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ABSTRACT

Eighty sighted male Ss participated in a study to determine the effect of the size of the braille cell on the rate of learning the names for braille symbols of letters of the alphabet (A-J and K-T). Study size (standard or large braille), test size (standard or large braille) and item set (A-J or K-T) were manipulated in a study-test procedure (each of five study trials followed by a test trial). Results revealed that performance was facilitated by large braille symbols during test and study trials, particularly if symbol discrimination is difficult. Faster learning of the A-J than the K-T sets was evidenced. (CL)

BRAILLE LEARNING: EFFECTS OF SYMBOL SIZE

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Previous research has shown that the rate of learning the names for each of a set of items is a direct function of the degree to which the items are discriminable from one another, independent of the modality (e.g., haptic, visual, auditory) in which the items are presented. The present experiment was done to provide additional information in this domain.

In a prior experiment from our laboratory (Newman, Hall, Ramseur, Foster, Goldston, DeCamp, Granberry-Hager, Lockhart, Sawyer, & White, 1982), subjects were given the task of learning the names for braille symbols for the first ten letters of the alphabet (i.e., A-J) presented during study trials for either visual or haptic examination. In addition, for half of the subjects, the items were presented in standard braille (the dimensions for the 2 x 3 matrix comprising the standard braille cell are 4 x 6 mm), and for the rest of the subjects, the items were presented in large braille (for which the size of the braille cell is 6 x 9 mm). On test trials, all subjects were tested haptically with standard braille items. Size of the braille cell during study trials was found to facilitate learning only for subjects who studied the items haptically.

The present study was done to ascertain whether this effect might be a function of the size of the braille cell during test trials. In addition, two sets of symbols were used, those for A-J and those for K-T. The symbols for K-T have been shown to be harder to discriminate from one another than those for A-J (Newman, Hall, Foster, & Gupta, in press). The braille symbols for the letters A-T are shown in Figure 1.

METHOD

A 2 x 2 x 2 design was used in which Study Size (standard or large braille), Test Size (standard or large braille), and Item Set (A-J or K-T) were manipulated. A study-test procedure was used; each of the five study trials was followed by a test trial. On study trials, each symbol was presented for haptic examination for 10 seconds along with auditory presentation of its letter name. On test trials, subjects were given 10 seconds to examine each item haptically and call out its letter name. Two different sets of orders of the items were used, each for half of the subjects in each treatment. In each order set, 10 different orders were employed.

There were 80 sighted male subjects. All were right-handed and were run individually. The subjects examined each item haptically on study and test trials using the index finger of the right hand. This hand was covered throughout the experiment to preclude visual examination of the items. A counterbalancing procedure was used in assigning subjects to the treatments.

RESULTS

The means for total correct over the five trials for each of the eight treatment conditions are presented in Table 1. A repeated measures analysis of variance for number correct on each trial gave the following significant effects: Item Set ($p<.001$), Test Size ($p<.01$), Study Size x Test Size ($p<.05$), Trials ($p<.001$), and Item Set x Trials ($p<.01$). The effect of Study Size approached significance ($p=.054$). No other effects were significant ($p>.05$).

Further analysis showed that the mean for the A-J set was higher than for the K-T set, with the difference increasing over training (see Table 2). Duncan's cluster analysis indicated that (a) the presence of large symbols during test trials was facilitative especially when standard symbols were present during study trials and (b) the presence of large symbols on study trials facilitated learning only when standard symbols were present on test trials (see Table 3).

Correlations were done for order of difficulty of the items within each item set for each pair of treatments (see Table 4). Coefficients ranged from .584 to .952. All were positive, and all were significant ($p<.05$). In addition, a confusion matrix was constructed for each treatment for each item set. Again correlations were done between each pair of treatments for each item set (see Table 4). Coefficients ranged from .264 to .699, and again all were positive, and all were significant ($p<.01$).

CONCLUSIONS AND IMPLICATIONS

The results of this experiment show that performance during learning the names for braille symbols is facilitated if large braille symbols are present during test trials, particularly if symbol discrimination is difficult during study trials; in addition, the presence of large braille symbols during study trials is facilitative when symbol discrimination is difficult during test trials. These latter results replicate our previous findings (Newman, et al., 1982), as do the faster learning of the A-J than the K-T sets (Newman, et al., in press). The analyses for item difficulty (similar to those reported recently by Loomis (1982)) and for the confusion matrices indicate that the order of difficulty of items, and the patterns of errors, are each relatively stable across a variety of experimental conditions.

A survey (Tobin, 1971) of British braille teachers of adventitiously blind adults indicated that a majority of them (i.e., 53%) favored using large braille symbols during the early stages of instruction; the remainder favored using standard-size braille. Our results and those from a previous experiment (Newman, et al., 1982) appear to support the use of large braille during early training. Our results suggest, also, that it might be desirable to use large braille for all items both on study trials and on test trials, at least early during training. Further research is required, however, to determine how and when the transition from large to standard braille could best be made.

FOOTNOTE

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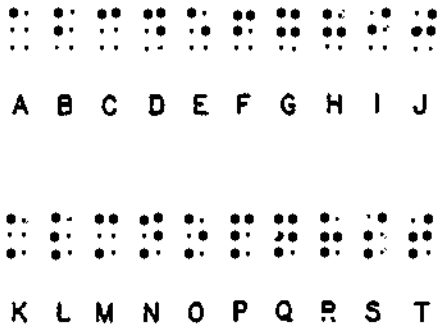

FIGURE 1. The First Twenty Letters Of The Alphabet In Braille Symbols.

TABLE 1

Mean Total Correct Responses For Each Treatment

Item Set	Study Size	Test Size: Standard	Test Size: Large
A - J	Standard	15.60	24.90
	Large	23.50	25.30
K - T	Standard	8.00	13.90
	Large	11.40	13.40

Note 1: Maximum possible total score was 50.00.

Note 2: Total number of subjects was 80.

TABLE 2

Mean Correct Responses During Learning For Each Item Set

	Trials					
Item Set	1	2	3	4	5	Row Means
A-J	2.48	4.05	4.68	5.28	5.85	4.47
K-T	1.25	1.80	2.68	2.95	3.00	2.34
Column Means	1.86	2.92	3.68	4.12	4.42	3.40

Note 1: Experimental design collapsed on Study Size and Test Size.

Note 2: Number of subjects for each Item Set was 40.

Note 3: Maximum possible score for each trial was 10.

TABLE 3

Mean Total Correct Responses For Study Size x Test Size

	Test Size		
Study Size	Standard	Large	Row Means
Standard	11.80	19.40	15.60
Large	17.45	19.35	18.40
Column Means	14.62	19.38	17.00

Note 1: Maximum possible total score was 50.00.

Note 2: Total number of subjects was 80.

Note 3: Experimental design collapsed on Item Set.

TABLE 4

Rank-Order Correlations Between Pairs Of Treatments For Item Difficulty And Types Of Errors

A-J Treatment Pairs						Items Correct	Types Of Errors
Study Size	Test Size		Study Size	Test Size			
Regular	Regular	&	Regular	Large		.911	.530
Regular	Regular	&	Large	Regular		.903	.658
Regular	Regular	&	Large	Large		.903	.642
Regular	Large	&	Large	Regular		.837	.599
Regular	Large	&	Large	Large		.874	.627
Large	Regular	&	Large	Large		.952	.699

K-T Treatment Pairs						Items Correct	Types Of Errors
Study Size	Test Size		Study Size	Test Size			
Regular	Regular	&	Regular	Large		.590	.356
Regular	Regular	&	Large	Regular		.893	.370
Regular	Regular	&	Large	Large		.584	.264
Regular	Large	&	Large	Regular		.713	.368
Regular	Large	&	Large	Large		.854	.546
Large	Regular	&	Large	Large		.780	.475

Note 1: Rank-order correlations were carried out separately for each item set.

Note 2: For Items Correct, all correlations were positive and significant (in all cases, $rho(8)>.58$, $p<.05$).

Note 3: For Types of Errors, all correlations were positive and significant (in all cases, $rho(88)>.26$, $p<.01$).

ABSTRACT

Learning the names for braille symbols was facilitated (a) by the presence of large symbols on study trials when standard-size symbols were present on test-trials and (b) by the presence of large symbols on test trials. Implications for design of braille instructional programs are discussed.