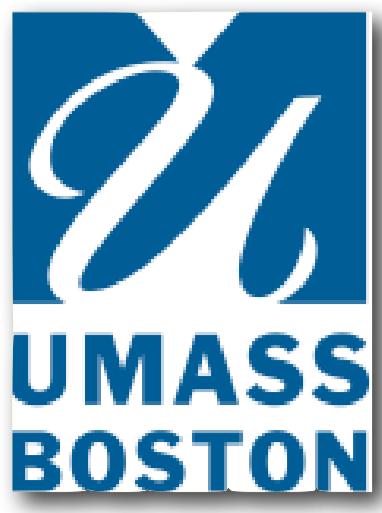
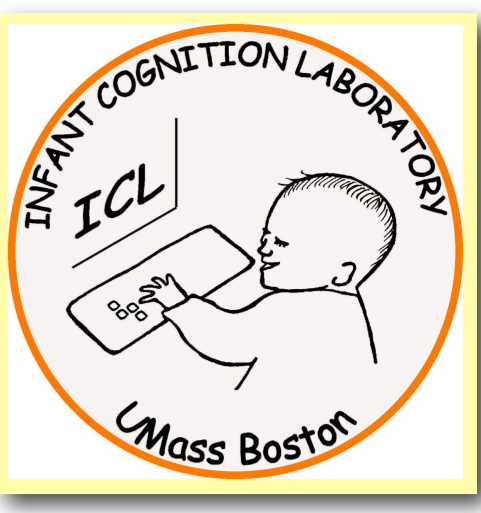


# Fast development of iconic memory: Infants' capacity matches adults'



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## Motivation

Iconic memory is the first visual information buffer, yet its capacity has never been measured in infants.

## Goal

Devise a partial report iconic memory paradigm that can be applied both to infants and adults. Compare their capacities.

## Introduction

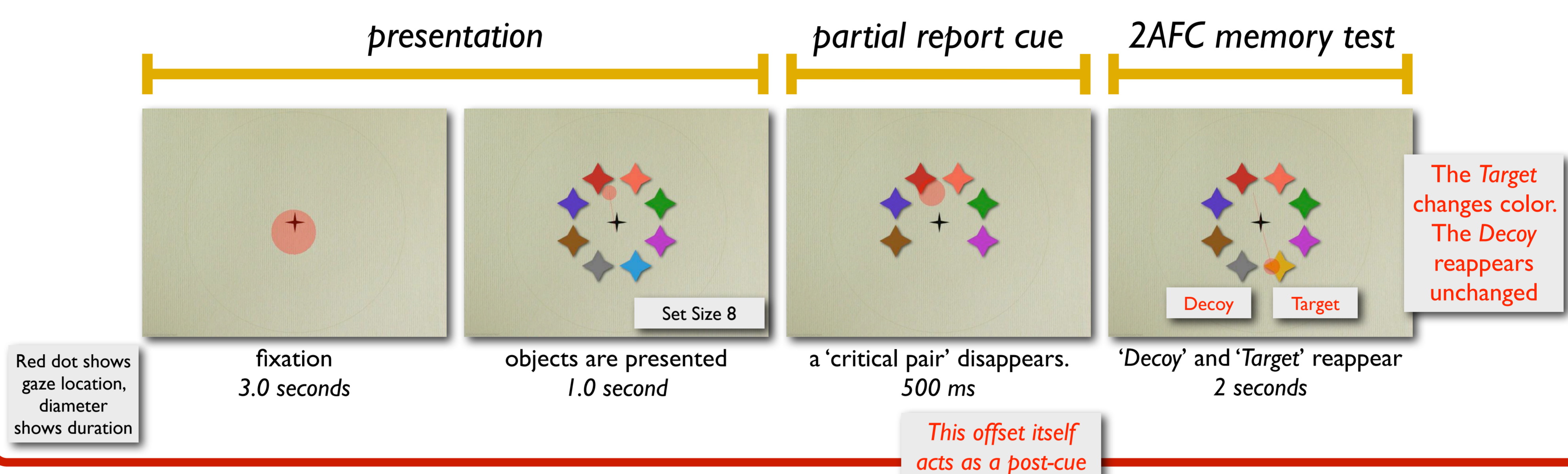
Iconic memory is the high capacity, short-lived initial store of visual information (Sperling, 1960). Iconic memory has never been studied in infants.

'Whole report' tests of 'very short term memory' (<300 ms retention) are remarkably low, e.g. just one item for 6.5 month olds (Oakes, Ross-Sheehy, & Luck, 2006).

'Partial report' was the key to measuring iconic memory (Sperling, 1960).

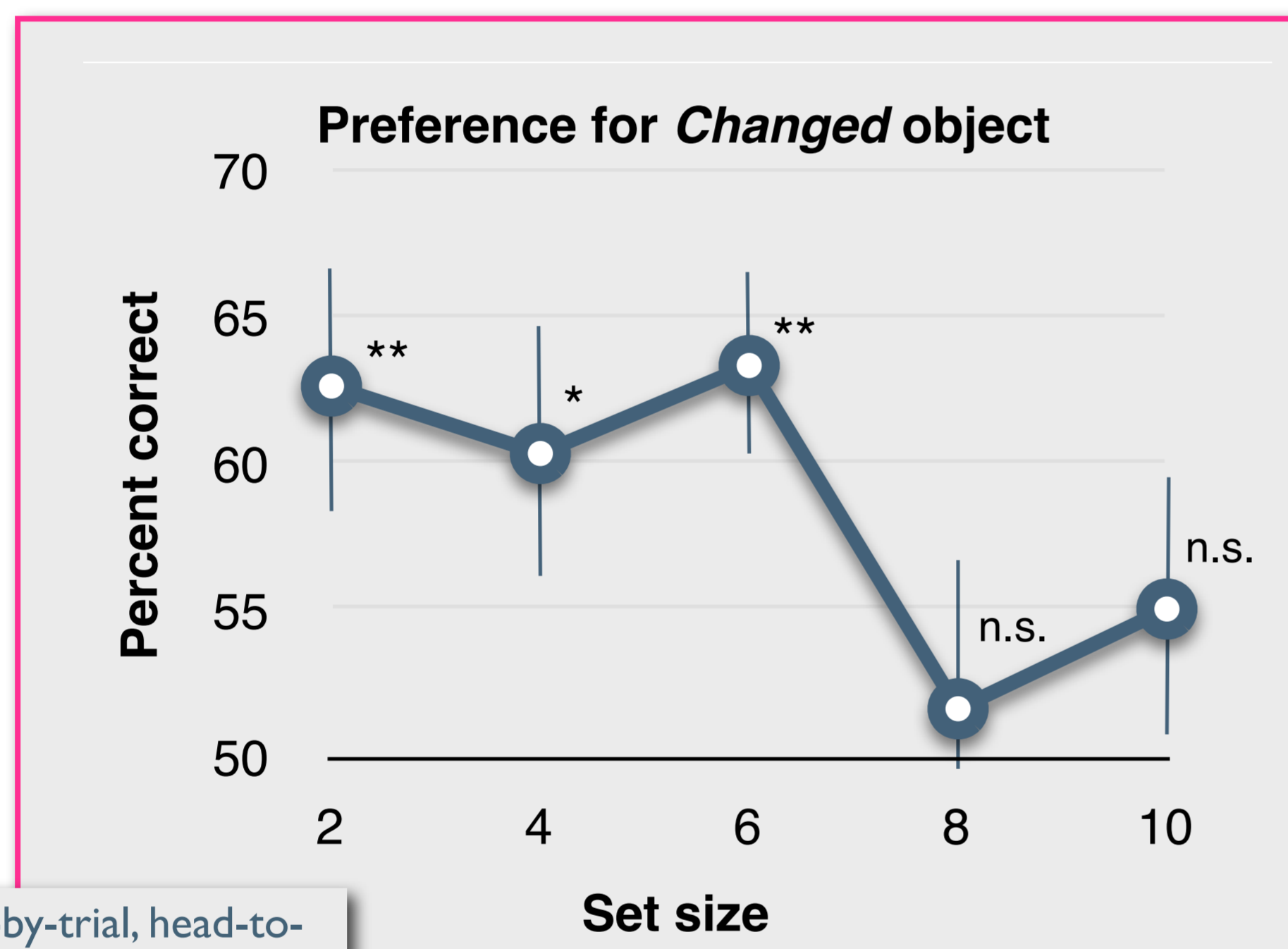
Here we apply a novel partial report procedure to both infants and adults.

## A partial report, 2AFC test of iconic memory for infants and adults



## Results

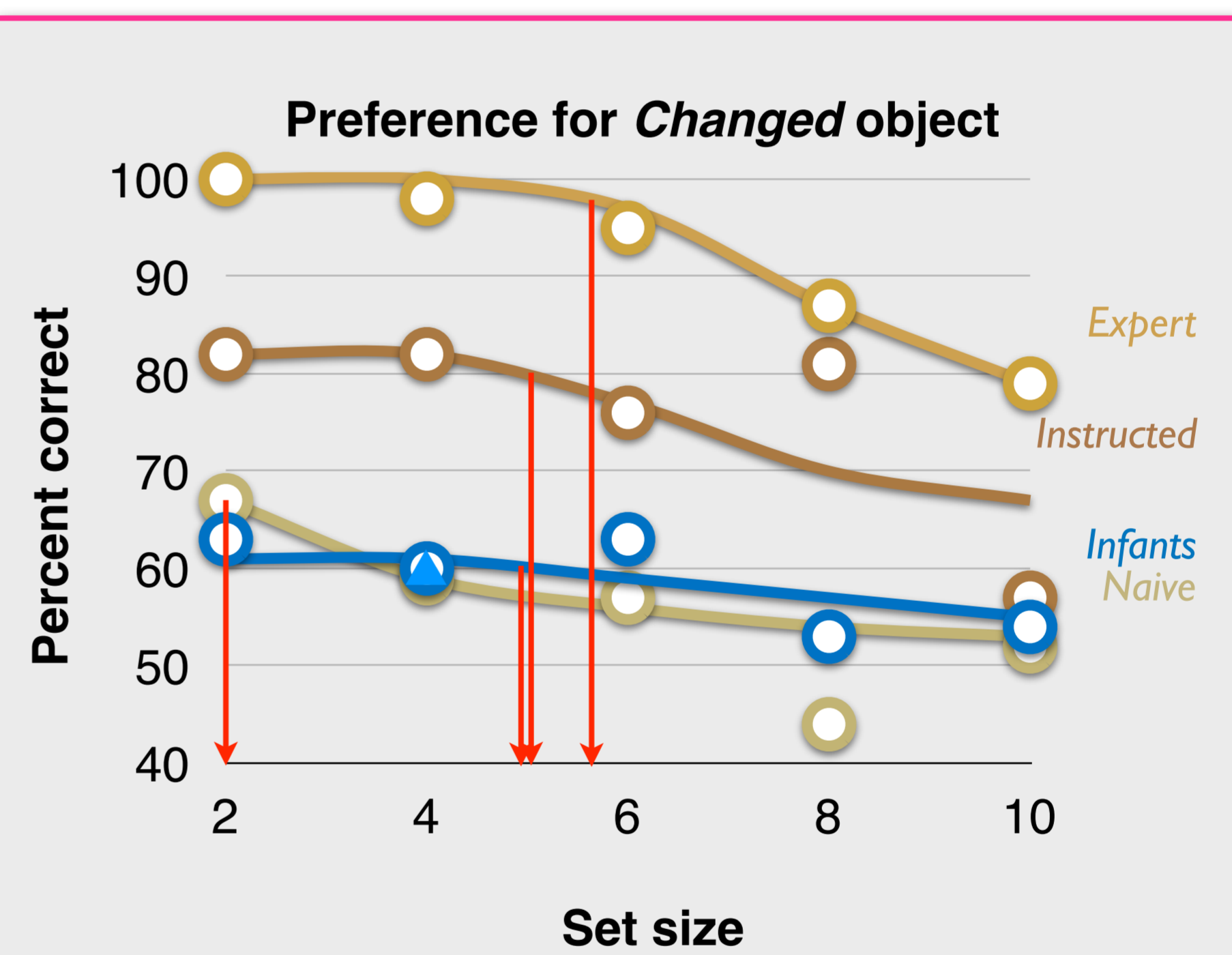
### Iconic memory, 6 month olds



A trial-by-trial, head-to-head 2AFC comparison between *Target* and *Decoy*. Trials where the *Target* is 'preferred' (fixated longer) are coded as correct.

Blaser & Kaldy, (2010). *Psychological Science*

### Infant vs. Adult capacity



Capacity estimates shown by red arrows. Expert: 5.75 items; Instructed: 5; Infants: 5; Naive: 2

Naive adults had no task knowledge, much as the infants. Instructed adults were fully briefed about the experiment and asked to fixate the *Changed* item as quickly and for as long as possible. Expert adults were similarly instructed, and had had previous experience in visual psychophysics experiments.

▲ Replication of set size 4 with independent infant group

**Participants:** A total of 62 infants, ~12 per set size, aged 5:00-6:30. 5 'Expert' adults were run, and 12 'Naive'/Instructed'. **Materials:** A Tobii T120 eye tracker was used for display and recording. **Procedure:** Infants were presented with two blocks of 18 test trials. Depending on block, a set of 2, 4, 6, 8, or 10 identically-shaped, but differently-colored items appeared, spaced symmetrically around fixation (adults saw all set sizes). After a 1 sec exposure, a randomly chosen pair of (neighboring) items disappeared. After a 500 ms delay the two items reappeared, with one changed to a new color (*Target*) and the other unchanged (*Decoy*). The sudden offset of the pair itself was the partial report post-cue. Since the pair was chosen randomly, any differential treatment of *Target* vs. *Decoy* is evidence that information about the items was in memory prior to offset.

Percent correct should be maximal when set size is below capacity, and drop as capacity is exceeded. This breakpoint is used to estimate capacity (Cowan, 2001).

Our results show nearly identical (5-6 item) iconic memory capacities for 6-month-old infants, instructed adults and expert adults.



Tobii T120

## Conclusions

We applied a novel partial report test to compare infants' iconic memory capacity to that of adults.

Our results show a five item iconic memory capacity in 6-month olds.

*Infant iconic memory capacity matches adults' (~5-6 items)*  
(...and, provocatively, exceeds that of naive undergraduates...)

Infants' and adults' match in capacity points to particularly rapid development.

## Rapid development



Recent fMRI studies in adults attribute iconic memory to persistent activation in higher-order visual areas such as the occipito-temporal cortex, particularly the lateral-occipital complex (LOC; Ruff, Kristjánsson, & Driver, 2007; Wong, Aldcroft, Large, Culham, & Vilis, 2009). Indeed, the occipital lobe is the part of the cortex that matures earliest (Huttenlocher, 1990), and the area corresponding to LOC in adults has been shown to be active at 6.5 months of age (Wilcox et al., 2009).

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