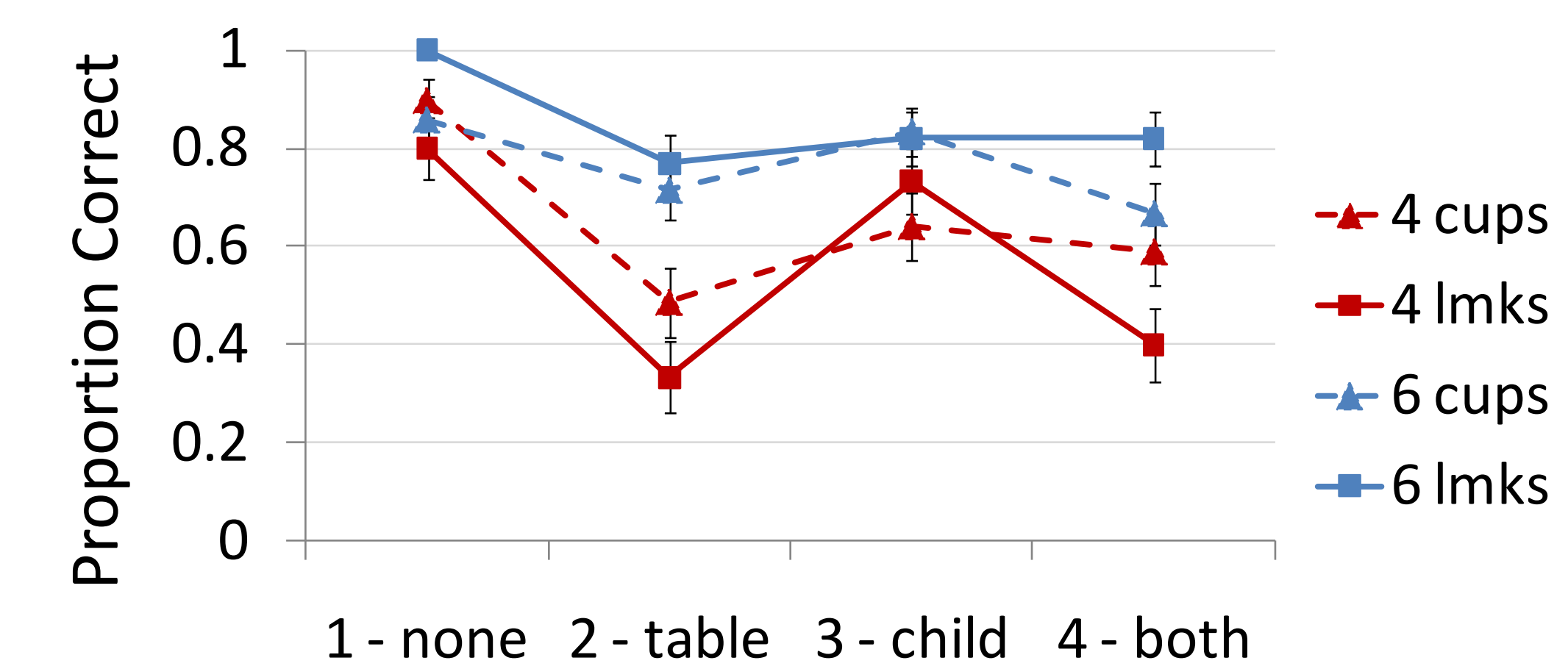
- 4- and 6-year-olds (n = 23, 27)
- Between subjects: Cups, Landmarks
- All children completed memory task; those in Landmarks condition also completed comprehension task

Experiment 2:

- Only 4-year-olds (n = 27)
- Between subjects: Verbal Cue, No Verbal Cue
- All children completed production task, memory task, and comprehension task

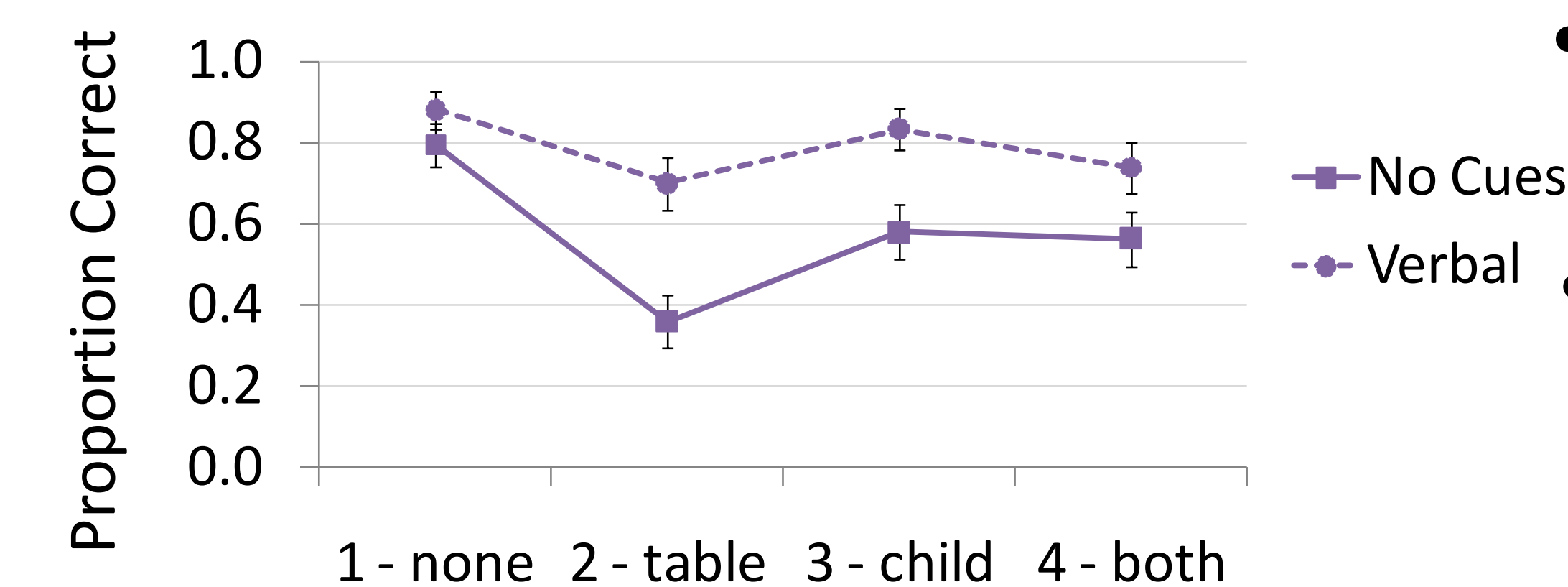
Results

Exp 1 Memory Task: How do kids use Ego vs Local reference frames?



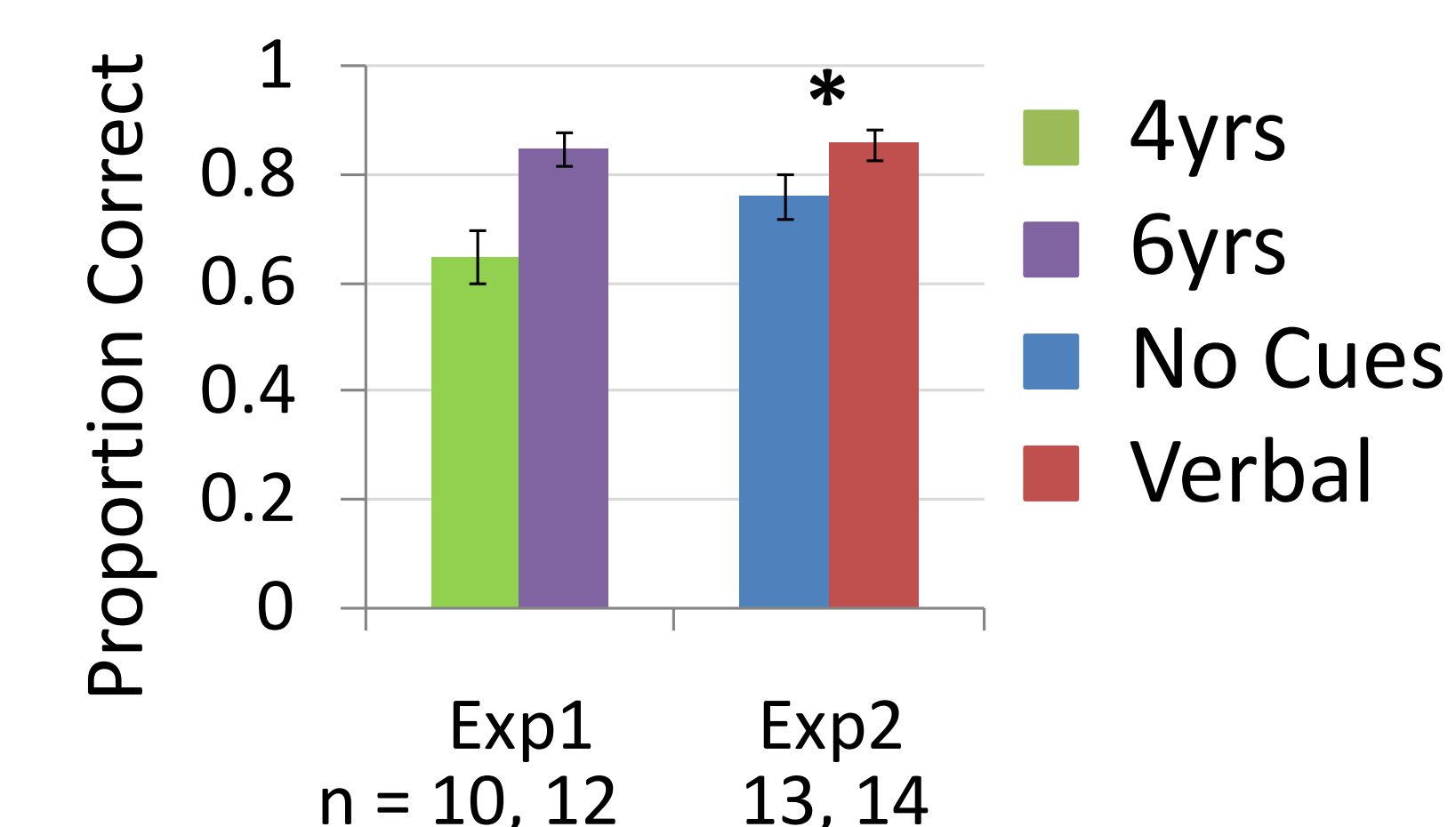
- Main effects of Age, Rotation; Age x Rotation interaction
- 4yr: 1-none > 2-table/4-both, 3-child > 2-table
- 6yr: 1-none > 2-table/4-both
- Age x Condition interaction

Exp 2 Memory Task: Can 4-year-olds incorporate verbal cues?

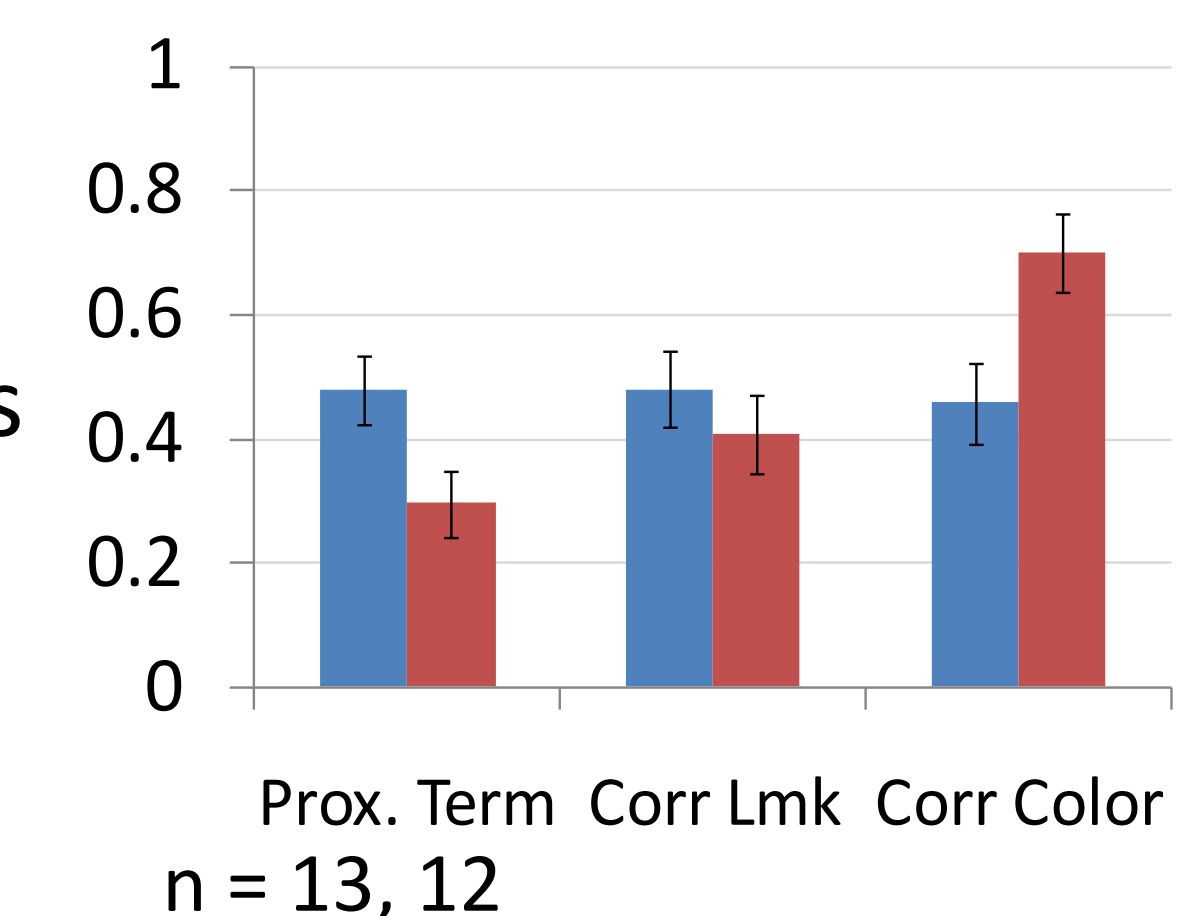


- Main effect of Condition
- Verbal > No Cues
- Main effect of Rotation
- 1-none > 2-table/4-both, 3-child > 2-table

Comprehension Task



Production Task



- Verbal cues (memory task) improved comprehension
- No *a priori* difference in production

Conclusions

- Egocentric updating at both 4 and 6 years in the memory task
- Without verbal cues, 6-year-olds but not 4-year-olds can use the local allocentric reference frame to remember locations
- No differences in 4- and 6-year-olds' comprehension within local allocentric frame; 4-year-olds don't produce descriptions well
- Providing verbal cues while hiding toy improved 4-year-olds' use of local allocentric reference frame
- **Future question: how enduring is this benefit? Can 4-year-olds spontaneously verbalize without instructions?**