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Elizabeth Anquillare and Diana Selmeczy

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Developmental Differences in Value-Based Remembering: The Role of Feedback and Metacognition

Elizabeth Anquillare and Diana Selmeczy
Department of Psychology, University of Colorado Colorado Springs

The ability to prioritize remembering explicitly valuable information is termed value-based remembering. Critically, the processes and contexts that support the development of value-based remembering are largely unknown. The present study examined the effects of feedback and metacognitive differences on value-based remembering in predominantly White adults from a Western university ($N = 89$) and children aged 9–14 years old recruited nationwide ($N = 87$). Participants completed an associative recognition task during which they memorized items worth varying point values under one of three feedback conditions (point feedback, memory-accuracy feedback, or no feedback). Developmental differences emerged such that children were most likely to selectively remember high-value items when receiving memory-accuracy feedback while adults were most selective when receiving point-based feedback. Furthermore, adults had more accurate metacognitive insight into how value impacted performance. These findings suggest developmental differences in the effects of feedback in value-based remembering and the role of metacognition.

Public Significance Statement
Selectively remembering the most valuable information is essential for adaptive memory functioning. We observed that children and adults can selectively remember valuable information, but different types of feedback support this process across age groups. Additionally, adults have better metacognitive insight into how value impacts memory performance compared with children.

Keywords: value-based remembering, selective learning, metacognition, feedback

Supplemental materials: https://doi.org/10.1037/dev0001539.supp

Value-based remembering is the ability to prioritize remembering information that is explicitly more compared with less important or valuable (Castel, 2008; Watkins & Bloom, 1999). For instance, when studying for an upcoming test, students should remember material explicitly indicated to be the focus of the test (e.g., worth 90%) compared to less important supplementary material (e.g., worth 10%). Given that we encounter more information than can be remembered, selectively remembering high-value information is critical for successful educational learning and adaptive daily functioning (Knowlton & Castel, 2022). Explicit value can vary depending on the context or domain (Murphy et al., 2021; e.g., remembering the due date for a critical vs. optional school assignment, a friend's life-threatening food allergy vs. foods they enjoy, a potential collaborator's name vs. the restaurant's name during a conference dinner). Researchers typically manipulate value by explicitly assigning to-be-remembered items varying point values that are rewarded if those items are later successfully recalled (Knowlton & Castel, 2022; see Nussenbaum et al., 2020 for a discussion on how individuals learn explicit value through experience). Extensive research has established that adults selectively recall high relative to low-point value information (Castel et al., 2011; Elliott et al., 2020; Siegel & Castel, 2019). However, there is a dearth of literature examining this topic in children (Castel et al., 2011; Hanten et al., 2002; Lipowski et al., 2017), and the mechanisms supporting the development of value-based remembering are largely unknown. The current research examined how feedback and the development of metacognitive skills (i.e., the ability to accurately self-reflect regarding one's cognitive performance; Schneider, 2008) may improve value-based remembering in children and adults.

Feedback can improve memory performance in both children (Lipko-Speed et al., 2014; Moore et al., 2018) and adults (Fazio et al., 2010; Pashler et al., 2005). Feedback may benefit memory by helping individuals correct their errors (Fazio & Marsh, 2010; Pashler et al., 2005) and improve their learning or decision strategies (Moore et al., 2018; Van Loon & Roebers, 2017). For example, both children and adults are more likely to restudy initially incorrect answers when receiving feedback (Fazio et al., 2010; Van Loon & Roebers, 2017), demonstrating that feedback can improve self-

Elizabeth Anquillare https://orcid.org/0000-0001-9699-7631

The data that support the findings of this study are available through the Open Science Framework: https://osf.io/586zk/. This study and analysis plan were not preregistered. The authors have no conflicts of interest to declare.

Elizabeth Anquillare served as lead for data curation, investigation, project administration, and writing–original draft. Diana Selmeczy served as lead for conceptualization, formal analysis, methodology, supervision, and writing–review and editing.

Correspondence concerning this article should be addressed to Diana Selmeczy, Department of Psychology, University of Colorado Colorado Springs, 1420 Austin Bluffs Parkway, Colorado Springs, CO 80918, United States. Email: diana.selmeczy@uccs.edu

regulated learning. Additionally, certain types of feedback may be particularly beneficial (Hattie & Timperley, 2007; Kluger & Denisi, 1996). For example, feedback providing process or strategy-relevant information (e.g., hints, explanations of correct answers) is more likely to improve learning than feedback providing memory-accuracy information (e.g., indicating whether the response was correct or incorrect; Van der Kleij et al., 2015).

During value-based memory tasks, value is typically assigned via points and the goal is to maximize the number of points earned (Knowlton & Castel, 2022). Critically, feedback regarding the number of points earned, often as summary feedback after a test block, is almost always provided. Therefore, it is unknown if feedback improves value-based remembering, if different types of feedback have different effects, and how the impact of feedback may change across development. Examining these topics is critical for determining which contexts best support effective learning strategies at different developmental periods. For example, feedback may be particularly beneficial for children given previous research suggesting feedback can improve task performance and strategies to a greater extent in younger compared with older children and adults (Droit-Volet & Izaute, 2005; Van Loon & Roebers, 2017).

We also considered the alternative possibility that feedback may not always be beneficial. Processing feedback may be cognitively demanding and require shifting attention between task and feedback information (Van Loon & Roebers, 2021). Children's working memory capacity is limited compared with adults (Alloway & Alloway, 2013). Therefore, children may not incorporate feedback as effectively, particularly when feedback is more complex or less familiar (Fyfe et al., 2015). Consistent with this idea, working memory correlates with the ability to integrate feedback in 5- to 10-year-olds (Stevenson, 2017) and older children can better incorporate feedback into their learning compared to younger children (Lipko et al., 2009; Lipko-Speed et al., 2014).

In addition to feedback, metacognition may be important for value-based remembering. Research with adults demonstrates metacognitive judgments are sensitive to value such that high-value items are judged as more likely to be remembered than low-value items (Soderstrom & McCabe, 2011). Critically, adults who predict better memory for high-value items are better at recalling high-value items during testing, demonstrating a positive correlation between metacognition and value-based remembering (Murphy et al., 2021). Thus, adults have metacognitive insight into how value impacts memory, which corresponds with selectivity in memory performance. Both value-based remembering (Castel et al., 2011) and metacognition (Schneider, 2008) improve substantially throughout childhood. However, research has not examined how value impacts children's metacognition and whether individual differences in metacognition may be linked to the development of value-based remembering. Throughout childhood and adolescence, there are considerable improvements in using metacognition to guide decision-making and learning strategies (Metcalfe & Finn, 2013; Selmeczy & Ghetti, 2019). Therefore, the relation between value-based remembering and metacognition may be stronger in adults than children, suggesting children may have limited metacognitive awareness about how value influences their performance.

Current Study

In the current study, we examined how feedback impacts value-based remembering in 9- to 14-year-olds and adults. Participants completed an associative recognition task during which they encoded color-item associations that were worth varying points in an unmoderated remote study session (see Shields et al., 2021 for more about remote research). Participants were told the points presented with items during encoding (e.g., 10 points) would be awarded if they later correctly recognized the color of the presented item (i.e., blue or pink). They were also told that the goal of the study was to maximize the number of points they earned. Although value-based remembering paradigms typically examine free recall (e.g., Soderstrom & McCabe, 2011) or item recognition memory (e.g., Adcock et al., 2006), research using associative recognition memory has been conducted with adults and demonstrates that value is more likely to impact recollection of specific details (including color) compared with general familiarity of items (Hennessee et al., 2017). Thus, we chose to examine associative memory, which heavily relies on recollective processes (Yonelinas, 2002). Furthermore, to the best of our knowledge, value-based remembering for associate recognition memory has not been examined in children, allowing us to extend the contexts under which this skill is observed throughout development. Participants also made judgments of learning (JOLs) (i.e., confidence ratings about whether an item would be later remembered) after each trial to examine whether metacognition would be impacted by value and whether it corresponds to selectivity in memory performance. Critically, during the memory test, participants received trial-wise feedback about the number of points earned, memory-accuracy feedback, or no feedback.

We had several predictions. We defined memory selectivity as the difference in memory performance for high- versus low-value items. First, we predicted receiving point-feedback would improve memory selectively compared with receiving memory-accuracy feedback or no feedback. Point-feedback provided direct information regarding the task goal and could therefore help guide participants to focus on encoding and retrieving high-value items to maximize their points earned. We additionally predicted point-feedback would be particularly beneficial for children compared with adults, given previous research suggesting feedback can play an important role in scaffolding children's learning strategies (Van Loon & Roebers, 2017). In contrast to point-feedback, memory-accuracy feedback indicated whether the answer was correct or incorrect but provided no direct information about points earned. Thus, memory-accuracy feedback may encourage participants to focus on encoding and retrieval strategies that increase overall accuracy (Pashler et al., 2005), which can result in earning additional points but not as efficiently as selectively focusing on remembering high-value items. In the no-feedback group, participants did not have information regarding their points earned or accuracy, and thus received no additional support to help guide strategies for increased memory selectivity.

We also predicted children would have lower metacognitive abilities compared with adults. We defined metamemory selectivity as the difference in metamemory judgments (i.e., JOLs) for high versus low-value items. Specifically, we predicted children would demonstrate a weaker relation between the predicted impact of value on performance (i.e., metamemory selectivity) and the objective impact of value on performance at testing (i.e., memory selectivity). This prediction was based on literature suggesting developmental improvements in using metacognition to guide memory strategies (Metcalfe & Finn, 2013; Selmeczy & Ghetti, 2019)

Method

Participants

Sample size was determined using a priori power analysis for a 3 (Feedback Group: Point, Memory, None) × 2 (Age Group: Child, Adult) interaction with 80% power to detect a medium effect size $f = 0.25$ (a priori $N = 158$). Additional participants were collected to account for potential exclusions and failures to complete the study (see the online supplemental materials), leading to a total sample size of 176. Participants included adults aged 18–33 years old ($N = 89$, $N_{\text{female}} = 71$, $M_{\text{age}} = 20.62$, $SD = 3.38$) and children aged 9–14 years old ($N = 87$, $N_{\text{female}} = 56$, $M_{\text{age}} = 10.92$, $SD = 1.45$). Participants self-identified as White (72%), Asian (7%), African American/Black (5%), multiracial (10%), and other (6%; see the online supplemental materials). Adults were recruited through the university research subject pool. Children were recruited nationwide through our lab's family database or were siblings of previous participants of one of our studies conducted via video conferencing to ensure participants were children from U.S.-based families. Adults and children were compensated with research credit and $10 gift cards, respectively.

Materials and Design

Memory stimuli consisted of 42 distinct line drawings of elephants, including blue, pink, and black versions. Pictorial items from the same specific category were chosen to minimize potential cheating (e.g., participants could not easily write down a description of the presented item for later reference). Image color (50% blue, 50% pink) and point value were randomly assigned during the encoding phase, and 36 trials were randomly intermixed for each participant for both encoding and test phases across three study/test blocks. The online experiment was developed using Gorilla Experiment Builder (https://www.gorilla.sc). Feedback group was randomly assigned between-groups.

Transparency and Openness

We report how we determine our sample size, all data exclusions, and all manipulations. Data and materials are available at https://osf.io/586zk/. The task used is available at https://app.gorilla.sc/openmaterials/432927. Data were analyzed using R, Version 4.2.0 (R Core Team, 2022). This study and analysis plan were not preregistered. All procedures were reviewed and approved by the university's Institutional Review Board (Protocol #2020-143).

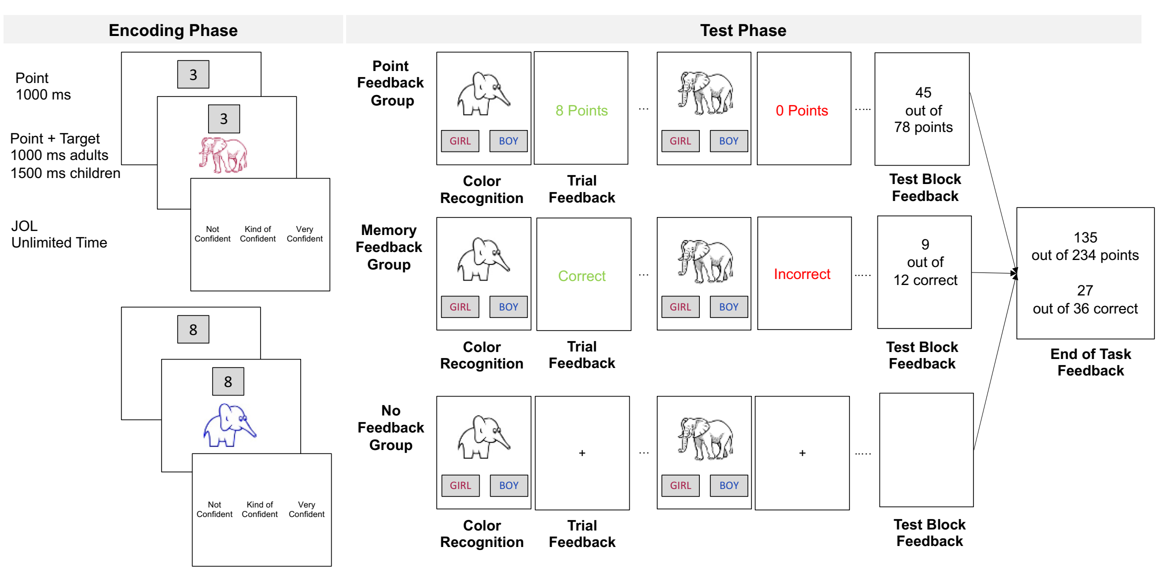
Procedure

Participants received a weblink and completed the study remotely. Comprehension questions assessed participants' understanding throughout the task. To familiarize themselves with the procedure, participants completed a short practice phase of six encoding and test trials identical to the main task. After the entire study, participants assessed their honesty and effort during the task (see the online supplemental results) and indicated any interference during participation.

During the Encoding Phase (Figure 1) participants were asked to remember the color (pink or blue) of serially presented elephant pictures each worth an explicit point value. To increase motivation to encode color, participants were told that elephants were either pink girls or blue boys as research suggests providing child-friendly task elements and cover stories increases interest and engagement (Johann & Karbach, 2018). Each image was paired with a point

Figure 1

Experimental Procedure



Note. During the encoding phase, participants were presented with blue and pink images and provided judgments of learning (JOLs). During the test phase, participants made a color recognition judgment and were provided with point value feedback, memory-accuracy feedback, or no feedback. Example task images were used from OpenClipArt (OpenClipArt, 2015a; OpenClipArt, 2015b). See the online article for the color version of this figure.

value between 1 and 12 which was displayed (1,000 ms) before the associated elephant (1,000 ms for adults, 1,500 ms for children). Participants were told they would receive the associated points if they later correctly remembered the elephant's color (e.g., if you later correctly identify this elephant as a blue boy you will receive 8 points). Participants were also explicitly told their goal is to maximize their points earned. After each trial, participants were asked for a JOL regarding whether they would later remember the elephant's color using a 3-point scale.

During the Test Phase, participants were presented with black versions of the same elephants seen during encoding. Participants were asked to indicate the original color of the elephant (i.e., pink girl or blue boy) and to rate their confidence (see the online supplemental results). Critically, the type of feedback participants received after their responses varied between groups. The memory-feedback group received memory-accuracy feedback (i.e., provided with the words "Correct" or "Incorrect" after each answer), the point-feedback group received points-earned feedback (e.g., provided with the explicit point value after a correct response ["8 points"] or told they earned 0 points after an incorrect response), and the no-feedback group was presented with a blank fixation and no performance information. Following each test block, summary feedback was presented to the point-feedback (e.g., 45 out of 78 points earned) and memory-feedback groups (e.g., 9 out of 12 correct). After the final testing block, participants in all conditions were told their total number of correct responses and total number of points earned through all three blocks.

Results

Accuracy

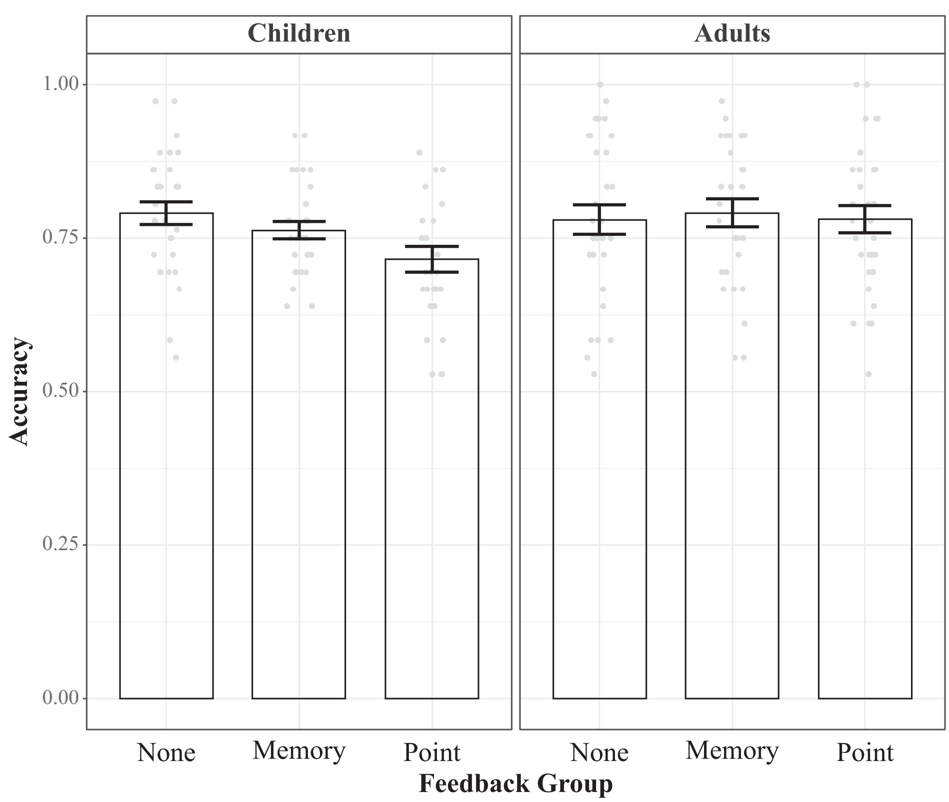
A 2 (age group: children, adults) × 3 (feedback group: none, memory, points) between-groups analysis of variance (ANOVA) on accuracy (proportion of correct item-color associations) revealed no significant main effects or interaction (ps $>$ .10; see Figure 2). Age and accuracy were not significantly correlated in children ($r =$ $-.03$, $p = .780$). Overall, these results suggest that accuracy was similar across groups.

Memory Selectivity

Memory selectivity was examined by comparing accuracy between high (7–12 points) and low (1–6 points) value items. Creating a categorical variable of continuous point values to examine selectivity has been used in previous research (Elliott et al., 2020) and children divide continuous point values using the same point cutoffs used in the current study (Castel et al., 2011). Results were also replicated using the selectivity index (Watkins & Bloom, 1999; see the online supplemental results).

Figure 2

Accuracy as a Function of Age and Feedback Group



Note. Accuracy was measured as the proportion of times item color was correctly recognized. Points represent individual participant data. Error bars represent ±1 *SE* around the mean.

We examined memory selectivity by analyzing accuracy (proportion of correct item-color associations) using a $2 \times 3 \times 2$ mixed ANOVA including between-subjects factors of age group (children vs. adults) and feedback group (none, memory, points), of a within-subject factor of point value (high vs. low). The three-way interaction was significant, $F(2, 170) = 6.84$, $p = .001$, $\eta_p^2 = .07$ (see Figure 3). Follow-up analyses examined the difference in accuracy between high- compared with low-valued items in each group separately. A difference score greater than zero indicates memory selectivity. In adults, the difference score was significantly greater than zero in the point-feedback group ($M = 0.08$, $SD = 0.13$, Cohen's $d = 0.64$, $p = .001$, $p_{\text{bonf}} = .009$), but not the memory-accuracy ($M = -0.01$, $SD = 0.10$, Cohen's $d = -0.13$, $p = .483$, $p_{\text{bonf}} = 1.00$) or no-feedback group ($M = 0.01$, $SD = 0.14$, Cohen's $d = 0.05$, $p = .782$, $p_{\text{bonf}} = 1.00$). Conversely, in children the difference score was significantly greater than zero in the memory-accuracy feedback group ($M = 0.06$, $SD = 0.11$, Cohen's $d = 0.55$, $p = .006$, $p_{\text{bonf}} = .037$), but not the point ($M = -0.02$, $SD = 0.16$, Cohen's $d = -0.14$, $p = .469$, $p_{\text{bonf}} = 1.00$) or no-feedback group ($M = 0.01$, $SD = 0.13$, Cohen's $d = 0.05$, $p = .794$, $p_{\text{bonf}} = 1.00$). Additionally, difference scores did not correlate with age when examining all children or children in each feedback group, $ps > .27$.

Overall, results suggest adults engaged in memory selectivity only when they received feedback about their points earned. In contrast, children engaged in memory selectivity only when they received feedback about their accuracy. Additionally, we did not observe age-related improvements in memory selectivity in children.

Metamemory Selectivity

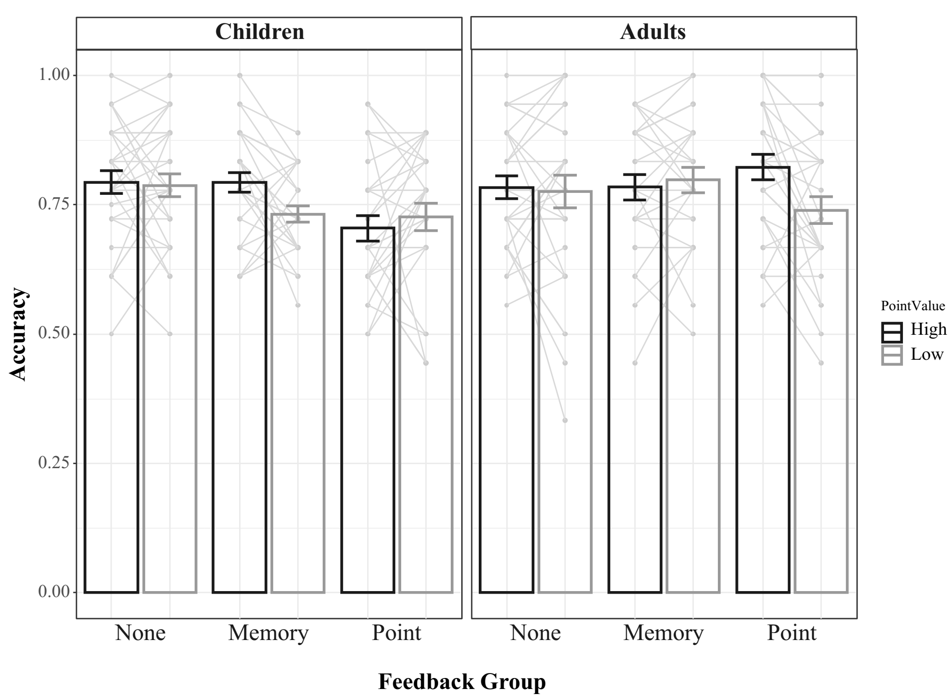
We examined metamemory selectivity by analyzing JOLs using a $2 \times 3 \times 2$ mixed ANOVA including between-subjects factors of age group (children vs. adults) and feedback group (none, memory, points) and a within-subject factor of point value (high vs. low; see Figure 4). The main effect of point value was significant, $F(1, 170) = 6.04$, $p = .015$, $\eta_p^2 = .03$, such that JOLs were slightly greater for high ($M = 1.31$, $SD = 0.45$) compared with low ($M = 1.28$, $SD = 0.45$, Cohen's $d = 0.19$) valued items. No other main effects or interactions were significant ($ps > .25$). These results suggest a small effect of point value on JOLs across groups. Additionally, we observed typical age-related improvements in the relation between JOLs and answer accuracy (see the online supplemental results).

Relation Between Individual Differences in Memory Selectivity and Metamemory Selectivity

We assessed whether participants who predicted better remembering high-value items via JOLs would also have greater accuracy for high-value items during testing. We measured memory selectivity as the difference in accuracy between high compared to low-value items and metamemory selectivity as the difference in JOLs between high compared with low-value items. We predicted memory selectivity using a regression model including metamemory selectivity, age group (dummy coded to child group), feedback group (dummy coded to the no-feedback group), and their interactions. One multivariate

Figure 3

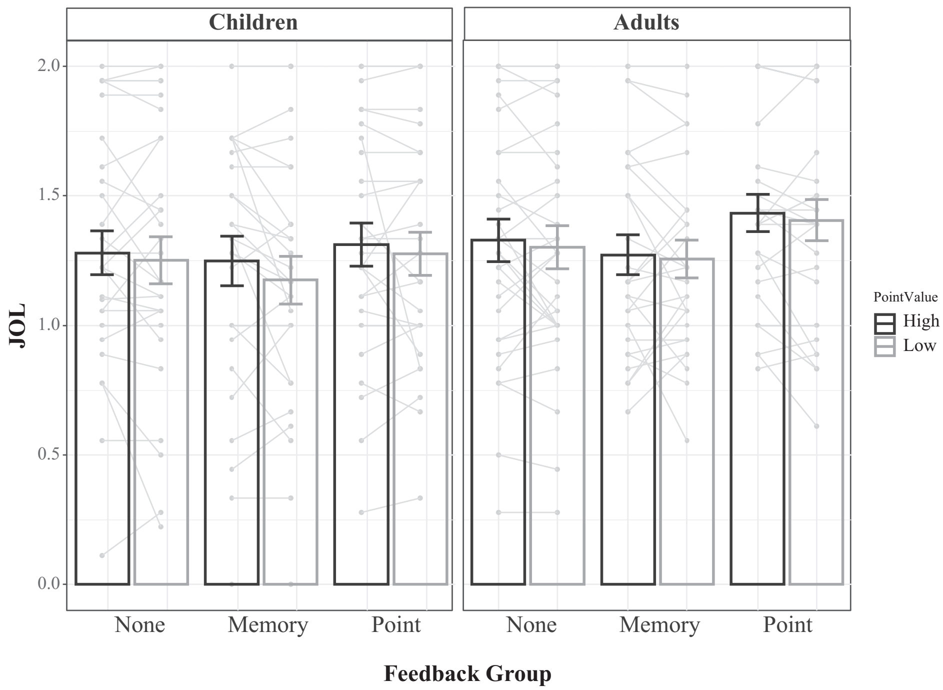
Accuracy Examined as a Function of Point Value, Age Group, and Feedback Group



Note. Accuracy was measured as the proportion of times item color was correctly recognized. Points and connected lines represent individual participant data. Error bars represent ± 1 *SE* around the mean.

Figure 4

Judgments of Learning (JOLs) Examined as a Function of Point Value, Age Group, and Feedback Group



Note. Points and connected lines represent individual participant data. Error bars represent ± 1 *SE* around the mean.

outlier was removed from the analysis (see the online supplemental results).

Results are reported in Table 1 and Figure 5. A significant interaction between age group and metamemory selectivity was observed, ($b = 0.57$, $p = .002$, $SE = 0.18$, 95% CI [0.22, 0.93]) such that the relation between memory selectivity and metamemory selectivity was stronger in adults compared to children. A significant interaction between metamemory selectivity and feedback group also emerged such that the relation between memory selectivity and metamemory selectivity was stronger in the point ($b = 0.50$, $p = .020$, $SE = 0.21$, 95% CI [0.08, 0.92]) and memory-accuracy feedback ($b = 0.36$, $p = .026$, $SE = 0.16$, 95% CI [0.04, 0.68]) groups compared with the no-feedback group; the relationship did not differ between the point and memory-accuracy feedback groups ($b = 0.14$, $p = .509$, $SE = 0.21$, 95% CI [−0.27, 0.55]). Finally, the three-way interaction approached significance ($p < .077$) such that the difference between age groups for the memory selectivity and metamemory selectivity relation was particularly prominent in the no-feedback group. A separate follow-up analysis confirmed the interaction between metamemory selectivity and age group was significant in the no-feedback group ($b = 0.57$, $p = .005$, $SE =$ 0.19, 95% CI [0.18, 0.96]), due to a positive memory selectivity and metamemory selectivity relation in adults ($r = .33$) and negative relation in children ($r = -.41$). The interaction was not significant in the point or memory-accuracy feedback groups ($ps > .28$). These results suggest adults had a stronger correspondence between memory selectivity and metamemory selectivity compared with children, particularly when no feedback was presented.

Discussion

Selectively remembering valuable information is a critical learning strategy with implications for education, social interactions, and healthy aging (Knowlton & Castel, 2022). However, the mechanisms and contexts that support the development of selectivity in children have rarely been examined. In the current study, we investigated the impact of feedback and the role of metacognition in value-based remembering in 9- to 14-year-old children and adults.

Adults improved their ability to selectively remember high-value items in the presence of trial-wise point feedback compared with memory-accuracy or no feedback. This result is consistent with previous research demonstrating that feedback, particularly feedback that scaffolds strategy use (Hattie & Timperley, 2007), can benefit learning strategies (Fazio et al., 2010). In our study, point feedback provided explicit information that could help participants adopt encoding and retrieval strategies focused on selectively attending to the most valuable information. Memory-accuracy feedback provided less relevant information for value-based selectivity but has been shown to increase overall accuracy during free recall tasks (Pashler et al., 2005). However, we did not observe that memory-feedback improved associative recognition, consistent with other recognition memory research in adults (Kantner &

Table 1
Regression Results Predicting Memory Selectivity

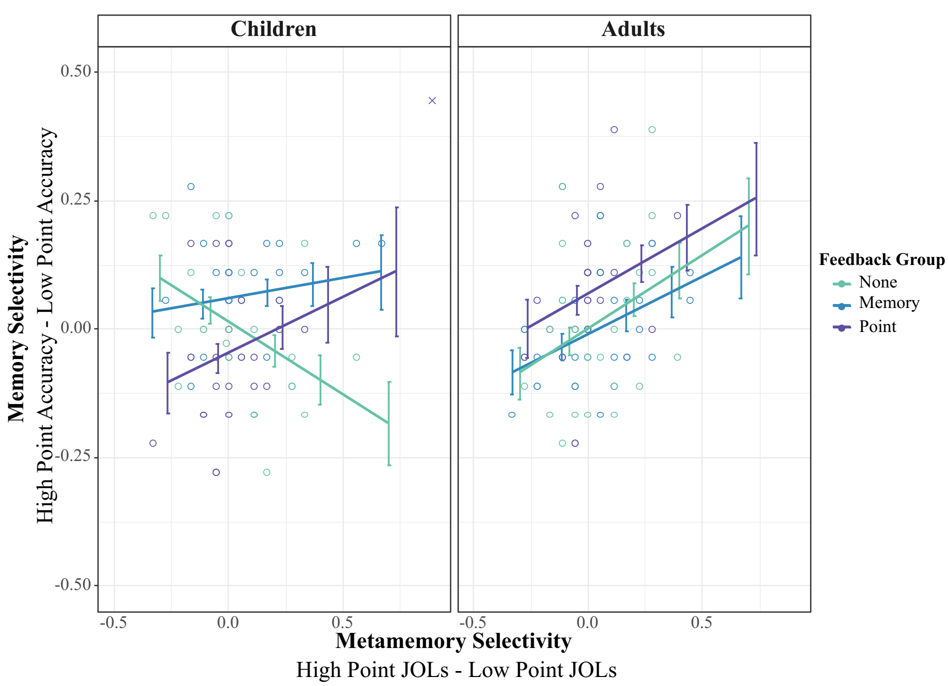
Predictor	Estimate	*SE*	CI	Statistic	*p*
(Intercept)	0.01	0.02	[−0.03 to 0.06]	0.66	.513
Metamemory	−0.28	0.12	[−0.52 to −0.05]	−2.41	**.017**
Feedback group (memory)	0.04	0.03	[−0.02 to 0.11]	1.23	.220
Feedback group (point)	−0.05	0.03	[−0.12 to 0.01]	−1.68	.094
Age group (adult)	−0.02	0.03	[−0.08 to 0.05]	−0.48	.629
Metamemory × Feedback Group (Memory)	0.36	0.16	[0.04 to 0.68]	2.24	**.026**
Metamemory × Feedback Group (Point)	0.50	0.21	[0.08 to 0.92]	2.36	**.020**
Metamemory × Age Group (Adult)	0.57	0.18	[0.22 to 0.93]	3.18	**.002**
Feedback Group (Memory) × Age Group (Adult)	−0.06	0.05	[−0.15 to 0.03]	−1.25	.213
Feedback Group (Point) × Age Group (Adult)	0.13	0.05	[0.04 to 0.22]	2.89	**.004**
Metamemory × Feedback Group (Memory) × Age Group (Adult)	−0.43	0.24	[−0.90 to 0.05]	−1.78	.077
Metamemory × Feedback Group (Point) × Age Group (Adult)	−0.53	0.30	[−1.12 to 0.06]	−1.79	.076

Note. Observations = 175; R^2/adjusted R^2 = .194/.140; *ps* < .05 are in bold.

Lindsay, 2010). Thus, the benefits of feedback for overall performance may be more likely to occur during contexts where there is a higher demand for self-generated retrieval cues.

In contrast to adults, children engaged in greater selectivity when given memory-accuracy feedback compared with point or no feedback. This result was in contrast to our prediction and suggests certain types of feedback may be particularly demanding for children to process (Fyfe et al., 2015). During point-feedback, children may have tried to sum up their earned points throughout the task, limiting available cognitive resources for attending to other task processes. Point feedback may have also oriented children to focus on point value (e.g., this picture is worth many points) at the expense of appropriately binding color information to the test item. Our results show evidence for this hypothesis as children's accuracy was numerically lowest in the point feedback condition. Finally, point feedback may be more complex than memory-accuracy feedback because it provides information about both accuracy (zero vs. some points) and value (e.g., 1 vs. 8 points). Future work would benefit from examining the effects of feedback on remembering specific point value associations to determine whether point-feedback may

Figure 5
Relation Between Memory Selectivity and Metamemory Selectivity Examined as a Function of Age and Feedback Group



Note. Points represent individual participant data. Point *x* represents an outlier that was not included in the regression model. Lines and error bars (±1 *SE* around the mean) represent predicted regression model values. See the online article for the color version of this figure.

improve remembering point-item associations at the expense of other information. Furthermore, future research can investigate ways to simplify point feedback to determine whether children, like adults, may also benefit from point feedback under certain contexts. For example, task demands could be decreased by using aggregate block-wise feedback only (instead of trial-wise feedback) to minimize the potential desire to sum points throughout testing. Using categorical point values (e.g., 1 vs. 10-point value items), or additional cues to encode point values (e.g., semantic categories) may also simplify task demands (Hanten et al., 2002) and allow children to incorporate point-feedback more effectively. Use of eye-tracking methodologies would also be helpful to examine how feedback may impact children's attentional processes during encoding.

In contrast to point feedback, memory-accuracy feedback may have allowed children to more easily focus on task demands and motivated improved memory selectivity relative to no feedback conditions. This is consistent with research demonstrating simple accuracy feedback can lead to better performance compared with strategy feedback during problem-solving, especially for children with low working memory capacity (Fyfe et al., 2015). Previous research also suggests that performance feedback can motivate children to better engage in task activities when compared with no feedback, including expressing greater interest and engagement (Butler & Nisan, 1986; Corpus & Lepper, 2007; Hattie & Timperley, 2007). Thus, in our task, the presence of memory-feedback was potentially simpler to process compared with point-feedback and better-motivated children to follow task instructions relative to no feedback.

Feedback has also been shown to improve metacognitive ability (Van Loon & Roebers, 2021). In our study, we observed both feedback and development affected the relationship between metamemory and memory selectivity. Participants who predicted better remembering high-value items were more likely to recall high-value items during testing, and this relation was stronger in adults compared with children. Furthermore, this developmental difference was most prominent in the absence of feedback, where children who predicted better remembering high-value items were less selective in their memory performance. This suggests that in the absence of feedback the least strategically selective children may overestimate the impact of value on their performance. Thus, it is possible that feedback improved metacognitive ability in children, which may have played a role in their ability to appropriately engage in memory selectivity under certain contexts. Future research is needed to better differentiate the underlying factors (e.g., task demands, motivation, metacognition) that lead children to benefit from memory-accuracy feedback.

In conclusion, our results provide novel insights into the types of feedback that best support effective strategies during value-based remembering across development. Furthermore, our findings highlight developmental differences in how metacognitive processes are influenced by task-relevant factors such as value. Additionally, we used remote research methods and demonstrated appropriate task performance with typical developmental improvements, providing evidence for the successful use of online research with children (Shields et al., 2021). Overall, this research has important implications for how to best support learning and metacognitive strategies during childhood. Our findings highlight the need to consider providing developmentally appropriate feedback, such as feedback with minimal processing demands, to promote effective prioritization of information during learning.

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