Journal of Experimental Child Psychology 172 (2018) 149–167

Contents lists available at ScienceDirect

Journal of Experimental Child Psychology

journal homepage: www.elsevier.com/locate/jecp

Infants use linguistic group distinctions to chunk items in memory

Aimee E. Stahl [a,*], Lisa Feigenson [b]

[a] Department of Psychology, The College of New Jersey, Ewing, NJ 08628, USA
[b] Department of Psychological and Brain Sciences, Johns Hopkins University, Baltimore, MD 21218, USA

ARTICLE INFO

Article history:
Received 8 August 2017
Revised 14 March 2018

Keywords:
Infants
Memory
Working memory
Chunking
Language
Social cognition

ABSTRACT

Although the capacity of infants' working memory is highly constrained, infants can overcome this limit via chunking; for example, they can use spatial cues to group individual objects into sets, thereby increasing memory efficiency. Here we investigated the use of abstract social knowledge as a basis for chunking. In four experiments, we asked whether 16-month-olds can use their sensitivity to distinctions between languages to efficiently chunk an array. Infants saw four identical dolls hidden in a box. Without chunking cues, infants in previous experiments fail to remember this number of items in such arrays. In Experiment 1, infants saw two of the four dolls each produce an utterance in a familiar language (English) prior to hiding and saw the other two dolls each produce an unfamiliar language (German or Mandarin). Infants successfully remembered all four dolls. Next we asked whether infants could chunk using linguistic group distinctions even when all dolls spoke unfamiliar languages. Infants failed to chunk speakers of unfamiliar languages when each doll within a pair produced a unique utterance (Experiment 2), but they succeeded when each doll within a pair produced the same utterance (Experiment 3). Infants' performance was not driven by low-level acoustical cues in the utterances given that infants failed to chunk when the dolls' speech was played backward (Experiment 4). Together, these results suggest that infants can leverage their early sensitivities to linguistic distinctions to hierarchically reorganize their memory representations, thereby overcoming working memory limits.

© 2018 Elsevier Inc. All rights reserved.

* Corresponding author.
E-mail address: stahla@tcnj.edu (A.E. Stahl).

https://doi.org/10.1016/j.jecp.2018.03.005
0022-0965/© 2018 Elsevier Inc. All rights reserved.

Introduction

The ability to temporarily store information in memory over brief durations is limited in both adults and infants. For example, adults can remember three or four items in working memory at a given time, but they fail to remember larger arrays (e.g., Alvarez & Cavanagh, 2004; Brady, Konkle, & Alvarez, 2011; Cowan, 2001; Sperling, 1960). A variety of methodologies have revealed similar limits in infants, indicating that they too typically can remember up to but no more than three items in working memory (e.g., Barner, Thalwitz, Wood, & Carey, 2007; Feigenson & Carey, 2003, 2005; Feigenson, Carey, & Hauser, 2002; Feigenson & Halberda, 2004; Oakes, Hurley, Ross-Sheehy, & Luck, 2011; Ross-Sheehy, Oakes, & Luck, 2003; Zosh, Halberda, & Feigenson, 2011). For instance, 12- to 14-month-olds will persistently search a hiding location after three objects are seen hidden and only a subset (i.e., one or two objects) is retrieved, showing that they successfully represented the three hidden objects and detected a mismatch with the number of retrieved objects. However, when four objects are hidden, infants fail to keep searching after *any* subset is retrieved (e.g., Barner et al., 2007; Feigenson & Carey, 2003, 2005).

Despite this signature limit on working memory in adults and infants, the process of "chunking" representations can allow observers to overcome typical memory capacity limits. Chunking involves hierarchically reorganizing memory representations by binding representations of individual items into sets so that the observer represents both the higher-order set (the "chunk") and the individual items within the set. This strategy allows observers to maintain more items in working memory than they otherwise could. Adults can employ a host of different cues for chunking, including low-level perceptual features, category membership, semantic relatedness, and statistical co-occurrences between items (e.g., Bower, 1972; Brady, Konkle, & Alvarez, 2009; Chase & Ericcson, 1982; Chase & Simon, 1973; Cowan, 2001; Ericsson, Chase, & Faloon, 1980; Gobet & Clarkson, 2004; Hitch, Burgess, Towse, & Culpin, 1996; Mathy & Feldman, 2012; Miller, 1956; Simon, 1974).

More recent research shows that chunking does not require extensive experience, language, or explicit instruction; even infants spontaneously chunk items, indicating that chunking is likely a fundamental aspect of human memory (e.g., Feigenson & Halberda, 2004, 2008; Kibbe & Feigenson, 2016; Rosenberg & Feigenson, 2013; Stahl & Feigenson, 2014). For example, although 14-month-olds typically fail to store representations of four identical objects concurrently, they succeed if the objects were observed as two spatially separated groups of two prior to hiding (Feigenson & Halberda, 2004; Rosenberg & Feigenson, 2013) or if perceptually distinctive objects reliably co-occurred in pairs (e.g., red circle, blue cross) throughout the experiment (Kibbe & Feigenson, 2016). Infants also can use conceptual knowledge to chunk items. For instance, infants remember a four-object array containing two toy cats and two toy cars, but they fail to remember arrays of four identical cats or four unique cats (Feigenson & Halberda, 2008). Even younger infants (7-month-olds) can chunk visual arrays if provided with multiple redundant grouping cues (Moher, Tuerk, & Feigenson, 2012).

More recent evidence suggests that in addition to using spatiotemporal cues and knowledge of object kinds to support chunking, infants also can use their knowledge in the social domain. In this previous work (Stahl & Feigenson, 2014), an infant saw four identical dolls equally spaced. In one condition, the dolls initially faced each other in pairs. The experimenter then turned the dolls toward the infant and made each doll greet the infant by saying "hello." In the other condition, the four dolls initially faced the infant. The experimenter then turned the dolls toward each other in pairs and made them greet each other by saying "hello." Infants in both conditions then watched all four dolls hidden, saw just two of the four dolls retrieved, and then were allowed to search the box. Infants remembered all four dolls (i.e., persisted in searching for the two remaining dolls) only when the dolls had behaved in affiliative pairs by turning to greet each other prior to hiding. This cue apparently caused infants to represent the four identical dolls as two social dyads, and this mental reorganization improved infants' working memory performance.

Infants' use of social knowledge for chunking is impressive because information about social groups often is not directly available to perception and instead must be inferred from abstract knowledge and subtle cues. In the studies by Stahl and Feigenson (2014), it was the observed interaction of

دریافت فوری ← متن کامل مقاله

ISIArticles
مرجع مقالات تخصصی ایران

✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
✓ امکان دانلود نسخه ترجمه شده مقالات
✓ پذیرش سفارش ترجمه تخصصی
✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
✓ دانلود فوری مقاله پس از پرداخت آنلاین
✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات