

SHORT REPORTS

CONTEXT EFFECTS IN SENTENCE MEMORY¹

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The effects on recall of unrelated sentences of both appropriate and inappropriate contextual information relative to no contextual information were studied. In addition, the materials were presented at either fast or slow rates on study trials. Inappropriate contexts retarded performance under the fast presentation rate and, contrary to expectation, the beneficial effects of appropriate contexts did not diminish under the slower presentation rate. Overall, the results provide further evidence of the importance for recall of the semantic context active during sentence processing.

This experiment was designed to extend previous research on the effects of semantic context on memory. Dooling and Lachman (1971) and Bransford and Johnson (1972) have shown that appropriate contextual information can facilitate recall of paragraphs that are specially constructed to be difficult to understand. In the present study, S's task was to learn a list of unrelated sentences, each of which was constructed so that it did not clearly specify a particular referential situation (e.g., *John could see his face in the body*). One independent variable was the availability and appropriateness of the semantic context provided for each sentence. In the appropriate-context condition, a cue preceding each sentence designated an appropriate referential situation (e.g., *new car*). No-context Ss did not receive information about possible referential situations for the sentences. In a third condition, inappropriate context, Ss were given cues that would induce them to try to relate each sentence to an inappropriate semantic context (e.g., *football*). Bransford and Johnson (1972, Experiment I) had included a partial-context condition, in which the context was not completely appropriate for the paragraph used. Recall in their partial-context condition did not differ significantly from their no-context condition. However, since some of the elements used in the partial context were relevant to the paragraph, both positive and negative effects probably were operating. Under the present conditions, a clear negative effect of inappropriate contextual information was expected.

A second independent variable was presentation rate. In previous studies, involving fairly long passages and relatively rapid rates of presentation, Ss who were not provided with appropriate contexts frequently reported that they were "searching for something the passage might be about." We expected that with a sufficiently slow rate of presentation, no-context Ss would be more likely to discover meaningful interpretations of the individual rela-

tively short sentences used in the present study. Therefore, the beneficial effects of providing appropriate contexts might be reduced under slow as compared to fast presentation rates.

Finally, the procedure included three study-test trials. Previous studies have involved only a single recall test. It was of interest to determine whether the advantage of the appropriate-context condition would persist over trials, since no-context Ss might be expected to benefit more from additional exposures to the material, especially under the slower presentation rate.

METHOD

An independent groups design was used, consisting of the factorial combination of the three context conditions with the two presentation rate conditions. There were 23 Ss in each condition. Each S received three alternating study and test trials of a list of 18 unrelated sentences.

Materials. Fifty context-sentence pairs were originally generated, with the requirement that the sentences be consistent with the grammatical and semantic constraints of ordinary conversational English, yet sufficiently ambiguous that the referential context was not immediately obvious from the sentence itself. The 18 that were judged by the four authors to best meet these criteria were selected for the acquisition list. Four examples, with appropriate contexts given in parentheses, are: *The crowd expectantly waited for the steam (geyser)*; *He kicked twice but got no change (vending machine)*; *The eye is comparatively calm (hurricane)*; and *The bird was too small for the family (Thanksgiving dinner)*.

The sentences were tape recorded in the same order for each of the six conditions. The order remained constant on the three study trials. The tapes for all conditions were created from a single recording of each sentence and each context.

In the appropriate-context conditions, each sentence was immediately preceded by its appropriate context. In the inappropriate-context conditions, contexts and sentences were re-paired so that there was no apparent relationship between a context and the sentence that followed it. In addition, each

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context was separated by at least four context-sentence pairs from its appropriate sentence. For the no-context conditions, the word *ready* preceded each sentence.

In the fast conditions, the presentation rate approximated that of ordinary conversation. The interval between the end of each sentence and the beginning of the next context was about 1 sec. and the total time for one presentation of the 18 items was approximately 1 min., 33 sec. For the slow conditions, the interval was increased to about 7 sec. and the total presentation time was approximately 3 min., 23 sec.

For a practice list, four additional context-sentence pairs were chosen from the original pool of items. The rate of presentation and type of context for the practice list were the same as those for the experimental condition which followed it.

Procedure. A group testing procedure was used, with experimental sessions assigned randomly to conditions. The Ss were instructed that they would hear a set of 18 sentences a total of three times and that they would have 5 min. after each presentation of the list to write down in any order as many sentences as they could recall. Appropriate- and inappropriate-context Ss were further instructed that there would be a phrase preceding each sentence that might help them understand the sentence, but that only the sentences need be recalled. Prior to the acquisition list, the practice list was presented, 2 min. were allowed for recall, and any questions about the procedure were answered. Response sheets were collected after each recall period.

Subjects. The Ss were 159 male and female undergraduates enrolled in introductory psychology courses at the State University of New York at Stony Brook. Data from 21 Ss were randomly discarded to equalize the *ns* at 23 Ss per cell. The Ss received credit toward a course requirement and the S with the best performance in each group received \$5.

RESULTS AND DISCUSSION

Protocols were scored for complete sentences. Each response was scored by two of three "blind" raters. Responses containing only minor changes, such as change of tense, reordering of phrases, or replacing of proper names by pronouns were judged as correct. In the case of a discrepancy between the raters, S was not given credit for the response.

The means are given in Table 1. Separate analyses were done comparing the appropriate-context vs. no-context conditions and the inappropriate-context vs. no-context conditions, since the no-context condition is the relevant baseline in each case. These analyses will be considered separately below.

Appropriate context versus no context. As indicated in Table 1, performance increased over trials, $F(2, 176) = 430.50, p < .001$. Recall also improved when appropriate contexts were provided, $F(1, 88) = 24.70, p < .001$, and when the presentation rate was decreased, $F(1, 88) = 11.11, p < .01$. More importantly, a significant Context \times Trials

TABLE 1
MEAN NUMBER OF COMPLETE
SENTENCES RECALLED

Context-presentation rate	Trial			Total
	1	2	3	
Appropriate-fast	3.96	8.56	11.74	24.26
Appropriate-slow	5.87	11.22	13.49	30.48
No-context-fast	2.43	6.65	9.48	18.56
No-context-slow	4.17	7.39	10.35	21.91
Inappropriate-fast	2.04	5.00	6.96	14.00
Inappropriate-slow	3.26	7.17	9.74	20.17

interaction, $F(2, 176) = 3.79, p < .025$, indicates that the acquisition rate was greater under appropriate- as compared to no-context conditions.

Our original expectation was that the slower presentation rate would be most beneficial to no-context Ss. However, the overall advantage of appropriate-context Ss was actually somewhat, though not significantly, greater under slow as compared to fast presentation conditions. It may be possible to set up conditions where no-context Ss profit more from increased processing time than evidenced in the present study. For example, giving no-context Ss a set to generate referential situations by showing them examples of contextual "solutions" that aid comprehension for these types of materials might produce more effective use of available time. On the other hand, even if the slower rate did allow no-context Ss to generate meaningful interpretations, any time spent searching for meaning probably reduces time available for other uses of the study interval—e.g., rehearsing, imaging, and/or interrelating sentences. Therefore, it may be that the advantage derived from having an appropriate context immediately available would persist under an even wider range of conditions.

Inappropriate context versus no context. As indicated in Table 1, recall increased over trials, $F(2, 176) = 2.88, p < .001$, and when the presentation rate was decreased, $F(1, 88) = 11.35, p < .01$. There was also a main effect of context, $F(1, 88) = 4.28, p < .05$, indicating that providing inappropriate contexts retarded overall recall. The Context \times Rate \times Trials interaction was also significant, $F(2, 176) = 3.15, p < .05$. Additional analyses yielded the following outcomes: Under fast-presentation conditions, inappropriate contexts produced both lower overall recall and slower acquisition, $F(1, 44) = 4.33, p < .05$; and $F(2, 88) = 4.10, p < .025$, respectively. However, performance of inappropriate- and no-context Ss did not differ significantly under the slower presentation rate. There are numerous possible explanations of this triple-order interaction. For example, the slower presentation rate may have allowed inappropriate-context Ss to discover the re-paired arrangement of contexts and sentences, or Ss may have been better able to use this information under the slow rate. On the other hand, Ss may have been able to disregard the contexts entirely at the slow rate.

In any event, under the fast rate, the inappropriate-

ate contexts presumably decreased the probability that Ss would arrive at stable, meaningful interpretations of the sentences. The fact that acquisition of linguistic information may actually be retarded if S is attempting to relate sentences to inappropriate contexts extends previous research and lends further support to the notion that recall depends on the semantic context that is active during acquisition.

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