DOCUMENT RESUME

ED 209 895 EC 140 615

AUTHOR Osguthorpe, Russell T.; And Others
TITLE The Effects of Reviewing Class Notes for Deaf and Hearing Students.
INSTITUTION National Technical Inst. for the Deaf, Rochester, N. Y.
SPONS AGENCY Department of Health, Education, and Welfare, Washington, D.C.
REPORT NO NTID-PS-22
PUB DATE Apr 78
NOTE 22p.; For related documents, see EC 140 611-630.

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Students; *Concept Formation; *Deafness; Higher Education; Memory; *Problem Solving; *Recall (Psychology); *Recognition (Psychology); *Review (Reexamination); Study Skills

ABSTRACT

Fifty-three deaf and thirty-three hearing college students observed a videotaped lecture followed by a 15 minute period of reviewing prepared class notes. Two days later, half of each group again reviewed the notes before taking a test measuring learning outcomes in four areas: recall, recognition, concept acquisition, and problem solving. Multivariate analysis of variance showed that repeated review was much more helpful to deaf students than to hearing students on the recall and recognition measures but not on the higher level learning outcomes. It was further shown that hearing students outperformed deaf students on each of the four dependent measures. (Author)

THE EFFECTS OF REVIEWING CLASS NOTES FOR DEAF AND HEARING STUDENTS

Paper Series No. 22

Russell T. Osguthorpe
Gary L. Long
Richard G. Ellsworth

April, 1978

NTID's principal goal in doing research is to influence the education, training and career placement of deaf citizens through systematic examination of issues related to deafness. As one part of NTID's total research effort, the Department of Research and Development conducts descriptive and experimental research. Research findings are used in the development of programs and materials in the areas of learning and instruction, personal and social growth, and career development of deaf students. This document was developed in the course of an agreement with the U.S. Department of Health, Education and Welfare.

Abstract

Fifty-three deaf and thirty-three hearing college students observed a videotaped lecture followed by a fifteen-minute period of reviewing prepared class notes. Two days later half of each group again reviewed the notes before taking a test measuring learning outcomes in four areas: 1) recall, 2) recognition, 3) concept acquisition, and 4) problem solving. Multivariate analysis of variance showed that repeated review was much more helpful to deaf students than to hearing students on the recall and recognition measures but not on the higher level learning outcomes. It was further shown that hearing students outperformed deaf students on each of the four dependent measures. It was concluded that repeated review is more beneficial to deaf than to hearing students and that it selectively affects memory tasks (recall, recognition) more than tasks requiring higher level processing (concept acquisition, problem solving).

The Effects of Reviewing Class Notes for Deaf and Hearing Students

Most deaf college students have difficulty taking their own lecture notes. This difficulty stems from the language deficit caused by the early onset of deafness, as well as the practical problem of having to focus attention on an interpreter. Unlike the hearing student, a deaf student cannot process information auditorily while recording it on paper. For these reasons, it is common for deaf students to be provided with a notetaker when enrolled in a class with hearing students. Although the practice of providing notes to deaf students is well accepted among educators, there has been no systematic research conducted to determine the instructional effects of class notes on deaf students.

Research with hearing students would suggest that the act of reviewing class notes facilitates students' ability to recall the information presented in the lecture (Carter & Van Matre, 1975; DiVesta & Gray, 1972; Fisher & Harris, 1973). In each of these studies students who reviewed the class notes outperformed those who did not. Performance, however, was measured solely by tests of recall. No attempt was made to measure the more complex learning outcomes of concept acquisition and problem solving. There are two important reasons for including these higher level

tasks in research on prose learning and more specifically research on class notes. First, instructional theory implies that certain learner behaviors should facilitate performance on specified learning tasks (Merrill, 1971; Gagne, 1970; 1971; 1971a). In the case of review (or rehearsal) the learner should show the most improvement on tasks which emphasize memory (recall and recognition). Since concept acquisition and problem solving require higher level processing, the act of reviewing should have a positive effect on learner performance but the effect should be less pronounced. Second, most college instruction focuses on the more complex learning tasks of concept acquisition and problem solving. If the research on class notes is to be of maximum relevance in the classroom, attempts must be made to measure the types of learning teachers are expecting from their students.

The purpose of this study was to measure the effects of reviewing class notes on four learning outcomes: recognition, recall, concept acquisition and problem solving. It was predicted that the act of review would facilitate performance on all four learning outcomes for both deaf and hearing students. It was further predicted that review would selectively affect the memory tasks (recall and recognition) more heavily than the tasks requiring higher level processing (concept acquisition, problem solving). The final prediction was that hearing students would outperform deaf students on each of the dependent measures (Walter, 1977).

Method

The subjects in this study included 53 deaf and 33 hearing college age students. The students were drawn from introductory psychology classes. The deaf students were all students at the National Technical Institute for the Deaf, Rochester, New York. Hearing students were attending Rochester Institute of Technology.

The experiment was conducted in two sessions. In the first session all students viewed a 23-minute videotaped lecture on behavioral psychology. The script for the lecture was specifically written for this experiment. The lecture was designed to represent the type of lecture a mainstreamed deaf student might encounter in a classroom planned primarily for hearing students. The videotape contained a lecturer and an interpreter who provided a simultaneous interpretation into Signed English for deaf students. Following the videotaped lecture students reviewed previously prepared notes for 15 minutes. These notes contained the critical concepts presented in the lecture. At the close of the first session each student returned the notes to the experimenter. The second session was conducted two days later. In this session half of each group reviewed the notes for 15 minutes. The other half of each group were administered the test. Following the 15-minute review period, the test was administered to the students who had been reviewing the notes.

The test was divided into four parts (recall, recognition, concept acquisition, problem solving). The recall test consisted of 12 definitions. Students were required to recall the term for each definition and write the term beside its definition. After completing the recall portion of the test students returned their paper to the experimenter and were administered the remaining three parts. The recognition portion consisted of the same 12 items found in the recall portion except that the definitions had been randomly reordered and the correct terms were listed. Students were required to match the term with its definition. The concept acquisition portion consisted of 11 multiple choice items requiring students to classify novel instances into their correct concept category. On the problem solving part of the test students were instructed to pretend that they were behavioral psychologists. They were then asked to give a written solution to three short case studies. Each solution was given a score of zero, one, or two. Scores were based on the student's appropriate use of the principles covered in the lecture and the notes.

Data were analyzed using multivariate analysis of variance with two independent variables (deaf vs. hearing, repeated review vs. no repeated review) and four dependent variables (recall, recognition, concept acquisition, problem solving).

Results

Table 1 lists the mean number of items correct and standard deviations on each dependent measure for the hearing and deaf groups in the repeated review and no repeated review conditions. A multivariate analysis of variance was used to test the difference between the hearing and deaf groups, repeated review and no repeated review conditions and the interaction of these factors. The Wilke's lambda obtained from the multivariate analysis of variance was referred to chi square tables for tests of significance.

Insert Table 1 about here

The multivariate interaction between groups (deaf-hearing) and conditions (repeated review - no repeated review) was found to be significant $x^2(4) = 24.99$, $p < .01$. The univariate F ratios in Table 2 indicate that the groups by conditions interaction was significant for recall and recognition measures but not significant for concept acquisition or problem solving. Subsequent examination of the simple main effects indicates that repeated review facilitated the deaf students' performance on recall and

recognition but had no significant effect on hearing students' performance (see Figures 1 and 2).

Insert Table 2, Figure 1 and Figure 2 about here

The multivariate test of the repeated review versus the no repeated review condition was significant $x^2(4) = 35.11$, $p < .01$. Examination of the univariate F ratios in Table 2 along with the means in Table 1 shows that students with repeated review outperformed those with no repeated review on recall, recognition and problem solving, but not concept acquisition. From the groups x conditions interaction, it can be seen that the repeated review versus no-repeated review difference for the recall and recognition measures can be attributed to improved performance on the part of the deaf students but not the hearing students. Thus, the results indicate that repeated review facilitated deaf students' performances on recall, recognition and problem solving items and hearing students' performance on problem solving. Repeated review did not facilitate performance on the concept acquisition measure.

The multivariate test of group differences (deaf-hearing) was highly significant $x^2(4) = 102.29$, $p < .001$. This finding is

also reflected in Table 2 with all four univariate F ratios being significant at the .001 level. The means in Table 1 further show that hearing students scored higher than deaf students on all four measures (recall, recognition, concept acquisition and problem solving).

Discussion

The results of this experiment have both practical and theoretical implications. It was predicted that the act of reviewing notes immediately prior to taking a test would facilitate performance on each of the four dependent measures, but would have the most impact on recall and recognition. The results indicated that repeated review facilitated recall and recognition performance for deaf students but not for hearing students. The fact that hearing students did not benefit from repeated review appears to be in contradiction with previous research which suggests that the act of reviewing class notes facilitates recall and is the most important function served by notes (Carter & Van Matre, 1975; Fisher & Harris, 1973). It should be pointed out, however, that in the present study all students reviewed the notes immediately following the lecture, but only part of each group (deaf and hearing) received the repeated review. Thus, it is possible that for hearing students, repeated review had no facilitative effect for recall and recognition items beyond that provided by immediate review. It could be argued that hearing students did well, because they had already been exposed to the material in other settings. Previous research suggests, however, that the content used in this study is unfamiliar to hearing college students who have not completed a psychology course (Andrew, 1975).

The results strongly supported the prediction that hearing students would outperform deaf students on each of the dependent measures. While this experiment did not focus on the causes of the deaf-hearing differences, previous research would suggest that part of the differences could be attributed to deaf students' difficulty with the English language (Quigley et al, 1976). Walter (1978) has reported that the average deaf college student has a vocabulary approximately one-third the size of the average hearing college student's vocabulary. These linguistic deficiencies combined with the deaf person's experiential voids have an adverse effect on deaf students' ability to process prose material (Walter, 1977).

One of the most important differences between deaf and hearing students in this experiment can be seen when the repeated review groups are compared on the recall and recognition measures. It is interesting to note that hearing students who had repeated review, outperformed deaf students (who had repeated review) on recognition items, but performed at relatively the same level as deaf students on recall items. (Since the items were identical, none of the variance between groups can be attributed to item difficulty level). The individual means (in Table 1) show that hearing students nearly doubled their performance from recall (M = 5.81) to recognition (M = 10.1) while deaf students increased only slightly (recall, M = 4.48; recognition, M = 6.05). Further analysis showed that approximately half (47%)

of the repeated review deaf students' recognition scores were equal to or actually lower than their recall scores. However, only 12% of the repeated review hearing group performed at the same level or worse. In other words, having the response set available was highly facilitative for hearing students but not for deaf students. Many deaf students were actually confused by having the correct answers on the test form. This finding has been replicated in a subsequent experiment (Ellsworth, 1977).

Existing theory surrounding deafness and cognitive processing does not adequately account for the recall-recognition discrepancy. Recent literature in cognition suggests that recognition, because it puts less of a load on memory, should be cognitively less difficult than recall (Brown, 1977). The performance of hearing students would tend to support this theory but the contradictory finding with deaf students needs further explanation. In the present experiment deaf students apparently had enough English (language) ability and cognitive ability to perform similarly to hearing students on the recall items. But when the recall items were changed to recognition items, deaf people were much less capable of benefitting from the retrieval cues available. Again the semantic and syntactic differences of the deaf-hearing groups is the most likely cause of this performance difference.

While repeated review was highly facilitative for deaf

students on both recall and recognition, it had no effect on their performance on concept acquisition and limited effect on problem solving. It should be noted that while repeated review had a significant effect on problem solving performance (see Table 2), the magnitude of that effect for deaf students was small (see Table 1). Few deaf students were able to give any measurable responses to problem solving questions regardless of their experimental group (88% of the deaf students who did not have delayed review received a score of one or zero, while 86% of those who had delayed review received a score of one or zero). These findings point to the limitations of review as a facilitative learning process. The act of reviewing notes, especially when the review is unstructured, has the most impact on tasks which focus on memory alone rather than tasks requiring higher order integrative processing. Since college courses have concept acquisition and problem solving type objectives as their primary learning outcomes, these findings have important instructional implications.

The results of this experiment yield several practical implications for deaf students, teachers and researchers. First, the data suggest that deaf students can, in fact, benefit from notes taken by someone else, if the notes are reviewed prior to the test. Second, since review has a limited effect on concept

acquisition and problem solving tasks, deaf students need additional academic support if they are to perform as well as hearing students. Third, teachers and researchers should be more aware of the potential pitfalls that recognition items may pose for deaf students. It should not be automatically assumed by a teacher of deaf students or a researcher that recognition items are less difficult than recall items.

References

Andrew, L. D. The effects of three types of prequestions and type of posttest on student achievement. Doctoral Dissertation, Brigham Young University, Provo, Utah, 1975.

Brown, J. Recall and Recognition. New York, New York: John Wiley & Sons, 1976.

Carter, J. F. & Van Matre, N. H. Notetaking versus note-having. Journal of Educational Psychology, 1975, 67, 900-904.

DiVesta, F. J. & Gray, G. S. Listening and Notetaking: I. Journal of Educational Psychology, 1972, 63, 8-14.

Ellsworth, R. G. Semantic note-rewarding as a cognitive facilitator for deaf students. Unpublished doctoral dissertation, University of Rochester, Rochester, New York, 1978.

Fisher, J. & Harris, M. Effects of notetaking and review on recall. Journal of Educational Psychology, 1973, 65, 321-325.

Gagne, R. M. The conditions of learning. New York: Holt, Rinehart, and Winston, 1970.

Gagne, R. M. The learning of concepts. In M. D. Merrill (Ed.), Instructional design: Readings. Englewood Cliffs, New Jersey: Prentice Hall, 1971.

Gagne, R. M. The learning of principles. In M. D. Merrill (Ed.), Instructional design: Readings. Englewood Cliffs, New Jersey: Prentice Hall, 1971a.

Lindsay, P. H. & Aorman, D. A. Human Information Processing. New York, New York: Academic Press, 1972.

Markle, S. M. & Tiemann, P. W. Conceptual learning and instructional design. The Journal of Educational Technology, 1970, I, 1.

Merrill, M. D. Instructional design: Readings. Englewood Cliffs, New Jersey: Prentice Hall, 1971.

Quigley, S. P., Wilbur, R. B., Power, D. J., Montanelli, D. S., & Steinkamp, M. W. Syntactic Structures in the Language of Deaf Children. Champaign, Illinois: Institute for Child Behavior and Development, University of Illinois, 1976.

Walter, G. Performance in English requires competence in syntax and vocabulary plus experience. Teaching English to the Deaf, 1977, 4, 1.

Walter, G. A comparative study of lexical abilities of hearing and hearing impaired children. Paper submitted for publication, 1978.

Table 1. Means and standard deviations for the hearing and deaf in the review and no review conditions.

	Number Possible		Deaf			Hearing		
			No Review	Review	Total	No Review	Review	Total
Recall	12	$\bar{X}$	1.06	4.48	2.42	5.94	5.81	5.88
		S.D.	1.39	2.46	2.51	3.05	2.56	2.78
Recognition	12	$\bar{X}$	2.38	6.05	3.83	10.00	10.13	10.06
		S.D.	2.20	2.36	2.88	1.70	2.42	2.05
Concept acquisition	11	$\bar{X}$	4.94	5.76	5.26	9.94	9.31	9.64
		S.D.	1.78	2.30	2.02	1.48	2.09	1.80
Problem solving	6	$\bar{X}$	.50	.81	.62	2.82	3.75	3.27
		S.D.	.98	.98	.99	1.63	1.29	1.53

Table 2

Univariate Fs from Groups (Deaf-Hearing) by Conditions (Review-No Review) Analyses.

Analysis	Dependent Measure	F(1,82)	p
Conditions (Review-No-Review)	Recall	21.32	.001
	Recognition	34.14	.001
	Concept Acquisition	2.21	.14
	Problem Solving	8.90	.01
Groups (Deaf-Hearing)	Recall	41.68	.001
	Recognition	152.60	.001
	Concept Acquisition	102.99	.001
	Problem Solving	95.94	.001
Interaction (Groups x Conditions)	Recall	12.00	.001
	Recognition	13.08	.001
	Concept Acquistion	2.84	.09
	Problem Solving	1.34	.25

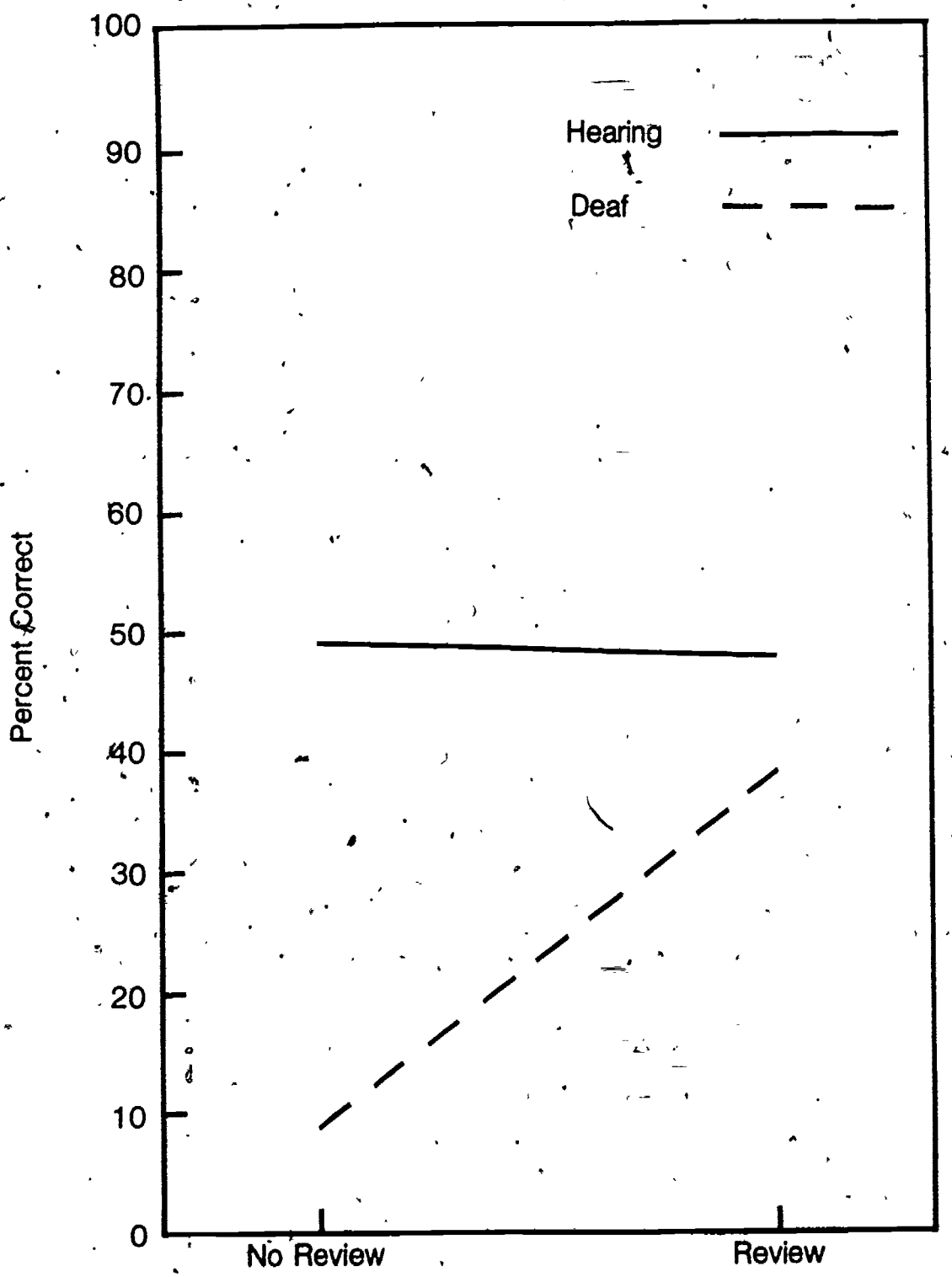

Figure 1. Recall scores for deaf and hearing students in the review and no review conditions.

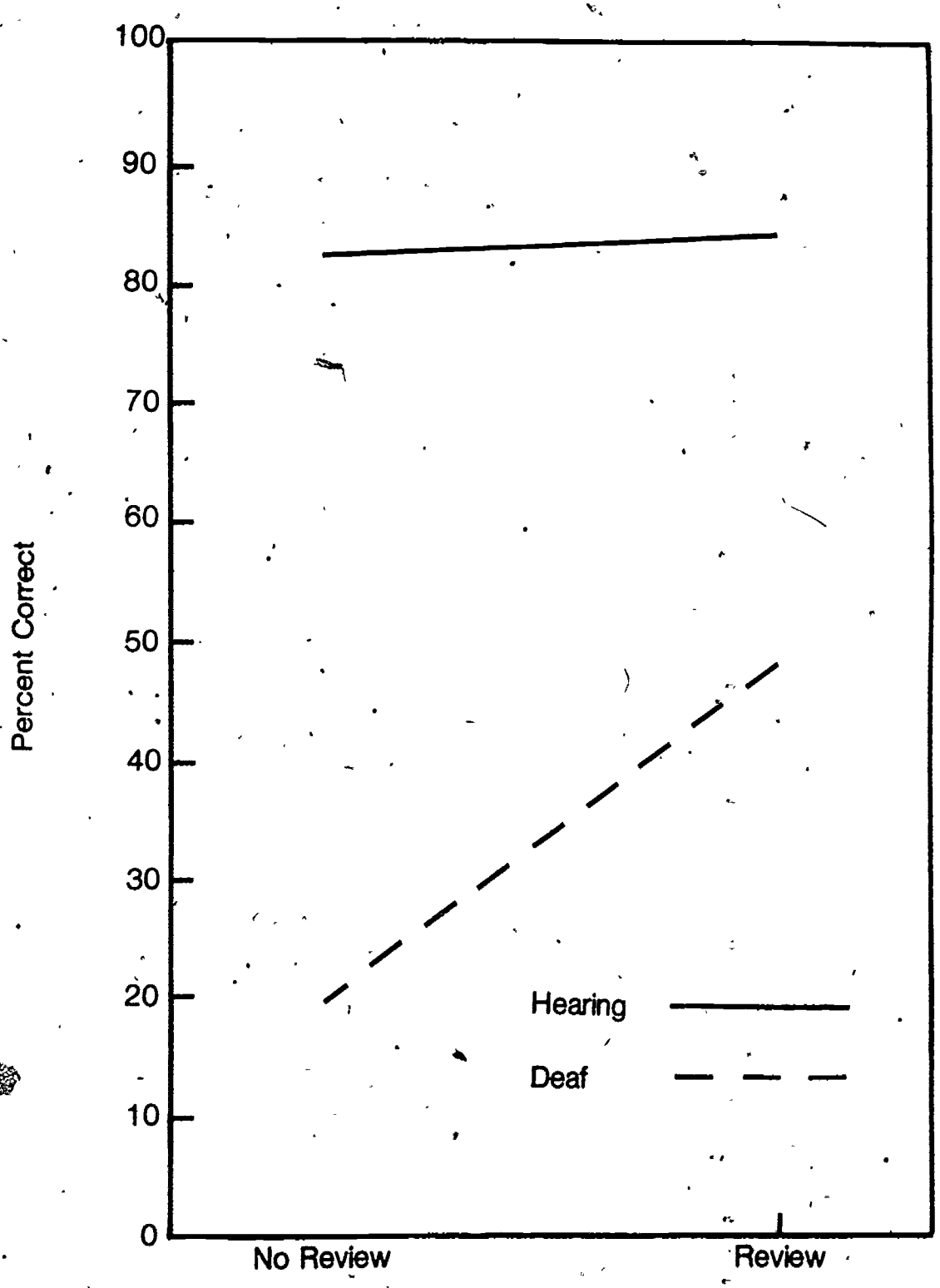

Figure 2. Recognition scores for deaf and hearing students in the review and no review conditions.