

## Age Differences in the Effects of Facilitating and Distracting Context on Recall\*

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### ABSTRACT

The effect of different types of context on cued recall of nouns embedded in sentences was examined. Younger and older adults studied target nouns embedded in sentences of three types: sentences containing supporting context, sentences with neutral context, and sentences containing context that was distracting to memory of the nouns. In Experiments 1 and 2, supportive sentences facilitated the performance of older adults at least as much as younger adults, and sentences that were distracting disrupted the performance of older but not of younger adults. In Experiment 3, however, when the disruptive nature of the distracting sentences was increased by ensuring that subjects processed the distracting information, there was no age by sentence type interaction. The results suggest that younger adults are better able to ignore distracting information if not required to attend to it, but are almost as disrupted as older adults when forced to attend to distracting information.

Context has been defined as information that is present in the environment that affects memory for to-be-learned material (Park, 1989). Most of the research conducted to examine age differences in the use of context has focused on context that supports or facilitates deliberate recall performance. Little research has been conducted to examine age differences in the effects of distracting context, or context that disrupts recall performance, and no previous study has compared the two types of context within the same study.

It has been suggested that older adults may not use context as effectively as younger adults to facilitate memory performance (e.g., Burke & Light, 1981). Several studies have been conducted in order to examine the effects of supportive or neutral context on age differences in memory. Under many conditions older adults appear to use context in ways similar to youn-

ger adults (cf. Light, 1991). For example, older adults have been shown to be as facilitated as younger adults by the reinstatement at retrieval of cues present at encoding (Park, Puglisi, Smith, & Dudley, 1987; Park, Puglisi, & Sovacool, 1984; Puglisi, Park, Smith, & Dudley, 1988). Park, Smith, Morrell, Puglisi, and Dudley (1990) and Craik and Jennings (1992) have proposed an integration hypothesis to explain age differences in the use of context. They suggest that older adults may be facilitated more than younger adults by context that is well integrated with the target material. Park et al. (1990) found some evidence to support this hypothesis. They found that when an intratask context (i.e., a picture) was well integrated with another to-be-remembered target picture, the memory performance of older adults benefited more than that of younger adults. Cohen and Faulkner (1983) also found that presenting

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target words within a sentence context increased the recognition performance of older more than younger adults. Thus, in some cases, a supportive context can benefit older more than younger adults.

The research that has been conducted to examine age differences in the effects of distracting context has focused on divided-attention manipulations. Park, Smith, Dudley, and Lafronza (1989) found that when subjects performed a divided-attention task (i.e., number monitoring) during the encoding of words, the performance of older adults was disrupted more than that of younger adults. Salthouse, Rogan, and Prill (1984) and Somberg and Salthouse (1982) also found that older adults were more disrupted by a divided-attention task. Older adults may have more difficulty with divided attention because it involves the allocation of limited resources (Salthouse et al., 1984).

Other researchers, however, have failed to find a larger effect of divided attention on older than on younger adults. Morris, Gick, and Craik (1988) found that repeating words out loud while verifying sentences had similar effects for younger and older adults, and Tun, Wingfield, and Stine (1991) found no age differences in the effects of divided-attention on recall performance.

Thus, when divided attention is used as a distracting context, often the performance of older adults is disrupted more than that of younger adults, though there are cases in which the performances of older and younger adults are equally disrupted. In studies of divided attention, however, the distracting context is not part of the learning task itself, but is rather a separate task competing with the learning task. Thus the divided-attention manipulation does not provide specific contextual information for the targets.

An alternative approach to the study of distracting context is to examine the ability to ignore irrelevant information. Hasher and Zacks (1988) proposed that older adults have more difficulty than younger adults inhibiting or suppressing irrelevant information. They hypothesize that older adults retain irrelevant information in working memory. This irrelevant

information takes up space in working memory, leaving less room for processing target information. Thus the inability to inhibit information leads to poorer memory for the targets. There has been some evidence that older adults do have more difficulty than younger adults inhibiting or suppressing irrelevant information (e.g., Hartman & Hasher, 1991; Hasher, Stoltzfus, Zacks, & Rypma, 1991).

The purpose of the current study was to examine and compare the effects of facilitating vs. distracting intratask context on the recall performance of younger and older adults within the same task. Another problem with the previous studies using divided attention as distraction is that the divided-attention paradigm does not allow one to examine the effects of facilitation and distraction in the same task. In the present study, the facilitating and the distracting contexts were similar in form and presentation, only differing in their relationship to the target. It was hypothesized that a larger age difference would be found when the context was distracting than when the context was facilitating. The memory performance of older adults was hypothesized to be more facilitated by a supportive context because older adults depend more than younger adults on external memory support. The memory performance of older adults was expected to be more disrupted by a distracting context than the performance of younger adults, in part because the older adults would be less able than the younger adults to ignore distracting information.

## EXPERIMENT 1

### METHOD

#### Subjects

The subjects were 36 undergraduate students ( $M$  age = 20.1,  $SD$  = 1.2) who received extra credit in a psychology class and 27 community-dwelling older adults ( $M$  age = 69.5,  $SD$  = 4.2) who were paid \$10 for their participation. There were 19 males in the younger group and 17 in the older group. Subjects rated their health on a scale of 1 (poor) to 4 (excellent). The younger adults had significantly higher health ratings ( $M$  = 3.6,  $SD$  = .5) than did the older adults ( $M$  = 3.2,  $SD$  = .7),  $F(1, 61) = 6.13, p < .05$ ,

but both means were between good and excellent. The older adults scored significantly higher ( $M = 35.7$ ,  $SD = 3.0$ ) than did the younger adults ( $M = 30.5$ ,  $SD = 3.4$ ) on the 40-item Shipley Institute of Living Vocabulary Test,  $F(1, 61) = 39.84$ ,  $p < .05$ . The older adults also had more years of education ( $M = 15.9$ ,  $SD = 3.3$ ) than did the younger adults ( $M = 13.7$ ,  $SD = 1.1$ ),  $F(1, 61) = 13.64$ ,  $p < .05$ .

### Materials

The materials used in this experiment were developed in pilot studies. Three groups of 30 sentences were developed. All groups of sentences contained the same list of 30 concrete nouns that were used as targets, but each group contained different types of sentences accompanying the nouns. There were three types of sentences, varying the amount of support they provided to the subject for remembering the noun. Group 1 (i.e., Facilitating) contained sentences where the context facilitated memory for the target material, and there were few alternatives to the target noun for the sentence frame, for example, "The beautiful **peacock** spread its feathers." Group 2 (i.e., Neutral) contained neutral sentences where many different nouns could serve as the target in the sentence frame, such as "The beautiful **peacock** was a pleasure to behold." Group 3 (i.e., Distracting) contained sentences having elaborations that were distracting and contradictory to the representation of the target noun in memory, such as "The beautiful **peacock** showed a partial solar eclipse." The sentences are in Appendix A.

Several steps were taken to norm the sentences used in this study.

#### *Appropriateness of the Noun*

The first pilot study was conducted in order to assess whether or not subjects would perceive that the sentences differed in how well the noun fit into the different sentences. Eleven undergraduate students were asked to rate how appropriate the given noun was for each of the three types of sentences on a scale of 1 (very appropriate) to 5 (inappropriate) in a within-subjects design. The 30 facilitating sentences received a mean rating of 1.33 ( $SD = .28$ ), the neutral sentences received a mean rating of 1.99 ( $SD = .67$ ), and the distracting sentences received a mean rating of 4.54 ( $SD = .45$ ). Thus the distracting sentences were different from the neutral and the facilitating sentences, but further pilot work needed to be done to determine whether or not the facilitating sentences were different from the neutral sentences.

#### *Best Sentence for the Noun*

A separate pilot study evaluated whether or not the facilitating sentences went with the noun better than

did the neutral sentences. Ten undergraduates were asked to choose which of the two sentences, facilitating or neutral, fit the noun best. The subjects chose the facilitating sentence in 88% of the cases. The facilitating sentences were, therefore, considered to be better for the noun than were the neutral sentences.

#### *Guessing*

There was some concern that subjects might be able to guess, rather than remember, the noun that was used to fill in the blank, especially for the facilitating sentences. Therefore, 53 undergraduates were given a randomized list of the facilitating and neutral sentences, each with a blank in place of the noun. The subjects were asked to fill in the blank with the most appropriate word. For the facilitating sentences, the noun was guessed in only an average of 3% of the cases, and for the neutral sentences, it was guessed in only an average of 1% of the cases. Thus the rate of guessing was low.

There were three lists of 30 sentences, each containing 10 facilitating, 10 neutral, and 10 distracting sentences in random order. Context type was counter-balanced across lists. All sentence groups used the same set of nouns. For example, for one list the word *peacock* would be presented with a facilitating sentence, for another list it would be presented with a neutral sentence, and for the third list it would be presented with a distracting sentence. The sentences were presented individually by slides onto a large screen in the front of the room.

#### **Procedure**

Subjects were tested in small groups. Each subject was assigned to one of the three groups of 30 sentences. The subjects were shown each sentence with a blank in place of the to-be-remembered noun for 5 s. After each sentence, the subjects were presented with the noun that went into the sentence for 3 s. The subjects were presented the sentence first without the word so that the distracting manipulation would be particularly effective. That is, the target noun would not match any representations activated in that 5-s period. Subjects were told to try to remember the noun, and that they would later be shown the sentences with the blanks and be asked to fill in each blank with the appropriate noun. The subjects then performed a 90-s subtraction distracter task. The sentences with the blanks were then presented for 10 s each, and the subjects attempted to recall the noun that went with the sentence. Each subject then filled out a demographic information sheet and took the Shipley Institute of Living Vocabulary Test.

## RESULTS

A 2 X 3 (X 3) repeated measures ANOVA was conducted with Age (Younger vs. Older) and Sentence List (List 1, List 2, or List 3) as the between-subjects variables and Sentence Type (Facilitating, Neutral, and Distracting) as the within-subjects variable. The analysis revealed a significant main effect of age,  $F(1, 57) = 21.67, p < .05$ , and a significant main effect of sentence type,  $F(2, 114) = 90.43, p < .05$ . There was also a significant interaction of age and sentence type,  $F(2, 114) = 3.14, p < .05$ .

There were three different lists of 30 sentences that were used for counterbalancing. As noted above, each sentence list contained 10 facilitating, 10 neutral, and 10 distracting sentences. The analysis revealed a significant effect of sentence list,  $F(2, 57) = 12.75, p < .05$ , and there were significant interactions between sentence list and age,  $F(2, 57) = 3.81, p < .05$ , and between sentence list and sentence type (i.e., facilitating, neutral, or distracting),  $F(4, 114) = 3.05, p < .05$ . The three-way interaction approached significance,  $F(4, 114) = 2.30, p = .06$ . Sentence List 2 and Sentence List 3 were not significantly different,  $F < 1$ . Because Sentence List 1 was found to be different from the other two lists, it was not used in subsequent analyses.

A 2 (X 3) repeated measures ANOVA was conducted using only Lists 2 and 3, with Age as the between-subjects variable and Sentence Type (Facilitating, Neutral, and Distracting) as the within-subjects variable. There were again significant main effects of age,  $F(1, 40) = 15.07, p < .05$ , and sentence type,  $F(2, 80) = 79.30, p < .05$ . There was also a significant interaction,  $F(2, 80) = 3.98, p < .05$ . The means for this interaction are presented in Figure 1.

An analysis of simple effects revealed no significant interaction between age and sentence type for the facilitating vs. neutral sentences,  $F(1, 40) = 1.53$ , or between age and sentence type for the neutral and distracting sentences,  $F(1, 40) = 2.22, p = .14$ . The interaction was therefore primarily due to the smaller age difference in the facilitating than in the distracting condition. For the younger adults,

there was a significant difference between the facilitating and the neutral sentences,  $F(1, 23) = 36.53, p < .05$ . However, there was no significant difference between the neutral and the distracting sentences,  $F(1, 23) < 1$ . There was also a significant difference between the facilitating and the neutral sentences for the older adults,  $F(1, 17) = 50.11, p < .05$ . For the older adults, however, there was significantly lower performance with the distracting than with the neutral sentences,  $F(1, 17) = 14.86, p < .05$ .

## DISCUSSION

In Experiment 1, the memory performance of the older adults was found to be at least as enhanced as that of the younger adults by the facilitating context, but unlike the younger adults, the performance of the older adults was disrupted by the distracting context. The results supported the hypothesis that the memory performance of older adults is more dependent on context than is the memory performance of younger adults. However, the interpretation of the results of Experiment 1 is complicated by the finding of differences between the counterbalanced lists of sentences. Also, in the within-subjects design the subjects probably realized that some of the sentences were meaningful and some were not meaningful. The use of the within-subjects design may have resulted in a bizarreness effect for the 10 distracting sentences because they were so different from the other 20 sentences. Many studies have found that bizarre items are better remembered than are common items within a mixed list, but this effect is much smaller or nonexistent when a between-subjects design is used (cf. Einstein & McDaniel, 1987). There may also have been less facilitation by the facilitating context because subjects could not distinguish between the three types of sentences at retrieval, and therefore could not be certain whether or not the sentence should have a meaningful completion.

Experiment 2 was designed to attempt to replicate the results of Experiment 1 using a between-subjects design. The between-subjects design should prevent subjects from noticing

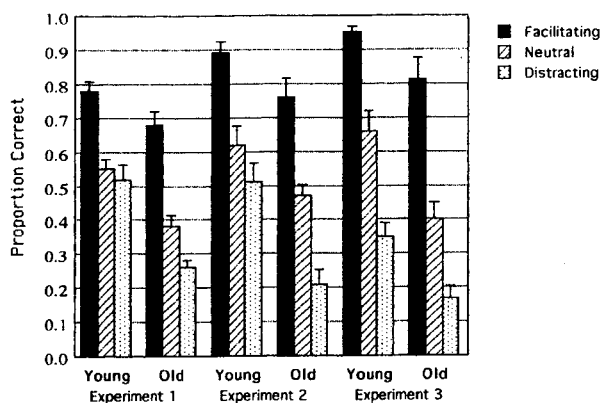


Fig. 1. The mean proportions of nouns recalled and the standard errors for all three experiments.

the sentence type manipulation. It was expected that there would be less potential for a bizarreness effect with a between-subjects design because all of the sentences on the distracting list would be unusual; therefore, none would stand out as particularly bizarre. Replication was especially important because of the differences found between the sentence lists used for counterbalancing in Experiment 1.

## EXPERIMENT 2

### METHOD

#### Subjects

Subjects were 36 undergraduate students ( $M$  age = 20.5,  $SD$  = 1.6) who were given extra credit in a psychology course and 36 older adults ( $M$  age = 68.9,  $SD$  = 4.4) who were paid \$10 for their participation. There were 18 females in each age group. The younger adults had significantly higher health ratings ( $M$  = 3.7,  $SD$  = .5) than did the older adults ( $M$  = 3.1,  $SD$  = .7),  $F(1, 70) = 16.80$ ,  $p < .05$ , though both groups again scored in the good to excellent range. The older adults had significantly higher Shipley vocabulary scores ( $M$  = 34.5,  $SD$  = 3.5) than did the younger adults ( $M$  = 31.5,  $SD$  = 3.8),  $F(1, 70) = 12.62$ ,  $p < .05$ . The older adults ( $M$  = 14.7,  $SD$  = 2.7) and the younger adults ( $M$  = 14.3,  $SD$  = 1.4) had approximately equal numbers of years of education,  $F(1, 69) < 1$ .

#### Materials

The sentences from Experiment 1 were also used in this experiment. There were three groups of 30 sentences, each containing a different type of sentence (i.e., facilitating, neutral, or distracting), but the same 30 nouns. There were two presentation orders for

each sentence type.

### Procedure

The procedure was the same as in Experiment 1 except that it was a between-subjects design. Each subject saw 30 sentences of one type.

## RESULTS

A 2 X 3 ANOVA revealed a significant main effect of age,  $F(1, 66) = 29.28$ ,  $p < .05$ , and a significant main effect of sentence type,  $F(2, 66) = 55.13$ ,  $p < .05$ . The interaction between age and sentence type did not reach statistical significance,  $F(2, 66) = 2.29$ ,  $p = .11$ . However, because this study was a replication of Experiment 1, further analyses were conducted. Using the Tukey-HSD procedure, with an alpha level set at .05, it was found that for both the younger and the older adults, there was a significant difference between the facilitating group and the neutral group. As in Experiment 1, there was a significant difference between the neutral and the distracting group only for the older adults. Analyses of the simple effects revealed no significant interaction of age and sentence type for facilitating and neutral sentences,  $F(1,44) < 1$ , or of age and sentence type for neutral and distracting sentences,  $F(1,44) = 2.94$ ,  $p = .09$ . The means are presented in Figure 1.

## DISCUSSION

As in Experiment 1, in Experiment 2 there was a larger effect of context on the memory performance of the older than on the performance of the younger adults. Both age groups were significantly facilitated by the presentation of the facilitating sentences, but only the performance of the older adults was significantly disrupted by the presentation of the distracting sentences.

Experiment 2, therefore, provided further evidence that older adults have difficulty ignoring distracting information. In Experiment 3, an attempt was made to increase the level of distraction by requiring subjects to fill in each sentence with a word before they were given the

to-be-remembered noun. It was hypothesized that under these conditions, the younger subjects would have more difficulty in ignoring the distracting information, and therefore, like the older adults, their performance would be significantly disrupted by the presentation of the distracting sentences. Also, because of the high performance (89%) of the younger adults with the facilitating sentences, an additional four sentences of each type were added in Experiment 3 in an attempt to prevent ceiling effects.

The procedure used in Experiment 3 also allowed closer examination and control of the behavior of the subjects at encoding. The number of times that subjects guessed the to-be-remembered target noun could be determined. This is important because some of the sentences were changed in Experiment 3, leaving open the possibility that the effects of facilitation could be due to the ability of subjects to guess the word that is used to complete the sentence. The procedure used in Experiment 3 also allowed for the assessment of the number of times that subjects could not think of a word to fill in the blank during encoding. Leaving a sentence blank could potentially decrease the distraction created by the sentence. Finally, the number of times subjects remembered the word they had generated to fill in the sentence rather than the word that was presented to them could be assessed.

## EXPERIMENT 3

### METHOD

#### Subjects

The subjects were 36 undergraduates ( $M$  age = 20.4,  $SD$  = 1.6) who were given extra credit in a psychology course and 36 older adults ( $M$  age = 68.6,  $SD$  = 3.9) who were paid \$10 for their participation. There were 21 males in the younger group and 19 in the older group. There was no significant age difference in health ratings ( $M$  younger = 3.5,  $SD$  = .6;  $M$  older = 3.3,  $SD$  = .8),  $F(1, 70) = 2.72$ ,  $p > .05$ . The older adults had significantly more years of education ( $M$  = 15.0,  $SD$  = 2.5) than did the younger adults ( $M$  = 13.7,  $SD$  = 1.2),  $F(1, 70) = 7.35$ ,  $p < .05$ . The older adults also scored significantly higher on the Shipley vocabulary test ( $M$  = 33.0,  $SD$  = 6.4) than did the

younger adults ( $M$  = 30.0,  $SD$  = 3.7),  $F(1, 70) = 5.96$ ,  $p < .05$ .

#### Materials

There were three groups of 34 sentences. Each group contained a different type of sentence (i.e., facilitating, neutral, or distracting). Some of the sentences used in the previous two studies were slightly altered for this experiment, primarily to increase the ease of sentence comprehension. The sentences are shown in Appendix B, with changes in bold typeface and italicized. Four additional sentences of each type (i.e., facilitating, neutral, and distracting) were added to those used in Experiments 1 and 2 because of the high performance in Experiment 2 by the younger adults in the facilitating sentence condition. It was expected that the addition of the sentences would make the task more difficult. All sentences were presented individually on an Apple Macintosh IIci computer screen.

#### Procedure

Subjects participated individually. They were shown a series of 34 sentences of one type on a computer screen at a rate of 10 s per sentence. Each sentence had a blank in place of a major noun. Subjects were asked to say out loud a word they thought should go in the blank, and their responses were recorded by the experimenter. The subjects were then shown for 3 s a noun that went into the blank. The subjects were told that they would later be shown the 34 sentences again, and they would be asked to try to fill in each blank with the noun that was previously presented to them. Subjects then performed a 90-s subtraction distracter task. Finally, subjects were shown the sentences with the blanks for 10 s each, and were asked to fill in each blank with the word that had been presented. They then filled out an information sheet and took the Shipley vocabulary test.

### RESULTS

Analyses were conducted on the responses given by the subjects during encoding. For the facilitating sentences, subjects correctly guessed the to-be-remembered noun an average of 2.34 ( $SD$  = 1.45) times (i.e., 7%). For the neutral sentences, the correct response was guessed an average of .42 ( $SD$  = .58) times (i.e., 1%), and for the distracting sentences, it was guessed .09 ( $SD$  = .20) times (i.e., almost 0%). There were no significant age differences in guessing.

A 2 X 3 analysis of variance with number of nouns recalled as the dependent variable revealed a significant main effect of age,  $F(1, 66) = 27.14, p < .05$ , and a significant main effect of sentence type,  $F(2, 66) = 91.38, p < .05$ , but no significant interaction,  $F(2, 66) < 1$ . Post hoc analyses of sentence type, using the Tukey-HSD procedure, with an alpha level set at .05, revealed that the facilitating group was significantly different from the neutral group, and the neutral group recalled significantly more than the distracting group for both age groups. The means are presented in Figure 1.

Analyses were conducted to determine the number of times subjects filled in the blank at recall with the noun that they had generated during encoding. There was no main effect of either age or sentence type,  $F < 1$ . There was also no interaction,  $F(2, 66) = 1.67, p > .05$ . Younger subjects filled in the blank with a word self-generated at encoding an average of 1.58 times, and older adults did this an average of 1.06 times. Therefore, there seemed to be little confusion between self-generated and presented nouns for either younger or older adults.

Using number of sentences left blank at encoding as the dependent variable, there was no main effect of sentence type,  $F < 1$ , and no significant interaction,  $F(2, 66) = 1.02, p > .05$ . There was a nonsignificant trend for older adults to leave more sentences blank ( $M$  younger = .83 sentences,  $M$  older = 1.94 sentences),  $F(1, 66) = 2.75, p = .10$ , but the number of sentences left blank was low for both younger and older adults.

Analyses were also conducted on the proportion of nouns recalled after eliminating those in which the subject guessed the noun or did not fill in the blank during encoding. The results were unchanged; the significant main effects of age and sentence type remained with no significant interaction. Again, both older and younger adults recalled more nouns from facilitating than from neutral sentences and more from neutral than from distracting sentences. Eliminating both those sentences left blank and those in which guessing occurred, the means for the younger adults for the Facilitating, Neutral, and Distracting sentences were .94 (.07), .64 (.20),

and .35 (.14). The means for the older adults were .78 (.24), .34 (.28), and .04 (.37).

## DISCUSSION

The results of Experiment 3 are consistent with the hypothesis that the recall performance of younger adults can be disrupted when subjects are required to attend to the distracting information. As in Experiments 1 and 2, the results of Experiment 3 support the hypothesis that when the context is well integrated with the target information, the memory performance of older adults is at least as facilitated as that of younger adults.

## GENERAL DISCUSSION

The results of all three experiments support the hypothesis that the cued recall performance of older adults is at least as facilitated as that of younger adults by the presence of supportive intratask context. This is consistent with the work of Puglisi et al. (1988) and Park et al. (1987), who found that older adults benefited as much as younger adults by the reinstatement during retrieval of cues present during learning.

The results of Experiments 1 and 2 provide evidence to support the hypothesis of Park (1989) that the performance of older adults may be more disrupted than that of younger adults by a distracting context. The results of this study are consistent with the studies examining the effects of divided attention on memory performance that found greater disruption of the performance of older than of younger adults (e.g., Park et al., 1989). The results are also consistent with those of Wingfield, Poon, Lombardi, and Lowe (1985), who found that older adults had more difficulty than younger adults recalling unusual sentences.

The results of this study are also consistent with the theory of Hasher and Zacks (1988) that older adults are less able to inhibit irrelevant information than are younger adults. In Experiment 3, when subjects were required to attend to the distracting sentences, the performance of

the younger adults significantly decreased from the neutral to the distracting sentences. The younger adults in this experiment may not have been able to inhibit the distracting information. One possible explanation for the relative lack of disruption for the younger adults as compared to the older adults in Experiments 1 and 2 is that the older adults could not ignore the distracting context as well as could the younger adults.

In summary, the hypothesis that the deliberate cued recall performance of older adults is more dependent on contextual information than is the memory performance of younger adults was supported. The age difference was largest in the distracting condition and smallest in the facilitating condition. The recall performance of older adults benefited at least as much as that of younger adults by facilitating context, and in two experiments only the performance of older adults was significantly disrupted by a distracting context.

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## APPENDIX A

**Sentences used in Experiments 1 and 2**

1. The red skirt  
was sent to the laundry.  
was bought at the store.  
was put in the salad.
2. The careful veterinarian  
hosed down the mess.  
opened the door.  
barked at the intruder.
3. The pretty plant  
fell off the florist's cart.  
fell off of the shelf.  
fell and cut her knee.
4. The tired intern  
walked into the operating room.  
walked into the swimming pool.  
purred in her sleep.
5. The stupid hobo  
forgot to get off the train.  
left the room.  
was repeated for years.
6. The persistent suitor  
called her on the phone every hour.  
visited the department store.  
flooded the valley.
7. The brown goat  
went into the barn.  
slept in the sun.  
went well with the skirt.
8. The young butcher  
cut the roast beef.  
looked at the book.  
galloped in the meadow.
9. The golden perfume  
was very fragrant.  
was a nice gift.  
was worshipped by the people.
10. The yellow frisbee  
got stuck in a tree.  
was given to the boy.  
sang in its cage.
11. The short cowboy  
pointed the gun.  
went to the store.  
had very few leaves.
12. The difficult exam  
was multiple choice.  
was on the table.  
was spoiled rotten.
13. The shiny dime  
was all he had to spend.  
belonged to the girl.  
raced to the fire.
14. The lazy fisherman  
slept on the boat.  
rested in the sun.  
syndrome worried the  
ophthalmologist.
15. The peaceful sleep  
was disturbed by the noise.  
was in the afternoon.  
had many happy residents.
16. The exciting concert  
captivated the audience.  
was hard to forget.  
required each traveler to get a  
tetanus shot.
17. The weary beggar  
asked for money.  
walked down the road.  
was put out to pasture.
18. The slippery frog  
swam in the brook.  
was in the car.  
was polished carefully.
19. The old board  
was used for a swing.  
was thrown away.  
lived in a retirement home.
20. The dirty glass  
cut the girl's finger.  
was dropped on the sidewalk.  
was printed in the men's room.
21. The little tulip  
grew in the garden.  
grew very quickly.  
opened the lock.
22. The big tiger  
was in the Atlanta zoo.  
was seen by the little girl.  
was cooked on the stove.
23. The clean towel  
was used to wash the car.  
had recently been washed.  
was used for the soup.

24. The angry hornet  
stung the farmer.  
slowly calmed down.  
yelled at the man.
  25. The broken finger  
was put in a cast.  
was fixed last week.  
could not tell time.
  26. The colorful parakeet  
was in its cage.  
was in the next room.  
was nailed to the wall.
  27. The round marble  
shot across the ground.  
belonged to the child.  
bounced down the street.
  28. The good novel  
was read by the girl.  
was left outside by the man.  
rapidly put out the fire.
  29. The tall tower  
was designed by the architect.  
was located near the park.  
was used by the house painter.
  30. The sweet pie  
was chocolate flavored.  
was in the kitchen.  
helped her mother wash the car.
- hopped into its hole.*
  5. The stupid *clown*  
*could not do the trick.*  
left the room.  
was repeated for years.
  6. The persistent suitor  
called her on the phone every hour.  
visited the *museum.*  
*caused a flood.*
  7. The brown goat  
went into the barn.  
slept in the sun.  
went well with the skirt.
  8. The young butcher  
cut the roast beef.  
looked at the book.  
galloped in the meadow.
  9. The golden perfume  
was very fragrant.  
was a *very* nice gift.  
*shown through the clouds.*
  10. The yellow frisbee  
got stuck in a tree.  
was given to the boy.  
*was filled with children.*
  11. The short cowboy  
pointed the gun.  
went to the store.  
had very few leaves.
  12. The *happy child*  
*ate the cookies.*  
*greeted the woman.*  
*barked at its owner.*
  13. The shiny dime  
*was his reward.*  
belonged to the girl.  
raced to the fire.
  14. The lazy fisherman  
slept on the boat.  
*went home early.*  
*purred in her sleep.*
  15. The peaceful city  
*had many happy residents.*  
*was quiet.*  
*was ended by the alarm clock.*
  16. The exciting concert  
captivated the audience.  
was hard to forget.  
*was tacked to the bulletin board.*

## APPENDIX B

### Sentences used in Experiment 3

1. The red *sweater*  
was sent to the laundry.  
was bought at the store.  
was put in the salad.
2. The *helpful* veterinarian  
*cleaned the cage.*  
opened the door.  
*were printed in English.*
3. The pretty plant  
fell off the florist's cart.  
fell off the shelf.  
fell and cut her knee.
4. The tired intern  
walked into the operating room.  
walked into the swimming pool.

17. The weary beggar  
asked for *donations*.  
walked down the road.  
was put out to pasture.
18. The slippery frog  
swam in the brook.  
was in the car.  
was polished carefully.
19. The old board  
was used for a swing.  
was thrown away.  
*was demolished*.
20. The dirty glass  
cut the girl's finger.  
was dropped on the sidewalk.  
*was vacuumed by the maid*.
21. The little tulip  
grew in the garden.  
grew very quickly.  
opened the lock.
22. The big tiger  
was in the zoo.  
was seen by the little girl.  
*stole the jewelry*.
23. The clean towel  
was used to wash the car.  
had recently been washed.  
was used for the soup.
24. The angry hornet  
stung the farmer.  
slowly calmed down.  
yelled at the man.
25. The broken finger  
was put in a cast.  
was fixed last week.  
could not tell time.
26. The colorful parakeet  
*sang in the bush*.  
*was in the utility room*.  
*was in the art gallery*.
27. The round marble  
shot across the ground.  
*was in the closet*.  
*grew on the citrus tree*.
28. The good novel  
was read by the *student*.  
was left outside by the man.  
rapidly put out the fire.
29. The tall tower  
was designed by the architect.  
was located near the park.  
was used by the house painter.
30. The sweet pie  
was chocolate flavored.  
was in the kitchen.  
helped her mother wash the car.
31. *The slow jeep*  
*drove through the town*.  
*was sold by its owner*.  
*was not on the track team*.
32. *The loud tuba*  
*was played in the band*.  
*was on the floor*.  
*prepared for take off*.
33. *The sad relative*  
*visited her sick brother*.  
*visited the school*.  
*was played on the radio*.
34. *The hot tea*  
*was drunk by the secretary*.  
*was made by the cook*.  
*burned the trees in the forest*.