DOCUMENT RESUME

ED 109 604 CS 001 991

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| AUTHOR | Koehler, John, Jr.; Bennett, Rosalie |
| TITLE | The Effects of Scanning/Encoding Training on Sight Word (SW) Learning and Recognition. |
| INSTITUTION | Southwest Regional Laboratory for Educational Research and Development, Los Alamitos, Calif. |
| SPONS AGENCY | Office of Education (DHEW), Washington, D.C. |
| REPORT NO | SWRL-TN-2-72-43 |
| PUB DATE | Oct 72 |
| NOTE | 25p. |
| EDRS PRICE | MF-$0.76 HC-$1.58 PLUS POSTAGE |
| DESCRIPTORS | Kindergarten Children; Primary Education; *Reading Instruction; Reading Processes; Reading Readiness; *Reading Research; *Reading Skills; *Sight Method; Teaching Methods; *Word Recognition |

ABSTRACT

Three scanning/encoding training conditions were compared with a control condition in transfer tasks involving learning and recognizing six minimally contrasting, single-syllable word-like forms. The scanning/encoding treatments failed to differ from the controls in prereading kindergarteners, which was attributed to the difficulty of the transfer list. Discrepancies between these results and outcomes from related studies are discussed in relation to the transfer of general strategies versus specific contents, and reasons for failure to replicate previous studies covered in the introductory literature review are presented. In summary, this study was unable to improve word-processing skills in kindergarteners in the manner shown in previous work. (Author/PB)

SWRL SOUTHWEST REGIONAL LABORATORY
TECHNICAL NOTE

DATE October 6, 1972

NO. TN-2-72-43

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Three scanning/encoding training conditions were compared with a control condition in transfer tasks involving learning and recognizing six minimally-contrasting, single-syllable word-like forms. The scanning/encoding treatments failed to differ from the controls in prereading kindergarteners, which was attributed to the difficulty of the transfer list. Discrepancies with outcomes from related studies are discussed in relation to the transfer of general strategies versus specific contents.

THE EFFECTS OF SCANNING/ENCODING TRAINING ON SIGHT WORD (SW) LEARNING AND RECOGNITION

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The present study is part of a series of studies which are concerned with ways to improve the discrimination, encoding and retrieval of words learned as whole units, i.e., sight word (SW) learning. Many current reading programs begin with sight teaching the words, usually a dozen or more, which form the vocabulary for the first reading stories. In subsequent instruction, stress is given to learning to decode words with the use of letter-sound correspondences, i.e., the phonics method, and the sight method is restricted to a residual small percentage of mostly irregularly spelled words.

Sight word learning in the initial stage of reading instruction can generate problems for children who have had little prior word learning experience. The words selected for the first reading stories are usually sufficiently dissimilar so that acquiring the words should be no problem. Studies on word learning (Samuels & Jeffrey, 1966; McCutcheon & McDowell, 1969; Otto & Pizillo, 1970) show that kindergarteners and first graders tend to develop tendencies of attending to and encoding only minimally discriminable cues of words, e.g., a single letter, when the words can be distinguished on such a basis. A consequence of the cue selection tendency is to interfere with further word learning since new words will likely overlap with the cues selected in learning the earlier words. Indications of this interference are frequently found in the classroom in forms such as increases in word confusion errors and learning plateaus after a few words have been learned.

It has been argued elsewhere (Koehler, 1970) that word learning interference effects in early reading instruction could be reduced if (a) more complete discrimination and encoding of letter patterns were carried out during SW learning, and (b) the conditions surrounding SW recall were improved. Two studies were conducted to explore training procedures aimed at improving SW processing during acquisition and SW recall. In the first study, (Koehler, et al., 1971a) kindergarteners were given training on attending to and encoding letter pattern information and associating SWs with their characteristic syntactical environments, e.g., the before nouns and adjectives. In the second study (Koehler, et al., 1971b) K-level children practiced SWs and phonics-derived or rule words (RW) under conditions varying list structure, amount and order of list practice, and the distinctiveness of list contents. The retention/transfer effects of this training were tested with sentences constructed from the training materials.

The major findings of these studies were that 1) training to visually discriminate position and order differences in sequences of letters and nonletters had only a minor influence on subsequent sight learning of contrasting single-syllable words; 2) learning words in a sentence context or marking SWs to make them clearly distinguishable from RWs has no or a slightly adversive effect on word learning and retention; and 3) practicing RWs before SWs aided SW acquisition and showed some positive transfer to sentence learning. The pattern of these findings in conjunction with those of related studies (cf. Koehler et al., 1971b) seemed to suggest that whole word learning improves when the training lays stress on attending to the acoustic as well as the orthographic features of words. Training that focuses on the visual differences may not be very effective because the learner is not required to relate these differences in any specific way to the accompanying acoustic changes. In the training on RWs in the Koehler, <u>et al</u>. study (1971b), the children were required to produce the individual letter sounds, i.e., sound-out RWs, and thus their attention was drawn to all letters in the words as well as how letter sequences related to the acoustic features of the words.

The preceding analysis would seem to imply that phonics training should precede or start concurrently with sight learning the first words. In view of the conceptual and perceptual difficulties attending the phonics approach, it is questionable whether any viable reading program can start off with phonics instruction. Beginning readers may nonetheless be trained to relate acoustic difference to orthographic differences with the use of tasks that largely avoid learning and understanding the phonics relationships. For instance, children could be taught to discriminate differences in word sounds and spelling patterns and to relate the differences across modalities. This could be accomplished by having children indicate the letter position where a pair of minimally-contrasting or highly similar words differ and then select the pair from a set of alternative pairs which matches the spoken pair.

The present study examines this procedure and others for their effects on the acquisition and retention of contrasting single-syllable words learned by the sight method. Some of the training conditions were designed to allow making comparisons with the findings from the earlier

Koehler, et al. studies. As noted above, Koehler, et al. (1971b) found that practice on sounding-out RWs facilitated SW acquisition and reading sentences containing the SWs. The sounding-out procedure is considered here to determine if the previous findings can be replicated and to gauge the effectiveness of other treatments in the study.

In another treatment, training is given on matching single-syllable words first under simultaneous presentation of standard and alternatives and then from memory, i.e., successive or delayed matching where the standard is removed before presenting the alternatives. Training with this procedure showed some facilitation on SW learning in the earlier study (Koehler, et al., 1971a). Most of the effect, however, showed up in a control group given training on materials that were easy to discriminate. It is possible that this group had more competent learners than the other treatment groups of the study. This interpretation would have to be questioned however, if matching-to-sample training on dissimiliar items (i.e., easy to discriminate) again was found to improve SW learning performance.

The control condition considered appropriate for the above treatments is sight learning a list of maximally-contrasting, single-syllable words. This condition has been found to produce little improvement in word scanning skills. Previous researchers (Samuels & Jeffrey, 1966; McCutcheon & McDowell, 1969; Otto & Pizillo, 1970) report that learning maximally-contrasting or dissimiliar items results in more recognition errors and inappropriate generalizations than learning a minimally-contrasting word list. Any word processing improvements resulting from practice on tasks involving aural-visual discrimination and matching, sounding-out, or simultaneous and delayed matching should therefore be disclosed in comparison with the control condition.

## METHOD

### DESIGN

Four groups of prereading kindergarteners received training on tasks expected to more or less develop attention to the acoustic features that covary with the orthographic cues of words. Group I Ss were given aural-visual discrimination and matching training with minimally-contrasting, single-syllable word-like forms; Group II sounded-out a list of maximally-contrasting, single-syllable words by individual letters; Group III received the simultaneous and delayed matching-to-sample training with the maximally-contrasting words as standards; and Group IV, the control, learned the list of maximally-contrasting, single-syllable words with the sight method. Subsequent to training, all Ss sight learned a list of single-syllable word-like forms contrasting as pairs at designated letter positions: this training was applied approximately 24 hours after the group training. The Ss were also required to recognize the forms from the list when mixed with similarly spelled words and to practice the original list for an additional 10 trials. These events also occurred approximately 24 hours after original learning. Training and testing on the word-like forms comprised the transfer phase of the study.

Training time among groups was held approximately constant by having Ss in Groups II, III, and IV practice pairing numbers with toy and animal pictures for designated amounts of time prior to training.

SUBJECTS

The subjects were 40 kindergarteners enrolled at a local public school[1]. The Ss were randomly assigned to the treatment groups (10 to a group) with the provision that an approximately equal number of each sex appear in each group. The instruction given the children in school did not have any direct relation to the treatment conditions.

APPARATUS AND MATERIALS

The study was conducted in a 2-cubical trailer on the school grounds. Each cubical contained visual-auditory display equipment so that two Ss could be trained and tested simultaneously and independently in the trailer. The visual materials were projected by means of 2 X 2 slides on the rear of a screen centered in a vertical panel. The S sat approximately two feet from the panel. The oral accompaniments of the slides were presented by a tape recording. The sound heard by the S came from two small speakers positioned in the lower right and left corners of the panel.

Concurrent visual and oral presentations were automatically sequenced with an inaudible signal on the recording tape. The sound accompanying a slide occurred from two to eight seconds after the slide appeared on the screen--the delay between slide and sound varied over treatments to allow sufficient time for the S to respond. The E could also operate a manual switch to delay presentation of the sound, a procedure which

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[1]The Ss attended the Mark Twain Elementary School in the Lynwood District of the Los Angeles City School System.

was used mostly on the early trials of a new task. When no sound accompanied the slide, the sequence of visual presentations was paced with a 4-second interval (exception: the delay matching task described below). The same pacing also applied to tasks having only oral presentations.

Two 6-item lists containing 3-letter words or pronounceable syllables were compiled in a manner to allow specifying 7-word pairs from each list that would contrast twice in the initial and final positions and three times in the medial position. In word list 1, the items contained a stop, a sibilant, a nasal and two vowel sounds; word list 2 had two stops, a nasal and two vowel sounds.

Each word list assessed the effects of training on half the Ss in a training group. The halves of Group I were trained on the contrasting pairs from one list and tested for transfer on the alternate list.

Ten items were used in testing recognition of the word forms learned in the transfer list. Each item consisted of a target and two distractors selected from the 6-item transfer list.

Six maximally-contrasting, single-syllable words were selected for training Groups II, III, and IV. For training on the matching-to-sample task (Group III), the two distractors chosen for each word varied from each other and the target word at all letter positions. Twelve items were constructed in this manner for the matching task.

The training equalization materials consisted of ten animal or toy pictures randomly paired with the numbers 1 to 10. All training and testing materials are listed in the appendix.

PROCEDURE[2]

Two Es ran Ss individually through the training and transfer tasks. The E worked with each S approximately 30 minutes per day; the S received a "good work" badge or a small trinket at the end of each session.

The following sequence of tasks was used in training Group I:

1. Labeling letter positions in 3-letter words. The S was trained to identify the first, middle, and last positions of a horizontal array of three animals or three letters in a word. The E pointed to the animal or letter in the array and the S responded with the position label. Training on the word items began with the letters in a spaced arrangement, e.g., H U T. Training continued until the S could errorlessly identify the positions on three words when the letters were normally spaced.
2. Discriminating letter position differences on visually presented word pairs. The words of each pair were presented in a vertical array and the S indicated the letter position at which the pair differed. When the S could correctly identify position differences on the seven word pairs (one trial), the training was discontinued.
3. Discriminating acoustic difference concurrent with visual differences. The S received an alternating pattern of trials on the seven word pairs: Trial A--S indicated letter

[2]Pilot work determined the procedures for training Group I Ss and the amount of training on the picture-number PAL task for Groups II, III, and IV.

position difference of a word pair and E pronounced the words and told the S to note that the words sounded different where their letters varied, Trial B--S indicated letter position difference of word pair and then indicated position difference when words were presented only orally by E. This pattern was continued until S performed errorlessly on Trial B.

4. Discriminating position differences on orally presented word pairs. The words of each pair were tape presented to S in a slightly slower than normal reading rate. The S gave the position where he or she believed the words differed in sound. Practice continued until one errorless trial was achieved.
5. Crossmodal matching. The S was shown two word pairs on the left and right sides of the screen and orally presented one of the displayed pairs. The S indicated which pair was heard by pointing to the pair on the screen. A trial consisted of presenting five slides twice with a different pair given orally on each presentation. Training was discontinued when one errorless trial was achieved.

Corrective feedback was given for incorrect or nonresponding in the above tasks.

Group II training consisted of associating numbers with pictures for two days and practice at sounding-out the six maximally-contrasting words as the words were sight learned on the subsequent days. For the latter training, a slide displayed the word with letters spaced to correspond to the individual phonemes of the word, e.g., R O LL, and the S responded by sounding-out the word in terms of the phonemes. The next slide displayed the word with normal letter spacing and the S responded with the blended or whole word form. The instructions to the S emphasized that the sounded-out and whole word forms were the same word. Both the picture list and word list were practiced first in successive parts and then as a whole list. On the first day, the S was given two sublists of five pictures each. The second day was devoted to practicing the whole list of pictures. No criterion performance was sought for the picture list practice. The S learned each of two 3-word sublists to a criterion of one errorless trial on the whole word part of the practice sequence and then practiced the 6-word list for 10 trials. The paired-associate anticipation method was used in all list practice.

Group III practiced the picture sublists for three days and the whole list for one day, otherwise training on the picture lists followed that given Group II. In training on the matching-to-sample task, the Group III S was shown the standard or target word with the matching alternatives in the no-delay condition and two seconds before the alternatives in the delay condition. The target word was displayed above the middle alternative in the no-delay condition and in the same location when it preceded the alternatives in the delay condition. The location of the alternative matching the target was counterbalanced over the 12 items. The S responded by pointing to his choice from the set of alternatives on the screen. When the choice was incorrect, the E indicated the correct alternative.

The S practiced on the no-delay problem until one errorless trial was achieved and then worked to reach the same criterion on the delay problem.

Group IV practiced the picture sublists for two days and the whole list for one day under the Group II training conditions. The two 3-word sublists were learned to a one errorless trial criterion and the whole list practiced for [illegible] trials. The words appeared on the sc[illegible]mal letter spacing form and the S responded with the whole word form. The paired-associate anticipation method was used for training all lists.

The [illegible] task consisted of learning the seven pairs in succession and the [illegible] list. Each pair was presented in an ABBA order and [illegible] where [illegible] of the presentations of a pair were [illegible]. The [illegible] list was learned to a criterion of one errorless trial. After the recognition test, the [illegible] list was practiced [illegible] additional [illegible] trials. The paired-associate anticipation method was used in pair and list learning.

The [illegible] consisted of two presentations of the [illegible] [illegible] appeared on the screen two [illegible] the target word was presented. The S [illegible] [illegible] responses [illegible] the S's response. [illegible] the S [illegible] the S [illegible] [illegible] each item and where appropriate, [illegible] [illegible] were practiced. The [illegible] of the list

Five Ss were terminated and replaced with other Ss in the study. Three failed to achieve criterion in a reasonable time and two had too many absences [illegible] for continuity in the training sequence. The S losses were evenly distributed over the training groups.

RESULTS

With the exception noted below, 4 (training treatment) X 2 (word set) factorial analyses of variance were performed on the age of Ss (months), number of sessions (days) to complete training series and various measures of transfer performance. The interaction between training treatment and word set failed to reach the .05 level of significance in any of these analyses. The data from the two word sets were therefore combined in calculating the means and standard deviations that are shown in Table 1.

Although Ss were assigned randomly to the cells of the 4 X 2 design, the Ss trained and tested with word list 1 were found to be significantly younger than those receiving word list 2, $F = 5.14$, $df = 1/32$, $p < .05$. This effect, however, failed to produce any noticeable bias on the transfer results.

The means and standard deviations listed in Table 1 for number of training sessions suggest that the picture-number task satisfactorily equalized training time across the groups. In support, the difference between training groups on this dimension was found to be unreliable, $F = 1.509$, $df = 3/32$, p [illegible] .10.

Transfer performance, including the recognition test, was evaluated in terms of trials to criterion and errors in word identification. The error measure was employed where a fixed number of trials was given the S.

TABLE 1

MEANS ($\bar{X}$) AND STANDARD DEVIATIONS (SD) FOR EACH TREATMENT GROUP ON MEASURES CONCERNED WITH TRAINING AND TRANSFER

| Group | | Age | Number of Training Sessions | Trials to Criterion on Transfer Pairs (Total) | Trials to Criterion on Transfer List | Errors on Recognition Test | Errors on 10 Trial Practice of Transfer list |
|---|---|---|---|---|---|---|---|
| | | Measures | | | | | |
| I | $\bar{X}$ | 65.0 | 3.2 | 89.1 | 4.3 | 8.8 | 33.9 |
| | S.D. | 3.89 | 1.14 | 20.04 | 1.83 | 2.86 | 14.50 |
| II | $\bar{X}$ | 64.3 | 3.8 | 83.6 | 4.7 | 7.4 | 34.3 |
| | S.D. | 2.71 | 0.79 | 19.04 | 3.16 | 2.72 | 14.40 |
| III | $\bar{X}$ | 66.0 | 4.0 | 93.2 | 2.8 | 9.9 | 37.9 |
| | S.D. | 5.81 | 0.94 | 34.78 | 1.99 | 3.51 | 10.29 |
| IV | $\bar{X}$ | 65.9 | 3.5 | 77.4 | 3.7 | 7.8 | 33.3 |
| | S.D. | 4.15 | 0.85 | 9.88 | 2.45 | 3.64 | 16.59 |

It is apparent from the table that in comparison to the controls (Group IV), the training treatments had little effect on transfer performance. No reliable difference was found on trials to criterion on all pairs ($F < 1$), reaching criterion on the 6-item list ($F = 1.16$, $df = 3/32$, $p > .10$), recognition test errors ($F = 1.12$, $df = 3/32$, $p > .10$) or errors made on the 10 trials of additional practice on the 6-item list ($F < 1$).

It is possible that the training effects were limited to the early stage of practice on the transfer task. Although differences in learning rate as a function of training may appear on the first few word pairs, further practice obliterates them because the materials and training procedures of the transfer task rapidly develop the skills addressed in the training conditions. That is, practice on minimally contrasting words in the transfer task improves scanning and encoding of the letter and spelling patterns of words much as the training treatments were expected to do. Under these conditions, differences arising from the earlier training conditions would likely wash out, especially if they were small.

This interpretation of training influences was tested by analyzing trials to criterion for individual word pairs with the use of the mixed variance model. In this analysis, differences in learning individual pairs did not contribute to within cell error since all Ss practiced the pairs in the same order. This would tend to reduce Type Two error, which means the test is more likely to detect the presence of treatment effects. Increasing the power of the test, however, made little difference: the analysis revealed no difference in learning the pairs ($F < 1$)

differential training effects over pair learning the pairs (training treatments X pairs: $F < 1$).

## DISCUSSION

The results of the study fail to show that training which focuses on discriminating, encoding, and retrieving the distinctive features of words improves sight learning performance any more than practice at sight learning words that have little relation to the transfer words. No effects from training could be discerned in the original practice on the transfer words in terms of overall performance measures or an analysis of learning progress. Nor were any effects found on the recognition test or in the 10 extra practice trials given on the transfer words 24 hours after original practice.

The recognition test results perhaps are particularly revealing of training ineffectiveness. Since the transfer words were highly similar, the bulk of acquisition may have been taken up with learning to associate the sound with the printed form of the word--it has been shown (Feldman & Underwood, 1957) that where both stimulus and response members suffer from high inter-item similarity, paired-associated learning is very difficult. Differences in scanning/encoding strategies arising from training thus would not be reflected in measures of acquisition performance, especially where training effects are small. On the other hand, these strategies should be brought into full play in a recognition test where discrimination between spelling patterns tends to predominate and retrieval of specific associations is normally minimized.

It is possible to contend that the recognition test was inappropriately designed. In previous work (McCutcheon & McDowell, 1969; Otto & Pizillo, 1970) the items on the recognition test contained distractors that while similar in spelling to the target item, were never presented to the Ss prior to test. In the present study the distractors were learned with the target item and were targets on other items in the test. It probably goes without saying that it should be easier to recognize the target item in the presence of new items than when it is combined with items from the same practice list. The latter item form would heighten associative interference between distractors and target and thus tend to obscure the effects of scanning/encoding skill training.

On the other hand, the recognition test of this study can be viewed as a more stringent test of the S's ability to process the distinctive features of words since associative interference between similar items should diminish as this ability develops. Moreover, this test would seem more suitable for evaluating Group I training outcomes than the form used in the other studies. The Ss in this group received considerable training at discriminating the differences between similar word forms in the visual and auditory mode and at matching the differences across the two modes. In the cross modal matching task, the Ss were required to make recognition responses to highly similar stimuli, which were the very conditions occurring in the recognition test. In consequence, the effects of this training, if any, should readily transfer to the test situation since the Ss were essentially trained on the skills used in the test.

It should be understood that having the recognition test favor Group I training transfer is in keeping with the purpose of the study. The earlier study (Koehler, et al., 1971b) found that sounding-out rule-based words facilitated SW acquisition in kindergarteners. It was hypothesized that the transfer from sounding-out to learning words as whole units was the result of learning to attend to the acoustic as well as the orthographic features of words during sounding-out practice. Group I training procedures were designed to develop the same skills while avoiding some of the training difficulties presumed to attend teaching nonreaders the phonics principles underlying the sounding-out procedure. An earlier document (Koehler, 1971) also suggested that procedures similar to those used in Group I could easily be incorporated in the instruction on the first SWs, and further, that such training can be viewed as preparing the beginning reader with certain rudimentary skills that play a role in learning to decode words with phonics-rules. The thrust of the study, therefore, was to obtain empirical support for these procedures and the proposed instructional forms. While the outcomes of the study were a disappointment in this respect, instruction based on Group I procedures still should be investigated in terms of its potential impact on word decoding skills.

Unlike the findings of the earlier study (Koehler, et al., 1971a), the matching-to-sample training here produced no more effects on transfer than the other forms of training. Most of the effect in the earlier work was found in the control group which received matching training with items that were easy to discriminate. It was suggested that this result reflected the presence of more competent learners in the control group than were to be found in the other groups of the study. The transfer performance of Group III (matching training) tends to support this conjecture and thus the earlier result can be largely dismissed.

But the matter of whether matching-to-sample training affects subsequent associative learning cannot be laid to rest entirely. Samuels (1971) has suggested that the delayed or successive matching procedure will help to develop the young child's ability to remember visual information, i.e., improve encoding. He supports this with a study (Samuels, 1969) where it was found that kindergarteners trained on successive matching-to-sample of letters were superior in subsequent letter name learning to a group receiving simultaneous matching practice on the letters. He claimed that his results came about because highly similar lower case letters were used as training materials. Where stimulus materials have low similarity, the delayed condition is no better than the simultaneous one.

This interpretation, however, does not agree with what happened in the earlier Koehler, et al. study (1971a). Groups receiving matching practice with highly similar items under both the simultaneous and successive procedures were performing more poorly than the control group eluded to earlier. While the source(s) of the discrepancy between the two studies cannot be entirely identified, it is suspected that some of the problem lies with the relationship between the training and transfer materials. The Samuels' study involved the same stimulus materials in both cases, whereas the Koehler, et al. study and the present one used different materials so that the transfer task would be able to assess generalization of scanning/encoding strategies apart from specific content. The findings of the latter studies suggest, of course, that the matching task was not successful in this respect. They also raise question with the position that children can be trained to develop better memory strategies through practice on the matching-to-sample task.

The earlier work (Koehler, et al., 1971b) found that practice at sounding-out rule-based words has some facilitation on learning a list of words by sight. It appeared that sounding-out practice was improving word processing skills in a general way since the RWs had little spelling relation to the SWs. Sounding-out practice in the present study was also designed to have the transfer task measure the development of word processing skill rather than the transfer of specific contents. It was found that transfer performance here could not be distinguished from that of the controls who sight learned dissimilar words prior to transfer. Since practice on dissimilar or maximally-contrasting words has been shown (Samuels & Jeffrey, 1966; McCutcheon & McDowell, 1969; Otto & Pizillo, 1970) to reinforce inappropriate word scanning skills, it would appear that SW learning was not improved by sounding practice in the present study.

It is suspected that the failure to replicate the earlier finding represents the list difficulty effect described earlier. The SWs learned in the Koehler, et al. study (1971b) were only moderately similar to each other. Learning words of modest difficulty is less likely to obscure the effects of sounding-out practice than learning to associate similarly sounding responses with similarly spelled stimuli; the latter, of course, were the practice conditions of transfer in the present work.

To sum up, the present study was unable to improve word processing skills in kindergarteners in the manner shown in previous work. Transfer list learning ease and the development of generalized word processing skills were believed to account for some of the inconsistency in research study outcomes.

# APPENDIX

## I. Minimally-contrasting word-like forms

| Word List 1 | Word List 2 |
|---|---|
| PIN | MUG |
| SIP | BEG |
| SAN | BUM |
| SIN | BUG |
| PAN | MEG |
| SAP | BEM |

## II. Recognition test items (target underlined)

| Word List 1 | | | Word List 2 | | |
|---|---|---|---|---|---|
| PAN | <u>PIN</u> | SAN | MUG | <u>MEG</u> | BUG |
| <u>SAN</u> | PAN | PIN | <u>BUM</u> | BUG | BEM |
| <u>SIN</u> | SIP | SAN | <u>MUG</u> | MEG | BEG |
| SIN | PIN | <u>PAN</u> | BUG | <u>MUG</u> | MEG |
| <u>PIN</u> | SIN | PAN | <u>BUG</u> | MUG | BEG |
| SAN | SAP | <u>SIP</u> | BEG | BUM | <u>BUG</u> |
| SAN | SAP | <u>PAN</u> | BEM | MEG | <u>BEG</u> |
| PIN | <u>SIN</u> | SAN | BUG | <u>BEG</u> | BUM |
| SIN | <u>SIP</u> | SAP | BEG | <u>BUG</u> | BEM |
| SIN | SIP | <u>SAP</u> | BUG | BEG | <u>MEG</u> |

## III. Maximally-contrasting words and sounded-out forms

| | | | |
|---|---|---|---|
| HUT | H U T | FIX | F I X |
| DOCK | D O CK | WEEP | W EE P |
| YAM | Y A M | | |
| ROLL | R O LL | | |

IV. Items for matching-to-sample task (target underlined)

| | | |
|---|---|---|
| FOND | SLAM | <u>HUT</u> |
| BIR | <u>WEEP</u> | NOT |
| <u>FIX</u> | DELL | TROT |
| ANT | <u>YEP</u> | <u>DOCK</u> |
| JAC | <u>ROLL</u> | MEX |
| <u>YAM</u> | DEER | SNIP |
| <u>WEEP</u> | FOND | BIR |
| SLAM | <u>DOCK</u> | ANT |
| DEER | <u>YAM</u> | NOT |
| MEX | SNIP | <u>ROLL</u> |
| <u>HUT</u> | JAC | DELL |
| TROT | YEP | <u>FIX</u> |

V. Picture-number list

| | |
|---|---|
| Elephant | 4 |
| Snake | 7 |
| Horse | 6 |
| Slide | 10 |
| Monkey | 1 |
| Skates | 5 |
| Frog | 3 |
| Sailboat | 2 |
| Tiger | 9 |
| Drum | 8 |

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