Ten-month-old infants can localize changes in visual short-term memory: An eye-tracking study

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Visual short-term memory (VSTM) develops rapidly between 6 and 10 months. Infants' VSTM is assessed using *change detection*. Infants are shown streams in which a collection of objects (i.e., colored squares) appears briefly (500 ms), disappears briefly (300 ms), and then reappears. This cycle continues and infants' looking at the streams is recorded. Conclusions about infants' VSTM are drawn from their looking at *changing streams* (i.e., streams in which one or more objects changes from cycle to cycle) as compared to *non-changing streams*. This task has revealed dramatic changes in infants' ability to detect changes (as indicated by their watching changing streams more than non-changing streams) in object color, location, and so on. Although this task has been important for revealing infants' developing VSTM, the conclusions we can draw from it are limited—we know infants *detect* changes, but not whether infants recognize which objects changed or whether they can localize those changes. In the present study, we examined this aspects of infants' VSTM using eye-tracking.

We assessed change detection in 6 10-month-old infants using an ASL pan/tilt eyetracker. Each infant received up to 18 trials with the following sequence: two squares of different colors briefly appeared (500 ms), disappeared briefly (300 ms), and then reappeared and remained on the screen 3,000 ms. On each trial, when the objects reappeared, one had changed colors (the left object on 50% of the trials). The question was this: Would infants look longer at the changed item than at the non-changed item? We measured infants' fixation both objects and calculated a *change preference* by dividing their fixation to the changed object by the total amount of looking to the two objects. If infants not only detected that there was a change, but also detected which object changed (and localized that a change) they will have a change preference score that is greater than chance (.50).

Infants significantly fixated the changed square more than the unchanged, $t(5) = 3.08$, $p = 0.027$, two-tailed, suggesting that they not only could detect the, but also that they can determine which of the two objects changed and where the change occurred. These results are significant because previous research demonstrated that infants are *sensitive* to changing displays, but not *why* or *what* about those displays draws infants' attention. Our data suggests that infants' performance in previous tasks reflects their ability to detect and locate which object has changed.