FEELINGS of knowing (FOKs) are defined as assessments that information is available in memory even when it has not been retrieved. FOKs can be useful in regulating successful remembering; for instance, by informing decisions about whether to initiate a memory search or whether to continue or terminate an unsuccessful retrieval search (e.g., Nelson & Narens, 1990; Singer & Tiede, 2008). FOK judgments ask individuals to predict future recognition success after a failed recall attempt (Hart, 1965). Cue-target paired associates (e.g., TICK-SPOON) are typically studied, and recall is tested by providing the cue word (e.g., TICK) and requiring recall of its newly learned associate (e.g., SPOON). The question is whether individuals manifest higher FOKs for items they successfully recognize than for items they do not. Such FOK accuracy (termed resolution) depends on multiple factors (e.g., Nelson, Gerler, & Narens, 1984). Individuals apparently base FOKs on multiple sources of information, including the familiarity of the cue and accessibility to information about the encoding experience that may be diagnostic of target availability (Dunlosky & Metcalfe, 2009; Koriat & Levy-Sadot, 2001; Metcalfe, Schwartz, & Joaquim, 1993). People often have better than chance accuracy in forecasting whether they will recognize unrecalled information (Blake, 1973; Costermans, Lories, & Ansay, 1992; Leonesio & Nelson, 1990; Schacter, 1983).

There is consensus that, relative to younger adults, older adults maintain equivalent FOK resolution for semantic information, such as world knowledge (e.g., Anooshian, Mammarella, & Hertel, 1989; Butterfield, Nelson, & Peck, 1988; Marquie’ & Huet, 2000; Souchay, Moulin, Clarys, Taconnat, & Isingrini, 2007). In contrast, several studies have found age-related differences in FOK accuracy in episodic memory tasks (e.g., Souchay, Isingrini, & Espagnet, 2000; Souchay et al., 2007). This finding is not universal, however. Other studies have found age equivalence in FOK resolution for episodic memory of unrelated paired associates (Hertzog, Dunlosky, & Sinclair, 2010; MacLaverty & Hertzog, 2009).

Recent research on a different metacognitive judgment, the judgment of learning (JOL), has indicated no age differences in resolution for episodic memory (Hertzog, Sinclair, & Dunlosky, 2010). We previously showed that implicit memory interference had similar effects on delayed JOLs of younger and older adults (Eakin & Hertzog, 2006). This study evaluated whether aging affected episodic FOK accuracy under conditions that generated implicit interference. A demonstration that implicit interference has differential impact on FOKs for older and younger adults would support the idea that older adults’ FOKs are based on different cues than those of younger adults. Conversely, a finding of age-related invariance in metamemory for implicit
interference would support the argument that FOKs for adults of different ages are constructed in a similar manner.

Implicit Interference Effects on Memory

Examining implicit interference is relevant to episodic FOKs because interference influences accessibility to clues about information held in memory that are an important influence on FOKs (e.g., Koriat, 1995). All words are associated with other words, but the size of the associative set varies. The impact of the number of associates on memory is similar to explicit retroactive interference (e.g., Eakin, 2005). When a target is studied alone, but recall is later cued by an associatively related word (i.e., extralist cueing), recall is typically worse when the cue has a larger, rather than a smaller associative set size. These set-size effects are explained by the Processing Implicit and Explicit Representations Model (PIER2; Nelson, McKinney, Gee, & Janczura, 1998), which posits that set-size effects are obtained because there is more implicit interference from competing associates when the associative set size is large. Presentation of the extralist cue activates all of its associates, including the target. The nontarget associates compete with the target for access, thereby generating greater implicit interference for larger versus smaller set sizes.

Cue-set-size effects can be eliminated in two ways. First, when the cue and target are studied together as paired associates—or using intralist cueing—cue-set-size effects are not obtained (Eakin & Hertzog, 2006; Nelson & McEvoy, 1979). According to PIER2, providing both the cue and target at study most strongly activate those associates shared by both words (see also Nelson, McEvoy, & Schreiber, 1990). Intralist cueing reduces implicit interference because competition arises only from associates in the intersection of the cue and target set. Therefore, the size of the sampling set for a large-set-size cue or target is effectively reduced to that of the small-set-size cue or target. Second, cue-set-size effects are eliminated when memory is tested using a forced choice recognition test for which the foils are members of the cue’s associative set (e.g., Eakin & Hertzog, 2006). The leading explanation is that, when recognition is prompted with a large-set-size cue, the functional sampling set is reduced to the alternative and foils presented on the five alternative forced-choice recognition test used in that study.

Prior research has found age differences in the impact of interference on both recall and recognition memory (see Eakin & Hertzog, 2006, for a review). Therefore, the paradigm is a good one for examining age differences in FOKs to see whether both younger and older adults accurately predict the influence of implicit interference on episodic memory.

Implicit Interference Effects on Metamemory

Delayed judgments of learning (DJOLs) have been shown to covary with implicit interference effects on recall. DJOLs are predictions about future recall that are made after studying an item, but before attempting to recall it. Like FOKs, DJOLs are believed to be based on information accessed at the time of the judgment (e.g., Koriat, 1995). Because implicit interference influences retrieval of this information, DJOLs vary in the same way as recall with regard to implicit interference. In addition, this finding was obtained for both younger and older adults (Eakin & Hertzog, 2006); no age differences were observed.

Although the results from Eakin and Hertzog (2006) found that DJOLs reflected the impact of implicit interference on recall, they did not reflect implicit interference effects on recognition. One reason for DJOLs’ failure to predict recognition in Eakin and Hertzog (2006) could be primarily due to the different impact of implicit interference on recognition than on recall; participants were told to predict recall. Despite predicting different criterion tasks (recall vs. recognition), one could argue that DJOLs and FOKs are highly similar in nature, differing only with respect to whether the prior retrieval search is covert and implicitly required by the metacognitive judgment (DJOL; Nelson, Narens, & Dunlosky, 2004) or overt and required by the memory task preceding the metacognitive judgment (FOK). If so, use of recognition memory as the task to be predicted could limit FOK resolution because the information available at prediction would be derived from past recall rather than future recognition. Indeed, we hypothesized that FOKs would behave similarly to DJOLs, both in terms of entrainment by recall outcomes and by sensitivity to associative set-size effects in recall, rather than recognition.

The foregoing arguments are relevant to whether manipulating associative set size would generate age differences in episodic FOK resolution. If DJOLs and FOKs are based on similar evidence at the time of a retrieval attempt, then one would predict equivalent relationships of FOKs with cued recall outcomes for both old and young adults. This relationship is rarely evaluated in FOK research. If individuals generically rely on the same factors, such as accessibility, when making FOKs that they do when making DJOLs, both age groups would demonstrate low FOK resolution (as in Eakin & Hertzog, 2006). Conversely, different information is accessed when making FOKs as opposed to DJOLs—and if younger adults access information that is actually diagnostic of subsequent recognition memory—then one might observe age differences in FOK resolution for recognition, even if none are observed for FOK resolution for cued recall. Functionally, what would be required is for people to override the influence of implicit interference on retrieval when making an FOK, attending instead to other sources of information that could be used to successfully predict recognition memory outcomes. Doing so may not be easy, even for the younger adults. Some studies suggest that younger adults routinely fail to anticipate learning and forgetting effects when making JOLs. However, older adults may have even more difficulty doing so. Age-related differences
in inhibition (e.g., Hasher & Zacks, 1988; Zacks & Hasher, 1994; see also Holley & McEvoy, 1996) and/or reduced executive processing resources (e.g., Perrotin, Isgròrini, Souchay, Clarys, & Taconnet, 2006; Perrotin, Tournèlle, & Isgròrini, 2008; Souchay, Isgròrini, Clarys, Taconnet, & Eustache, 2004) may reduce the likelihood that older adults will seek and evaluate different sources of evidence when making FOKs.

**METHOD**

**Design and Participants**

The design was a 2 × 2 × 2 mixed-model factorial design. Cue set size (small, large) was manipulated within subjects. Cueing procedure (extralist, intralist) and age group (younger, older) were between-subjects factors. Fifty-one younger adults (M = 19.58, SD = 2.05) from Mississippi State University participated in exchange for course credit. Forty-two older adults (M = 68.09, SD = 4.45) were recruited from the Atlanta, Georgia community and were reimbursed for participation.

**Materials**

*Stimulus materials.*—We created a list of 44 related cue and target word pairs using the University of South Florida word association norms (Nelson et al., 1990). Half of the word pairs had small-set-size cues (5–9 associates, M = 6.79, SD = 0.16) and half had large-set-size cues (16–24 associates, M = 19.75, SD = 0.10). We equated forward association strength (M = 0.12, SD = 0.03) and backward association strength (M = 0.03, SD = 0.01) across cue set size and list. Note that the association strength was relatively low; the target was never the most highly associated member of the cue’s semantic set. We also equated target set size, printed word frequency (Kucera & Francis, 1967), concreteness, and connectivity (Nelson, McEvoy, & Schreiber, 1998). We used the ListChecker Pro 1.2 program (Eakin, 2010) to ensure that each cue was associatively related only to its intended target and not to any other target or cue on the list.

The paper-and-pencil recognition test consisted of five alternatives, one of which was the target. A Scantron form was provided for response collection. Each of the 44 cues was presented (e.g., TWIG-TREE) for 8 s. They were instructed to form an interactive image of the two words; participants pressed the space bar to indicate when an image was formed. After the 8 s, participants rated their image as vivid (clear with lots of detail) or neutral (unclear and vague) or pressed the enter key if they were not able to form an image (compliance rates and proportion of items rated vivid were not correlated with memory outcome). All 44-list pairs were presented for encoding in random order. The recall phase followed; each of the 44 cues from the word pairs was presented in random order and participants typed in the target word with which the presented word had been paired during the encoding phase. We encouraged participants to try hard to recall and to guess if they were able to do so. If unable to recall or guess, participants typed “NEXT” on the keyboard. All items were presented for recall before proceeding to the FOK phase.

During the FOK phase, regardless of recall outcome, the same 44 cues were again randomly presented, and participants provided an FOK for each item. We told them to base their FOKs on their sense of whether they would be able to recognize the item from among five alternatives on a future recognition test. Time was not limited, but we asked participants to make their predictions quickly using a percentage confidence rating scale of 0–100 (0 = certain not to recognize, 100 = certain to recognize), and we encouraged them to use the full range of the scale.
Results

Probability of Recall

A general linear model produced two key results. First, the expected interaction between cue set size and cueing procedure was significant, $F(1, 89) = 15.31, p < .001$, $\eta^2_p = .15$. Cue-set-size effects were obtained for extralist cueing and eliminated for intralist cueing. Second, age influenced the effect of cue set size on recall. The main effect of age was significant, $F(1, 89) = 6.70, p = .01$, $\eta^2_p = .07$, and the three-way interaction between age, cueing procedure, and cue set size was significant, $F(1, 89) = 9.87, p = .002$, $\eta^2_p = .10$. Cue-set-size effects were obtained under extralist cueing and were eliminated under intralist cueing for the younger adults, not the older adults (see Table 1). For the older adults, cue-set-size effects were not obtained for either cueing procedure.

Probability of Recognition—All Items

The mean probability of recognition varied between age groups, $F(1, 89) = 8.15, p = .005$, $\eta^2_p = .08$, with better overall recognition memory by younger adults (see Table 1). Age did not interact with cue set size $F < 1.00$ or cueing procedure, $F < 1.00$.

Probability of Recognition—Unrecalled Items Only

Recognition of unrecalled items did not differ between the two age groups, $F(1, 84) = 1.08, p = .30$. Set-size effects were not obtained under extralist cueing for either age group (see Table 1). None of the interactions approached significance.

FOK Sensitivity

Our primary focus was on whether older adults manifested impaired FOK accuracy in either (a) predicting subsequent recognition memory or (b) influence of recall success on FOKs. However, mean FOKs are reported first (see Table 2).

FOKs for all items.—The main effect of recall outcome was significant, $F(1, 83) = 31.63, p < .001$, $\eta^2_p = .28$. FOKs were higher for recalled ($M = 90.56, SEM = .80$) than for unrecalled ($M = 55.09, SEM = 6.46$) targets. This finding did not differ for the two age groups; the interaction was not significant, $F(1, 83) = 3.19, p = .08$. Similar to recall, cue set size interacted with cueing procedure, $F(1, 89) = 14.36, p < .001$, $\eta^2_p = .14$; cue-set-size effects were obtained for extralist cueing and were eliminated in intralist cueing. This finding was obtained for both younger and older adults. Although recall varied with age, FOKs for all items did not, $F(1, 89) < 1.00$. Age did not interact significantly with cueing procedure, $F(1, 89) < 1.00$, or with cue set size, $F(1, 89) < 1.00$, and the three-way interaction was not significant, $F(1, 89) = 2.98, p = .09$.

FOKs for unrecalled items only.—FOK research traditionally evaluates FOKs for unrecalled items only. Variations in FOKs did not coincide with recognition of unrecalled items.
Although recognition was equal for unrecalled targets given small- and large-set-size cues, FOKs were higher for small- than for large-set-size cues, $F(1, 84) = 11.41, p = .001$, $\eta^2 = .12$ ($M = 51.95$, $SEM = 2.55$ and $M = 45.79$, $SEM = 2.73$, respectively). FOKs also did not vary with cueing procedure ($F(1, 84) = 1.69, p = .20$) and did not interact with age ($F(1, 84) < 1.00$). None of the other interactions were significant.

**FOK Resolution**

Although FOK sensitivity findings suggest that—similar to DJOLs—FOKs were influenced by the impact of implicit interference on recall, rather than an examination of resolution indicates whether FOKs were correlated with recognition outcome and whether aging impaired FOK accuracy at predicting the impact of implicit interference on recognition. A general linear model was conducted on within-person ordinal Goodman–Kruskal gamma correlations ($G$) between FOKs and both recognition and recall (see Table 3).

**FOK resolution with recognition.**—FOK resolution for all items, regardless of recall outcome, was reliably above chance, $t(63) = 9.01, p < .001$. Notably, resolution did not vary with age group ($F(1, 61) < 1.00$), indicating that younger and older adults were equally accurate at predicting recognition outcome when all items were included in the analysis, even though that outcome differed for younger and older adults. For items that were not recalled, however, it was clear that neither younger nor older adults could accurately predict recognition outcomes. When recall failed, resolution was poor for both age groups; the overall mean $G$ was essentially zero.

**FOKs resolution with cued recall.**—To determine the influence of prior experience with implicit interference obtained during recall, FOKs were correlated with recall success. Resolution was reliably greater than chance, $t(92) = 39.76, p < .001$, with an overall mean of 0.80 ($SEM = 0.02$). Small age differences were obtained. Younger adults ($M = 0.87, SEM = 0.03$) were more accurate than older adults.

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### Table 2. Mean Feeling of Knowing Sensitivity for All Items and for Unrecalled Items Only

<table>
<thead>
<tr>
<th>Cueing procedure</th>
<th>Younger adults</th>
<th></th>
<th></th>
<th>Older adults</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small set</td>
<td>Large set</td>
<td></td>
<td>Small set</td>
<td>Large set</td>
<td></td>
<td>Small set</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>All</td>
<td>Extralist</td>
<td>73.35</td>
<td>15.55</td>
<td>61.31</td>
<td>18.43</td>
<td>67.33</td>
<td>15.65</td>
</tr>
<tr>
<td></td>
<td>Intralist</td>
<td>85.35</td>
<td>12.56</td>
<td>84.53</td>
<td>15.05</td>
<td>84.94</td>
<td>20.41</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>79.35</td>
<td>72.92</td>
<td>76.13</td>
<td>76.76</td>
<td>71.25</td>
<td>74.01</td>
</tr>
<tr>
<td>Recalled</td>
<td>Extralist</td>
<td>94.30</td>
<td>5.54</td>
<td>93.06</td>
<td>8.93</td>
<td>91.69</td>
<td>8.39</td>
</tr>
<tr>
<td></td>
<td>Intralist</td>
<td>93.88</td>
<td>6.54</td>
<td>89.50</td>
<td>10.09</td>
<td>93.68</td>
<td>6.90</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>94.09</td>
<td>91.28</td>
<td>92.68</td>
<td>89.45</td>
<td>88.61</td>
<td>89.03</td>
</tr>
<tr>
<td>Unrecalled</td>
<td>Extralist</td>
<td>45.25</td>
<td>24.85</td>
<td>40.14</td>
<td>24.83</td>
<td>42.70</td>
<td>25.53</td>
</tr>
<tr>
<td></td>
<td>Intralist</td>
<td>52.86</td>
<td>23.01</td>
<td>48.75</td>
<td>27.17</td>
<td>50.81</td>
<td>21.35</td>
</tr>
<tr>
<td></td>
<td>$M$</td>
<td>49.06</td>
<td>44.44</td>
<td>46.75</td>
<td>54.83</td>
<td>47.14</td>
<td>50.99</td>
</tr>
</tbody>
</table>

**Note.** Marginal means are included.

### Table 3. Feeling of Knowing Resolution (Feeling of Knowing $\times$ Recognition) for All and Unrecalled Items Only

<table>
<thead>
<tr>
<th>FOK $\times$ Recognition</th>
<th>Younger adults</th>
<th></th>
<th></th>
<th>Older adults</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Small set</td>
<td>Large set</td>
<td></td>
<td>Small set</td>
<td>Large set</td>
<td></td>
<td>Small set</td>
</tr>
<tr>
<td>All</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Extralist</td>
<td>0.29</td>
<td>0.54</td>
<td>0.22</td>
<td>0.61</td>
<td>0.25</td>
<td>0.58</td>
<td>0.35</td>
</tr>
<tr>
<td>Intralist</td>
<td>0.68</td>
<td>0.26</td>
<td>0.29</td>
<td>0.92</td>
<td>0.49</td>
<td>0.23</td>
<td>0.45</td>
</tr>
<tr>
<td>$M$</td>
<td>0.48</td>
<td>0.26</td>
<td>0.37</td>
<td>0.41</td>
<td>0.40</td>
<td>0.41</td>
<td></td>
</tr>
<tr>
<td>Unrecalled</td>
<td>$-0.09$</td>
<td>0.49</td>
<td>$-0.04$</td>
<td>0.61</td>
<td>$-0.06$</td>
<td>0.77</td>
<td>$-0.01$</td>
</tr>
<tr>
<td>Intralist</td>
<td>0.02</td>
<td>0.71</td>
<td>$-0.22$</td>
<td>0.92</td>
<td>$-0.10$</td>
<td>0.63</td>
<td>0.22</td>
</tr>
<tr>
<td>$M$</td>
<td>$-0.03$</td>
<td>$-0.13$</td>
<td>$-0.08$</td>
<td>0.04</td>
<td>0.13</td>
<td>0.08</td>
<td></td>
</tr>
<tr>
<td>FOK $\times$ Recall</td>
<td>Extralist</td>
<td>0.86</td>
<td>0.05</td>
<td>0.86</td>
<td>0.05</td>
<td>0.87</td>
<td>0.07</td>
</tr>
<tr>
<td>Intralist</td>
<td>0.86</td>
<td>0.07</td>
<td>0.88</td>
<td>0.07</td>
<td>0.86</td>
<td>0.07</td>
<td>0.77</td>
</tr>
<tr>
<td>$M$</td>
<td>0.86</td>
<td>0.87</td>
<td>0.69</td>
<td>0.79</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes.** FOK resolution for recall (FOKs $\times$ recall) is included in the lower section of the table for comparison purposes. Marginal means are included. FOK = feeling of knowing.
Recall gammas versus recognition gammas.—A statistical comparison of mean G for FOK-by-recall to mean G for FOK-by-recognition highlighted the differential findings depending on the type of memory test. Cued recall was much more highly correlated with FOKs ($M = 0.80, SEM = 0.02$) than recognition performance ($M = 0.46, SEM = 0.05$), $F(1, 84) = 55.57, p < .001, \eta_p^2 = .40$.

**Discussion**

We used implicit interference effects on memory as a basis for evaluating FOKs and FOK resolution in younger and older adults. Age differences were obtained both for recall and for recognition. For recall, cue-set-size effects were obtained under extralist cueing and eliminated under intralist cueing and recognition for younger adults. For older adults, cue-set-size effects were not obtained for extralist cueing. Therefore, set-size effects on recall and recognition were different for the two age groups, and these effects could have, in principle, impacted FOKs and FOK resolution differentially for younger and older adults.

Both younger and older adults provided FOKs that were inconsistent with the lack of implicit interference effects on recognition memory. Although both age groups showed reliable FOK correlations with recognition memory for all items (when successfully recalled items were included in the correlations), neither group showed above-chance FOK resolution when the analysis was restricted only to unre- called items. This finding suggests that neither age group was able to override the implicit interference at the time of the FOK in order to accurately reflect the fact that implicit interference would be resolved on the recognition test. Rather, mean FOKs manifested implicit interference effects that mirrored those influences of set size on recall. This finding is consistent with prior research with young adults showing that DJOLs and FOKs both mirrored cue-set-size (Schreiber & Nelson, 1998) and target-set-size (Schreiber, 1998) effects in cued recall. Indeed, FOKs were much more highly correlated with recall than with recognition, pointing to the strong influence of recall on subsequent FOKs, even though FOKs were collected in a block that was delayed until after the recall test.

The most plausible reason that FOKs were more highly correlated with recall than with recognition outcomes is that people were using retrieval of a candidate answer both at recall and at the time of the FOK and that candidate retrieval was highly correlated across these two retrieval attempts (Krisnky & Nelson, 1985). We tested this by eliminated commission errors and recalculated gammas between FOKs and recognition, which resulted in a mean gamma of .45 ($SE = 0.07$) with no significant main effects or interactions. Accuracy was somewhat higher when commission errors were eliminated than when they were included ($G = .39$). Apparently, when a response was accessible (even when it was not correct), people had high confidence in future recognition. Gammas for omission errors only were low ($G = .12, SE = 0.16$), indicating that when no response came to mind, FOKs were indiscriminate with regard to future recognition. Alternatively, FOKs may have been based on retrieval of information about whether the item had been previously recalled, as in memory for past test heuristic by Finn and Metcalfe (2008). In either case, the fact that FOKs for unre- called items were not correlated with subsequent recognition indicated that either (a) few other cues were utilized when making the FOKs or (b) any other cues that were being accessed for such trials lacked predictive validity for recognition performance. Although people were explicitly trying to predict recognition, the conditions at the time of the FOK prediction more closely matched those at recall than at recognition. For both FOKs and recall, a cue was presented in isolation and, regardless of cueing procedure, the implicit interference experienced when the cue is processed for FOK was prescriptive of the impact of implicit interference on recall. However, presumably because this influence is implicit, people did not predict that it would be reduced for recognition.

Implicit interference effects on FOKs support the accessibility view of FOK construction (Koriat, 1995; Koriat & Levy-Sadot, 2001). Varying degrees of implicit interference from associates of the cue influenced the accessibility of information available when FOKs were made. Accessibility of information affected recall but was neutralized by presenting alternatives on the forced-choice recognition test.

It is interesting to note that there was one indication of an age difference in FOK resolution; gamma correlations of FOKs with recall were reliably higher for younger adults, even though they were much higher for both age groups than the correlations of FOKs with recognition memory. This finding is not material with respect to the issue of age differences in episodic FOK resolution because other studies have focused exclusively on resolution for unre- called items, given their analog to feeling of knowing as originally intended (e.g., Hart, 1965). Nevertheless, this age difference is intriguing. We suggest that one influence on the difference is that older adults are less confident than younger adults that they will correctly recognize successfully recalled items (see MacLaverty & Hertzog, 2009, for a similar finding). This effect probably diluted the correlation of FOKs with prior recall outcomes. This outcome also suggests at least some divergence between FOKs and DJOLs because it was not observed for DJOLs in the Eakin and Hertzog (2006) study.

Adults of both age groups produced chance levels of FOK resolution for recognition memory for unre- called items. In contrast, other published studies of age differences in episodic FOK resolution using unrelated items (e.g., Hertzog et al., 2010; MacLaverty & Hertzog, 2009) have
found above-chance FOK resolution for both age groups. MacLaverty and Hertzog found equivalent resolution for younger and older adults in both immediate and delayed FOKs (delayed FOKs were used in the present study), so the issue appears to be one of low resolution for related items. Resolution of immediate JOLs has also been shown to be better for unrelated than for related pairs (Connor, Dunlosky, & Hertzog, 1997; Hertzog, Kidder, Powell-Moman, & Dunlosky, 2002; Hertzog, Sinclair, & Dunlosky, 2010). This study, in combination with results from MacLaverty and Hertzog, suggests that associative relatedness also influences the resolution of FOKs.

The present study adds to the growing evidence that age differences in episodic FOKs found in some studies (e.g., Souchay et al., 2007) are far from universal. Instead, the age differences in FOK resolution found by Souchay and colleagues (2007) may depend instead on differences in methods (e.g., type of recognition memory test) or realized samples of older adults. For instance, older adults of Souchay et al. (2000) had much lower mean education and lower scores on the MMSE than those in the present study. In addition, episodic FOK accuracy is impaired by Alzheimer’s disease (Souchay, Isingrini, & Gil, 2002), mild cognitive impairment (Anderson & Schmitter-Edgecombe, 2010), and low scores on neuropsychological tests of frontal function (e.g., Perrotin et al., 2008; Souchay & Isingrini, 2004; Souchay et al., 2000). Such findings may indicate that studies finding age differences in episodic FOK resolution have included older adults with normative brain pathology in their sample (see Eakin, Harris, & Hertzog, 2010; MacLaverty & Hertzog, 2009, for further discussion).

CONCLUSIONS

Many factors such as the number of associates of a cue, cueing procedure, and the type of memory test can metamemory. However, age does not appear to be one of those factors. As in the case of predicting implicit interference effects on recognition, sometimes people of both age groups are equally inaccurate. Accurate metamemory predictions derive from people attending to diagnostic sources of information when making predictions. When metamemory judgments are based on invalid sources of information or ignore valid sources, dissociation between metamemory judgments and memory outcomes have been obtained (e.g., Eakin, 2005; Koriat & Bjork, 2005, 2006). As this study demonstrated, the influence of implicit interference is different on FOKs than on recognition, and people of both age groups failed to predict this differential impact. However, metamemory judgments reflected the impact of implicit interference on recall, and in this case, both younger and older adults’ FOKs were highly correlated with recall outcomes. Even though age differences were obtained in recall, both age groups relied on accessibility during the recall test as a basis for FOKs, leading to high correlations of FOKs with recall for both age groups but minimizing correlations of FOKs with subsequent recognition memory.

FUNDING

This research was supported in part by a postdoctoral fellowship awarded to D. K. Eakin by the National Institute on Aging (NIA; Cognitive Aging Training Grant NIA 2374 AG01751-11) at the Georgia Institute of Technology. This research was also supported by Grant NIA R37 AG13148 awarded to C. Hertzog.

ACKNOWLEDGMENTS

The authors would like to thank Elizabeth Crommelin, Rosalyn Daniels, Shuntal Dean, Lindsey McKay, Miranda Morris, Leigh Nadel, Jared Pryor, Helen Saputra, and Mary Wheeler for their assistance with data collection and processing.

CORRESPONDENCE

Correspondence should be addressed to Deborah K. Eakin, PhD, Department of Psychology, Mississippi State University, P.O. Box 61461, Mississippi State, MS 39762. E-mail: deakin@psychology.msstate.edu.

REFERENCES


Eakin, D. K. (2010). ListChecker Pro 1.2: A program designed to facilitate creating word lists using the University of South Florida word association norms. Behavior Research Methods, 42, 1012–1021. doi:10.3758/BRM.42.4.1012


