

Brief Report

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Processing and Rejection of Novel Items in Childhood: Event-Related Potential Study of Similar Lures and Novel Foils

ABSTRACT: *The ability to correctly identify novel items improves during childhood. Failures to correctly identify novel items are most likely to occur when novel items are similar to previously encountered items (i.e., similar lures) than when they are distinct (i.e., novel foils). Age-related improvements in the correct rejection of novel items are important for children's learning and in applied settings, such as participation in legal proceedings (e.g., lineup identification). However, research has not assessed what processes support children's ability to reliably reject similar lures. The current study examined the rejection of similar lures and novel foils in thirty-eight 5- and 6-year-old children using behavioral and electrophysiological measures. Following a week delay, children were less proficient at rejecting similar lures than novel foils and elicited a larger amplitude Nc response (i.e., 350–500 ms) to similar lures. This finding, taken in conjunction with previous studies demonstrating the role of the Nc in attentional processes [see de Haan, M. (2007). Visual attention and recognition memory in infancy. In M. de Haan (Ed.), *Infant EEG and event-related potentials* (pp. 101–144). New York, NY: Psychology Press], suggests that children allocate greater attention toward similar lures, compared to novel foils, when accurately rejecting them. © 2015 Wiley Periodicals, Inc. Dev Psychobiol 57:263–270, 2015.*

Keywords: *lures; episodic memory; recognition memory; attention; event-related potentials; Nc component*

INTRODUCTION

Distinguishing experienced events from novel events is an important cognitive ability that undergoes significant development during childhood. The developmental trajectory of this skill has been of particular interest due to its relevance in the debate regarding children's roles in judicial proceedings (e.g., Goodman, Ogle, McWilliams, Narr, & Paz-Alonso, 2014). Providing accurate testimony in response to questioning and identifying a perpetrator in a lineup both require being able to

discriminate between previously experienced and novel information. The novel information presented during legal proceedings is often quite similar to, yet distinct from, what was experienced. For example, during lineup identification, the perpetrator (e.g., a middle-aged Caucasian male) could be surrounded either by similar lures (e.g., another middle-aged Caucasian male) or novel foils (e.g., an elderly Caucasian male). Thus, it is important to understand the development of the ability to reject novel information that varies in relatedness to previously encountered information. The aim of the present study was to explore the neurocognitive mechanisms underlying children's ability to successfully identify similar lures and novel foils.

Current behavioral research suggests that children are less likely to correctly reject novel information when it is similar to previously encountered information (Baker-Ward, Gordon, Ornstein, Laurus, & Clubb,

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1993; Lindsay, Johnson, & Kwon, 1991; Lloyd, Doydum, & Newcombe, 2009). For example, Baker-Ward and colleagues (1993) assessed 3-, 5-, and 7-year-old children's memory for a routine pediatric examination. When asked about events that did not occur, all children were more likely to endorse the occurrence of examination-typical activities (e.g., whether the doctor used a stethoscope) than examination-atypical activities (e.g., whether the doctor cut the child's hair); the youngest children were the most susceptible to this error. Likewise, Lindsay and colleagues (1991) had 4- and 6-year-old children listen to similar and distinct storytellers (e.g., two females versus one female and one male) tell stories that were either thematically similar or distinct. Although no age-related differences were present between the age groups' ability to reject details from the distinct stories when the storytellers were also distinct, 6-year-old children were better able to reject saying that they heard details that came from a thematically related story and distinguish details told by each storyteller. Lastly, another study showed 4- and 6-year-old children pictures of item-background pairs (Lloyd et al., 2009). Although there were no differences in 4- and 6-year-old children's ability to correctly reject novel items and backgrounds that were presented individually, 6-year-old children were significantly better at correctly rejecting item-background pairs (e.g., dog-red) that were previously presented in other configurations (e.g., dog-blue; bear-red; Lloyd et al., 2009). This research collectively shows that the ability to correctly reject novel information improves with age and is negatively influenced by stimulus similarity.

However, no studies to date have examined the mechanisms that underlie the successful rejection of similar lures and novel foils during childhood. Thus, it remains unclear why children are better at rejecting novel foils compared to similar lures and what neurocognitive mechanisms underlie the development of this ability. The event-related potential (ERP) methodology is well suited to address this question because segments of the electroencephalogram can be time-locked to stimuli to index how they are processed at a neurocognitive level. Two ERP components of interest have been identified in previous literature that may distinguish similar lures and novel foils in childhood and provide insight into their differential processing. The first is the Nc, a negative-going component that is maximal over fronto-central leads approximately 400–600 ms poststimulus onset. In younger children, this component has been localized to the prefrontal cortex and cingulate cortex (Reynolds & Richards, 2005). The cognitive processes reflected by the Nc component have been highly debated. Processes that

are hypothesized to be reflected by the Nc component include automatic attentional processes driven by stimulus features (e.g., Vaughan & Kurtzberg, 1992), top-down controlled attentional processes (Ackles & Cook, 1998), novelty detection (e.g., Reynolds & Richards, 2005), among others. The Nc response is modulated by memory (i.e., familiar and novel stimuli elicit different amplitude Nc responses). However, whether familiar or novel stimuli elicit larger amplitude Nc responses has been inconsistent across studies of infants and young children. Some studies report that novel stimuli elicit a larger negative amplitude Nc response than familiar stimuli (Carver et al., 2003; Czernochowski, Mecklinger, & Johansson, 2009; Dawson et al., 2002; Riggins, Rollins, & Graham, 2013), whereas other studies report that familiar stimuli elicit a larger negative amplitude Nc response than novel stimuli (de Haan & Nelson, 1997, 1999; Marshall, Drummey, Fox, & Newcombe, 2002; Riggins, Miller, Bauer, Georgieff, & Nelson, 2009). Due to these inconsistencies, Richards and Reynolds (2005) hypothesized that Nc amplitude "may be greater to the stimulus that elicits the greatest attentional response regardless of novelty versus familiarity or frequency of presentation (p. 612)." A recent study that assessed how visual preference, attention, and stimulus novelty influenced the Nc amplitude in infants supports this hypothesis (Reynolds, Courage, & Richards, 2010). The amplitude of the Nc component was largest for items that infants demonstrated a visual preference for regardless of whether the items were familiar or novel, suggesting that the Nc response may be a reflection of overall stimulus salience (Reynolds et al., 2010).

The other component of interest is late slow wave activity. Slow wave activity begins approximately 800 ms poststimulus onset and has been localized to temporal cortex in younger children (Reynolds & Richards, 2005). Positive slow wave (PSW) activity has been associated with the updating of a memory trace and the recollection of contextual information (Nelson, 1994; Nelson, Thomas, de Haan, & Wewerka, 1998; Riggins et al., 2013; for review see DeBoer, Scott, & Nelson, 2007 and de Haan, 2007). For example, Marshall and colleagues (2002) demonstrated that the amplitude of PSW activity in 4-year-old children was more positive for correctly recognized items than novel items. Additionally, another study of 5- and 6-year-old children demonstrated that the PSW was sensitive to the recollection of contextual information (Riggins et al., 2013). Thus, due to their prior implication in memory processes during early childhood, Nc (which reflects attention processes) or PSW activity (which reflects memory processes) may differ when children process similar lures and novel foils.

Although previous behavioral studies have shown that children are less likely to correctly reject similar lures than novel foils (Baker-Ward et al., 1993; Lindsay et al., 1991; Lloyd et al., 2009), the neural and cognitive processes that underlie these errors have not been examined. To address this question, we reanalyzed the dataset used by Riggins and colleagues (2013). The study by Riggins and colleagues (2013) aimed to examine ERP correlates of recollection during childhood. ERPs were collected while children passively viewed pictures of novel items and items they had previously encoded in two separate locations. Then, children behaviorally identified whether they had seen an item before, and, if so, which location it was previously encountered in. Children's PSW response was larger for items that were subsequently recollected along with the correct location (source-correct) than items that were recognized but for which the location was forgotten (source-incorrect) and correctly rejected novel items. This pattern of results was taken as evidence that the PSW is reflective of recollection during childhood. The novel items included in the study were semantically or categorically similar (i.e., similar lures) or dissimilar (i.e., novel foils) to previously encountered items. Because the primary focus of the study was on whether a recollection ERP effect, which is assessed by comparing ERPs to source-correct, source-incorrect, and correctly rejected novel items (e.g., Wilding & Rugg, 1996), was present in children, the correctly rejected novel items used by Riggins and colleagues (2013) collapsed across similar and dissimilar novel items.

The aim of the present study was to use behavioral and electrophysiological measures of memory to assess neurocognitive mechanisms that underlie the processing of similar lures and novel foils. Behavioral performance and ERP activity in the Nc and PSW components were compared between similar lures and novel foils to determine the role of attention and memory processes in the correct rejection of similar lures and novel foils. Based on the previous literature (see de Haan, 2007 for review), if increased allocation of attention toward similar lures supports their accurate identification, the Nc response would be larger for correctly rejected similar lures than novel foils (e.g., Carver et al., 2003; Czernochowski et al., 2009; Dawson et al., 2002; Riggins et al., 2013). Another possibility is that participants engage in recall-to-reject processing in order to reject similar lures. Some researchers who study adults argue that the correct identification of similar lures is supported by the recollection of previously encoded information (e.g., Rotello & Heit, 2000). For example, in order to accurately reject seeing a fly, one could recollect that the insect previously seen

was a mosquito. Based on the findings by Riggins and colleagues (2013), recall-to-reject processing in children would be supported by a larger amplitude PSW response to similar lures than novel foils.

METHOD

Participants

Children were recruited from a database maintained by the University. Participants included thirty-eight 5- and 6-year-old children ($M = 5.62$ years, $SD = .32$, 18 males, 20 females) who met inclusion criteria and provided a minimum of 10 ERP trials per condition of interest (see EEG Recording and Analyses section below). Children received a small gift at the end of each session for participation.

Stimuli

Behavioral stimuli included 90 age-appropriate, store-bought items. A total of 60 items were presented at the encoding session. Each item was identified with a verbal label, paired with another item, and associated with a typically performed action (e.g., pages were turned in a book). Paired items were semantically or categorically related (e.g., a lion book and a giraffe book) and associated with the same action. The 30 item pairs were split into 6 sets for counterbalancing between participants. An additional 30 stimuli were presented during retrieval as novel items; half of the novel items served as similar lures and were semantically or categorically related to the previously viewed items (e.g., an elephant book), whereas the other half served as novel foils and were not (e.g., a frisbee). Stimuli for the ERP assessment included $4.5'' \times 8''$ digitized color photographs of the items.

Procedure

All procedures were approved by the Institutional Review Board prior to the start of the study. During encoding, children were not informed that their memory would be subsequently assessed. Children were introduced to a play-like setting of two adjacent locations that were associated with a distinct character. To ensure encoding, the experimenter performed the action associated with each item and required that the child behaviorally reproduce the action. Order of set presentation was counterbalanced between participants and order of item presentation within each set was random. A 5–10 min delay was introduced between locations to temporally separate the encoding of items in each location.

Memory retrieval was assessed following a 5–9 day delay ($M=6.84$, $SD=.75$) using both electrophysiological and behavioral assessments. The electrophysiological assessment preceded the behavioral assessment. For the electrophysiological assessment, children were fitted with a stretchy Lycra cap appropriate for their head circumference. Then, children passively viewed two blocks of pictures of the 90 stimuli (60 previously viewed stimuli and 30 novel stimuli) for a total of 180 ERP trials. To diminish concerns that novel items were processed differently during their second presentation, we conducted a 2 Presentation (first, second) \times 6 Coronal Plane (AFz, Fz, FCz, Cz, CPz, Pz) analysis on mean amplitude during the 350–500 ms time window for correctly rejected novel items. Only children who provided a minimum of 10 trials per condition per block ($n=23$) were included in this analysis. Results indicated there was no main effect of or interaction with Presentation ($ps \geq .72$). E-Prime 2.0 presentation software (Psychological Software Tools, Inc., Pittsburgh, PA) was used to present each stimulus for 500 ms followed by a fixation cross that appeared for an interstimulus interval that varied between 1250 ms and 1750 ms. A passive-viewing paradigm was chosen in order to diminish movement related artifact associated with a button press (DeBoer et al., 2007). Studies in adults have shown significant overlap between the recruitment of neural regions involved in incidental and intentional retrieval (Hall, Gjedde, & Kupperts, 2008; Rugg, Fletcher, Frith, Frackowiak, & Dolan, 1997). ERPs were subsequently back-sorted into conditions based on behavioral memory performance.

During the behavioral assessment, the experimenter randomly presented previously viewed and novel items. Children made a recognition judgment for each item, and, if the item was judged to be “old,” children made a forced choice judgment regarding the location in which the item was encountered by placing it in that location (see Riggins et al., 2013). If the item was “new,” children placed it in a separate bin. Following the retrieval session, the experimenter coded behavioral performance based on the location where the child placed each item.

EEG Recording and Analyses

EEG was continuously recorded from 64 Ag/AgCl electrodes as well as two vertical and two horizontal electrooculogram channels at a sampling rate of 512 Hz (BioSemi Active 2). Offline processing included re-referencing EEG data to a linked mastoid reference configuration using Brain Electrical Source Analysis (BESA) software (MEGIS Software GmbH, Gräfelfing, Germany). Missing data from individual channels were

interpolated for a maximum of 10% of bad channels (i.e., 6 per participant; see DeBoer, Scott, & Nelson, 2005). Ocular artifacts were corrected, consistent with previous ERP studies in children (e.g., Marshall et al., 2002), by applying the Ille, Berg, and Scherg (2002) algorithm. Data were high pass filtered at 0.1 Hz and low pass filtered at 80 Hz. Waveforms shown in Figure 1A are presented with a 30 Hz low pass filter. Movement related artifact was hand-edited and rejected prior to averaging. Trials were epoched with a 100 ms baseline and continued during stimulus presentation for 1500 ms. ERPs were averaged based on behavioral performance for old items as well as correctly rejected and falsely recognized similar lures and novel foils. As recommended by DeBoer and colleagues (2005, 2007), participants with fewer than 10 trials per condition were excluded from analysis. The present analyses are constrained to correctly rejected items because participants falsely recognized too few items. Participants contributed an average of 72 old trials ($SD=15$, $range=42-104$), 15 correctly rejected similar lure trials ($SD=4$, $range=10-27$), and 19 correctly rejected novel foil trials ($SD=4$, $range=10-28$).

IBM SPSS Statistics 20 (IBM Corp., Chicago, IL) was used for all statistical analyses. Repeated-measures ANOVAs were conducted on mean amplitudes for epochs associated with the Nc (350–500 ms) and PSW (800–1500 ms) components. Time windows were selected based on previous ERP studies in children (Marshall et al., 2002; Riggins et al., 2013). To assess whether differences were present in children’s processing of correctly rejected similar lures and novel foils, a 2 Condition \times 2 Hemisphere (left, right) \times 3 Sagittal Plane (medial, central, and lateral) \times 3 Coronal Plane (frontal, central, parietal) repeated-measures ANOVA was conducted for each time window using the following leads, F1, F2, F3, F4, F5, F6, C1, C2, C3, C4, C5, C6, P1, P2, P3, P4, P5, and P6. The Greenhouse–Geisser correction was applied if the assumption of sphericity was violated, which is common with ERP data. Only main effects of or interactions with Condition are reported.

RESULTS

Behavioral Results

Descriptive statistics of performance on the memory paradigm are presented in Table 1. Children were reliably able to distinguish previously encountered items and novel items, as shown by a d' estimate that was significantly above zero, $t(37)=22.65$, $p < .001$, $d=3.68$. Children were able to correctly reject both

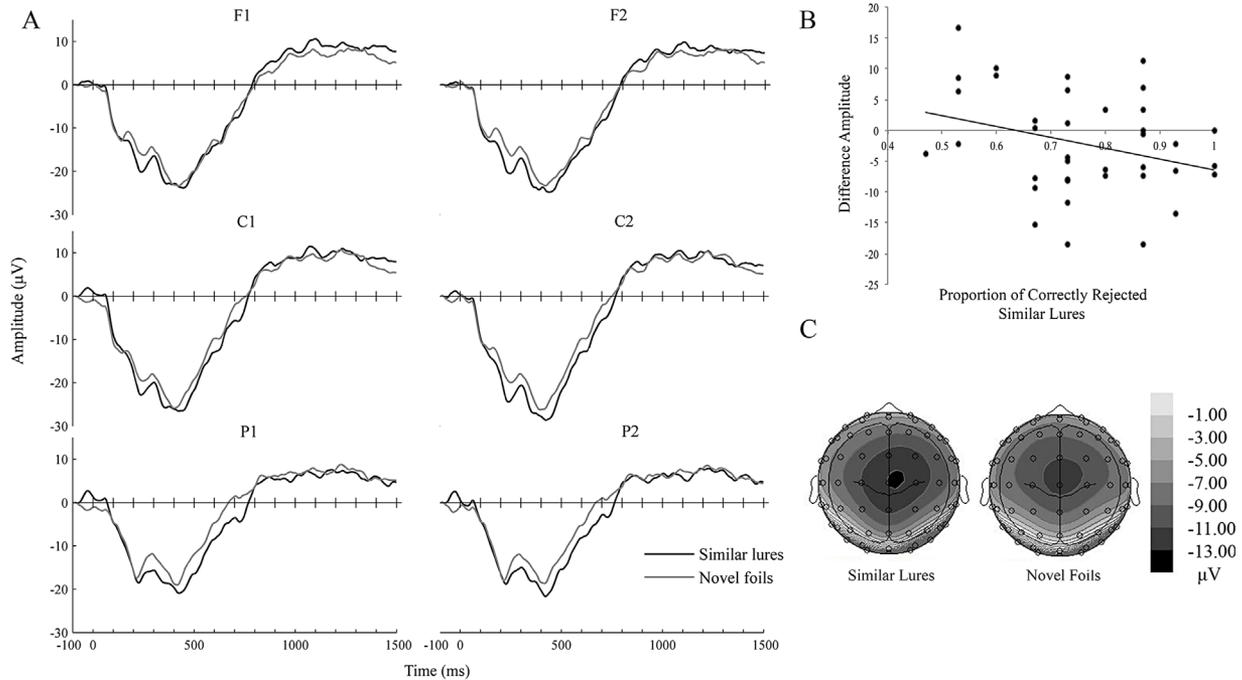


FIGURE 1 (A) Grand average waveforms illustrating that similar lures elicited a larger Nc response (350–500 ms) than novel foils, particularly over right fronto-central leads (B) Scatterplot demonstrating the correlation between accurate rejection of similar lures and larger Nc responses to similar lures, relative to novel foils (as reflected by a more negative difference amplitude), across right central and medial frontal leads (F2, F4) (C) Voltage maps of the 350–500 ms time window demonstrating similarity of topographical distribution during the processing of similar lures and novel foils.

similar lures, $t(37) = 11.23$, $p < .001$, $d = 1.82$, and novel foils, $t(37) = 23.47$, $p < .001$, $d = 3.81$, above chance. However, children were less likely to correctly reject similar lures compared to novel foils, $t(37) = 8.24$, $p < .001$, $d = 1.31$. Further, children were able to accurately recollect the original source an item was located, $t(37) = 6.1$, $p < .001$, $d = .99$.

ERP Results

Nc component (350–500 ms). In the early time window, there was a Condition \times Sagittal Plane \times Coronal Plane

Table 1. Accuracy on Memory Paradigm

Dependent Measure	M	SD
D'	2.37	.65
Hits	.87	.07
Correct rejections	.85	.11
Correct rejection of similar lures	.76	.14
Correct rejection of novel foils	.93	.11
Source accuracy for hits	.57	.07

Notes: All dependent measures except for d' are proportions.

interaction, $F(4,148) = 4.0$, $p = .01$. Follow-up analyses at each Sagittal Plane revealed that the Condition effect was present over right medial (F2, C2, P2), $F(1,37) = 4.22$, $p = .047$, and central (F4, C4, P4), $F(1,37) = 4.06$, $p = .051$, leads. A larger negative amplitude response was elicited to similar lures (medial, $M = -21.36$; central, $M = -23.44$) than novel foils (medial, $M = -19.09$; central, $M = -21.08$; see Figure 1A). The three-way interaction emerged because the effect was maximal over medial fronto-central leads.

To examine whether variation in behavioral performance was related to the Nc response, we examined the association between the correct rejection of similar lures and the difference in average amplitude between correctly rejected similar lures and novel foils. The average amplitude elicited to novel foils was subtracted from similar lures in order to account for individual differences in overall amplitude. To reduce the number of correlations calculated, difference waveforms were only calculated for right medial and central leads where differences in amplitude were found between conditions. Further, difference amplitudes were averaged

across medial and central leads at each coronal plane (i.e., F2 and F4, C2 and C4, P2 and P4). Correlations were one-tailed as we hypothesized that larger amplitude differences would be associated with greater rejection of similar lures. More accurate rejection of similar lures was correlated with larger Nc responses to similar lures relative to novel foils at frontal, $r [36] = -.3$, $p = .034$, but not central, $r [36] = -.21$, $p = .101$, or parietal leads, $r [36] = -.04$, $p = .406$ (see Figure 1B).

To assess how novel items were processed relative to old items, mean amplitudes elicited to old items were compared to similar lures and novel foils. The analysis of similar lures and old items revealed a main effect of Condition, $F(1,37) = 10.29$, $p = .003$, with similar lures ($M = -20.43$, $SE = 1.27$) eliciting a larger negative amplitude response than old items ($M = -17.57$, $SE = .8$). In contrast, there was no main effect of or interaction with Condition in the analysis of novel foils and old items, $ps \geq .12$.

Positive slow wave component (800–1500 ms). There was no main effect of or interaction with Condition, $ps > .166$, during the late time window.

Topographical Analysis

A topographical analysis was conducted to determine whether similar lures and novel foils engaged dissociable neural regions during the 350–500 ms time window. The scalp topographies for the similar lures and novel foils are presented in Figure 1C. The McCarthy and Wood (1985) approach was used to remove differences in mean amplitude across conditions which can confound differences in topography. The normalized data were analyzed using a 2 Condition (similar lures, novel foils) \times 2 Hemisphere (left, right) \times 3 Sagittal Plane (medial, central, and lateral) \times 3 Coronal Plane (frontal, central, parietal) repeated-measures ANOVA. No significant differences in topography were present between similar lures and novel foils, $ps > .11$. Therefore, although the magnitude of the Nc response was larger for similar lures than novel foils, support was not found for the recruitment of different neural generators across conditions.

DISCUSSION

The current study contributes to the body of literature demonstrating that children have greater difficulty rejecting novel information when it is similar to previously encountered information (Baker-Ward et al., 1993; Lindsay et al., 1991; Lloyd et al., 2009). The electrophysiological data extended these findings by

demonstrating that the amplitude of the Nc response was larger for similar lures than novel foils, despite being similar in topography. Further, children who elicited a larger Nc response to similar lures relative to novel foils across frontal leads were better able to correctly reject similar lures. Modulation of the Nc by memory has commonly been reported in previous literature. However, whether the Nc was larger to novel (Carver et al., 2003; Czernochowski et al., 2009; Dawson et al., 2002; Riggins et al., 2013) or previously encountered items (de Haan & Nelson, 1997, 1999; Marshall et al., 2002; Riggins et al., 2009) differed across studies. Recent research suggests that rather than reflecting either novelty or familiarity per se, the Nc response is sensitive to stimulus salience (Reynolds et al., 2010). Reynolds and colleagues (2010) found that the Nc was largest to stimuli that infants demonstrated a behavioral preference for, regardless of whether the stimulus was familiar or novel. The present finding is consistent with the hypothesis that the Nc reflects stimulus salience because children would need to orient greater attention to the similar lures, compared to the novel foils, in order to correctly reject them. However, many critical questions exist for future research. For example, future studies need to assess precisely what characteristics of stimuli and task demands determine which stimuli are the most salient across development as well as how attention is influenced by developing cognitive control abilities (e.g., Munakata, Snyder, & Chatham, 2012).

In contrast to the differences between similar lures and novel foils in the Nc, support was not found for differences in the processing of these items in the PSW. PSW activity has been associated with the updating of a memory trace and the recollection of contextual information (Riggins et al., 2013; for review see DeBoer et al., 2007 and de Haan, 2007). The present study aimed to assess whether the PSW would differ between similar lures and novel foils because it was possible that the PSW would be more positive to similar lures if children were engaging in recall-to-reject processing (i.e., recollecting the lion and giraffe books in order to correctly reject the elephant book). However, correctly rejected similar lures and novel foils did not differ in the PSW. Support for recall-to-reject processing in adults has been demonstrated by speeded and associative recognition tasks as well as electrophysiological measures (Curran, 2000; Doshier, 1984; Gronlund & Ratcliff, 1989; Rotello & Heit, 2000; Rotello, Macmillan, & Van Tassel, 2000). For example, because recollection is a relatively slow process, the correct rejection of similar lures is more diminished under speeded conditions relative to the correct rejection of novel foils (Doshier, 1984; Gronlund & Ratcliff, 1989). An ERP study also provided evidence for recall-to-reject processing in

adults (Curran, 2000). Curran (2000) presented adults with previously encountered words in the same plurality (e.g., table), similar lures in the opposite plurality (e.g., tables), and novel foils (e.g., lamp). Curran (2000) found that the parietal old/new effect, which has been associated with recollection in adults, was more positive to similar lures than novel foils. However, mixed support for recall-to-reject processing is present in the adult literature as well. The ERP difference between similar lures and novel foils was only found in one of two of Curran's (2000) experiments and another set of behavioral studies, which manipulated word plurality, did not find evidence for recall-to-reject processing (Rotello & Heit, 1999). Acknowledging that caution should be taken when interpreting a null finding, multiple possible explanations could account for this finding. First, it is possible that children in the present study predominantly relied on processes other than recollection to correctly reject similar lures (e.g., attention or item familiarity since the lion book should have been more familiar than the elephant book). Another possibility is that, because recollection follows a prolonged developmental trajectory (e.g., Ghetti & Angelini, 2008), 5- and 6-year-old children may not strategically use recall-to-reject processing. Lastly, children completed a passive-viewing paradigm during the ERP portion of the study. Because recall-to-reject processing is a strategic process, it may only be utilized when participants are actively retrieving information from memory.

Additional studies are needed to better understand the development of the ability to accurately reject novel items. As described above, speeded recognition and associative recognition paradigms are more likely to recruit recall-to-reject processes than recognition paradigms (Curran, 2000; Doshier, 1984; Gronlund & Ratcliff, 1989; Rotello & Heit, 1999, 2000). However, these methods have not yet been used in studies of children, although they could be. For example, associative recognition can be measured in children by using pictures displayed in identical and rearranged pairs, such as in the design previously used in a behavioral study by Lloyd and colleagues (2009). The development of recall-to-reject processes is an important area of interest given the prolonged developmental trajectory of recollection (e.g., Ghetti & Angelini, 2008). Future research should also assess the processes that underlie the processing of falsely recognized lures and foils in childhood; the present study was only able to assess how children process correctly rejected similar lures and novel foils because children provided too few trials in order to examine the processing of falsely recognized lures and foils. Thus, it is currently unknown whether the falsely recognized items neurally resemble previously encountered or novel items in the Nc and slow wave components of the ERP

waveform. One limitation of the present study is that when children behaviorally identified items as novel, they had previously seen them during the ERP assessment. Despite the fact that there was no overt effect of repeating the stimulus on the ERP response, future research could investigate the degree to which children's ability to correctly reject similar lures and novel foils is influenced by brief exposure. These questions for future research are important given the relevance of correct rejection of novel information for children's learning and participation in judicial proceedings.

NOTES

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