

Fig. 1. ROC curves for the immediate ILI conditions (I = immediate; 15 = 15 min; D = 1-day test intervals).

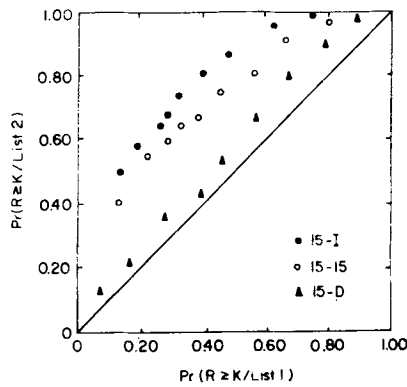


Fig. 2. ROC curves for the 15-min ILI conditions.

The present findings show that lengthening the ILI produces a short-term increase in S's ability to discriminate list membership. Presumably, this happens because S bases list discrimination, at least in part, on apparent recency, so that lists differing most in recency are most easily discriminated. As the retention interval grows longer, however, and as memories for both lists grow older, the apparent recencies converge, and the initial advantage produced by the longer ILI eventually disappears. This is the result that was expected on the basis of what is known about recency discrimination (Hinrichs & Buschke, 1968; Yntema & Trask, 1963). It provides strong support for the current theoretical accounts of forgetting (especially PI) as being due to a loss of discrimination in memory of list membership—or, in the case of short-term memory tasks, of temporal position—of the to-be-remembered items.

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Table 2

d_s Values for List Discrimination as a Function of ILI and TI

Inter-List Interval	Test Interval		
	I	15	D
I	.57	.51	.33
15	1.05	.72	.18

Generalization in short-term recognition of auditory verbal stimuli

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Groups of second-, fourth-, and sixth-grade school children were asked to indicate whether or not each of 81 words being presented aurally had been presented previously. Using this short-term recognition task, verbal generalization to words related antonymically, synonymically, and phonotographically to the critical repeated word was demonstrated. Generalization was greatest for phonotographically related words.

Many different experimental findings have been subsumed under the terms "semantic conditioning," "semantic generalization," and "mediated generalization." Feather (1965) reviewed 25 studies in this area with a variety of conditioned responses and concluded that, although 22 reported evidence for semantic generalization, only 13 of those had included controls for pseudoconditioning and had differentiated extinction effects from generalization effects, and none had controls for simultaneous conditioning to the generalization stimuli.

In view of these difficulties, it is not surprising that a variety of somewhat contradictory results have been reported with respect to the dimensions of generalization. An early experiment by Riess (1946), using GSR, found developmental changes in generalization gradients. His youngest Ss (mean age: 7.75 years) exhibited a gradient along the dimension (from greatest generalization to least): homophones, antonyms, synonyms; those Ss of mean age 10.67: antonym-

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NOTE

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homophones, synonyms; and the two older groups (mean ages 14.00 and 18.50): synonyms, antonyms, homophones. Korn (1966), using GSR, reported no differences in magnitude of generalization across the same three categories in adult Ss. Similarly, Lerner (1968), using salivation, obtained generalization with both synonyms and antonyms, again without differences, although this was based on only one S.

The Ss' task in the present study was designed to reduce or to avoid some of the problems inherent in the classical-conditioning paradigm (e.g., pseudoconditioning and sensitization), to allow group administration, and to test for generalization without specifically training prior responses. The Ss were asked simply to indicate recognition of a word as being repeated in a list being read to them at the time. Generalization was defined as responding in error to words related semantically (antonyms or synonyms) or phonotographically to the repeated stimulus word. The questions dealt with were: (1) Can verbal generalization be demonstrated using a short-term recognition task? (2) If it can, does the response occur to words related phonotographically or semantically to the stimulus word? (3) Finally, can differences be demonstrated as a function of age within elementary-school children?

SUBJECTS

Elementary-school children from the second (15 females, 10 males), fourth (12 females, 10 males), and sixth (7 females, 13 males) grades of A. C. Moore School, Columbia, South Carolina, participated in the study.

MATERIALS AND PROCEDURE

The stimulus list consisted of 81 English

one- or two-syllable words. Because of the complexities of intralist interference, idiosyncratic differences in familiarity, and associative variation over age groups, the list was constructed using a single key word, BIG, which was repeated. Phonotographically related words within the list were: TWIG, FIG, SPRIG, RIG, WIG, GIG, BRIG, and JIG. PIG and DIG were rejected as (1) being most similar in visual form to BIG and (2) involving the least change in place of articulation as compared to BIG. The semantically related words were: SMALL, LITTLE, TINY, DWARF, PUNY, SHORT, SCANT, BRIEF (antonyms) and FAT, LARGE, GREAT, GIANT, TALL, HUGE, AMPLE, BULKY (synonyms).

The key word occurred in Positions 1, 21, 41, 61, and 81. Six related words, two of each category, occurred between reoccurrences of BIG. The order of their appearance was balanced. No words that were known members of an associative pair (Entwisle, 1966) occurred next to each other. Of the 52 buffer words, none was listed by Entwisle as a common response of elementary-school Ss to any of the crucial experimental words nor were any of them phonetically ambiguous.³

The list was prerecorded on magnetic tape and read in a monotone at a constant rate of one number-word pair every 5 sec to allow time for S to make a response. To assist the Ss in keeping up with the tape recorder, each S was given a sheet containing 81 numbered lines, and the words on the recorded list were preceded by the appropriate number, from 1 to 81.

The Ss were instructed to listen to the list of words. They were told that some of the words would be repeated, and that, if a word was repeated, they were to put a check by its number. The Ss were encouraged to guess if they were not certain. Following a four-item practice list with one repetition and an opportunity to ask questions, the recorded list was played for each group of Ss.

An error was defined as a word checked when it had not been repeated. Data for each S were compiled in terms of total responses, total errors, errors within the experimental (similarity) categories (antonymic, synonymic, phonotographic), and correct responses to the repetitions of the word, BIG.

RESULTS

As shown in Table 1, the task was well within the response capabilities of the Ss in terms of their responding correctly to the repetitions of BIG, with four being the total possible number of correct responses. The observed differences were all consistent with the expectation of better performance by older Ss.

The errors in responding to the words

Table 1
Per Cent of Ss Responding Correctly to Repetition of Critical Word

Grade	Number of Correct Responses		
	4	3	2
2 (N = 25)	60.0	20.0	20.0
4 (N = 22)	86.4	9.1	4.5
6 (N = 20)	95.0	5.0	0

Table 2
Total Number of Generalization Errors

Grade	Type of Similarity		
	Antonym	Synonym	Phonotograph
2 (N = 25)	22	15	49
4 (N = 22)	14	14	74
6 (N = 20)	24	15	54
Total	60	44	177

antonymically, synonymically, or phonotographically similar to the critical word are shown in Table 2. A mixed-model analysis of variance, having one between-Ss factor (three grades) and one within-Ss factor (three types of similarity), was performed on these data. The effect of grades was nonsignificant [$F(2,64) = 1.28, p > .20$], indicating the number of errors made at each level was not a significant source of variance.

The effect of similarity was highly significant [$F(2,128) = 72.59, p < .001$], indicating the consistency of the effect which is apparent in Table 2. For 59 of the 67 Ss, the phonotographically similar words produced the highest number of errors. Similarly, the Grades by Similarities interaction also achieved significance [$F(4,128) = 4.43, p < .005$]. Inspection of Table 2 suggests that this effect was primarily attributable to the fourth-grade Ss. Because of the significant interaction effect, F tests for simple effects were calculated to examine the effect of similarity at each grade. At each grade, the effect of similarity was significant at $F(2,128) = 11.89, 50.32, \text{ and } 19.23$ ($p < .001$) for Grades 2, 4, and 6, respectively.

DISCUSSION

Generalization, defined as errors in short-term recognition of aurally presented words antonymically, synonymically, or phonotographically similar to a critical word, has been clearly demonstrated. Moreover, using second-, fourth-, and sixth-grade Ss, this tendency to generalize was consistent at all ages.

Errors did occur to words antonymically and synonymically related to BIG, but the majority of errors for all grades were made in response to phonotographs, even though the words probably most easily confused with BIG were not included in the list. The consistency of the pattern of errors at all grades as a function of the type of similarity between the probe word and BIG

is to be contrasted with findings reported in the laboratory at Northwestern,⁴ which indicated that, on a visual-recognition task, second graders made errors in an acoustic category (consistent with the present findings), while sixth graders made largely associative errors. Likewise, the present findings are consistent in the second grade with Riess's (1946) findings, using visual presentation, but show varying degrees of inconsistency at higher grades, although the overlap of Ss' mean age is not complete. The discrepancy between the findings of the latter investigators and those reported here underscores the need to determine whether or not the current findings would also occur using visual or combined aural-visual presentation.

It should also be noted that the finding of a significant intra-S tendency to generalize stands in some contrast to the conclusions of Feather (1965) and Lerner (1968). There still remains, of course, the problem of specifying the degree of similarity shared by antonymically, synonymically, and phonotographically related words.

In summary, this short-term recognition task is one of which elementary-school Ss are capable, and one in which generalization can be demonstrated. Additional work is needed to extend the present findings to visual as well as to combined aural-visual presentation and also to determine the relative position of antonymically, synonymically, and phonotographically similar words on the generalization gradient from the critical word, in this case, BIG.

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NOTES

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3. A copy of the entire list is available from either author.
4. B. J. Underwood (1969). Personal communication.