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ABSTRACT

The ability to analyze a word into its component sounds is prerequisite to a child's learning of letter-sound correspondences and therefore to his learning to read. As prereaders do not typically master the ability to analyze a work into its component sounds, techniques must be developed to teach them this skill. Most procedures which have been tried have not been successful with children younger than 6 or 7 years; however, Zhurova reports success teaching even 3-year-olds to isolate initial sounds of words with the method she describes. The current experiment evaluated Zhurova's iteration method of instruction by comparing it with a segmentation method. Ss were 32 kindergarteners. The two methods of instruction were fully crossed with four sequences of real word and nonsense stimulus items, given in two training sessions. None of the six variables was significant; however, training time had a significant effect. (Author)

Technical Report No. 212

# AN EVALUATION OF METHODS FOR TEACHING INITIAL SOUND ISOLATION

by Robin S. Chapman and Marga R. Kamm

Report from the Basic Prereading Skills
Component of Program 2

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## Statement of Focus

The Wisconsin Research and Development Center for Cognitive Learning focuses on contributing to a better understanding of cognitive learning by children and youth and to the improvement of related educational practices. The strategy for research and development is comprehensive. It includes basic research to generate new knowledge about the conditions and processes of learning and about the processes of instruction, and the subsequent development of research-based instructional materials, many of which are designed for use by teachers and others for use by students. These materials are tested and refined in school settings. Throughout these operations behavioral scientists, curriculum experts, academic scholars, and school people interact, insuring that the results of Center activities are based soundly on knowledge of subject matter and cognitive learning and that they are applied to the improvement of educational practice.

This Technical Report is from the Basic Prereading Skills Project, an element of the Reading and Related Language Arts Project in Program 2, Processes and Programs of Instruction. General objectives of the Program are to develop curriculum materials for elementary and preschool children, to develop related instructional procedures, and to test and refine the instructional programs incorporating the curriculum materials and instructional procedures. Contributing to these program objectives, this element has two general objectives: (1) to investigate ways to test for skill deficits and to overcome them and (2) to develop a kindergarten-level program, including diagnostic tests and instructional procedures, for teaching basic prereading skills. Tests and instructional programs will be developed for visual and auditory skills, including letter and letter-string matching with attention to order, orientation and detail, and speech sound matching and blending.

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## Abstract

The ability to analyze a word into its component sounds is prerequisite to a child's learning of letter-sound correspondences and therefore to his learning to read. As prereaders do not typically master the ability to analyze a word into its component sounds, techniques must be developed to teach them this skill. Most procedures which have been tried have not been successful with children younger than 6 or 7 years; however, Zhurova reports success teaching even 3-year-olds to isolate initial sounds of words with the method she describes. The current experiment evaluated Zhurova's iteration method of instruction by comparing it with a segmentation method. Ss were 32 kindergartners. The two methods of instruction were fully crossed with four sequences of real word and nonsense stimulus items, given in two training sessions. None of the six variables was significant; however, training time had a significant effect.

# I
# Introduction

A child's ability to analyze a word into its component sounds is necessary to his learning of letter-sound correspondences and therefore important to his beginning to read. Prereaders typically show great difficulty in performing tasks of sound analysis, such as judging whether two words begin with the same sound (Calfee, Chapman, & Venezky, 1971), saying how many sounds a word contains (Elkonin, 1959), or giving the initial or final sound of a word (Bruce, 1964). These studies show the need for instructional procedures in sound analysis for the prereader.

Many procedures to teach children to perform sound analysis tasks are reported to be ineffective with children of mental ages less than 6 or 7 years (Elkonin, 1959; Bruce, 1964). Those few which promise some success are to be found primarily in anecdotal form in Russian psychological literature (Elkonin, 1959; Zhurova, 1963). It is the purpose of the present study to evaluate the procedure reported by Zhurova (1963) for teaching children between the ages of 3 and 6 years to isolate the first sound of a word. Elsewhere (Wilder, 1972) an attempt to replicate Elkonin's work is described.

Zhurova calls her teaching procedure the "method of intonation." It consists of the multiple repetition of the sound to be isolated, within an otherwise normal pronunciation of the entire word. For instance, a presentation of the initial sound in bag would be done as follows: /bə bə bə bæg/.[1] In the remainder of this report, we will refer to this technique as iteration.

Zhurova trained ten children in each of three age groups with this method, presented in the context of a game. She reports that the youngest children (3 to 4 years) were able to produce the initial sound only when the experimenter had just previously given the iterated form of the word. Most of the 4- to 5-year-olds learned to produce the sound in isolation without the immediate support of the iterated word, but iteration (supplied by E or spontaneously by the child) was necessary during the course of learning. Of the 5- to 6-year-olds, five were able to isolate initial sounds without iterated examples or productions; the other five required iteration during the course of learning, just as the children a year younger had.

Zhurova attributes the success of the iteration method to the fact that this technique does not disrupt the integrity of the word, which she asserts is a single, cohesive unit to the preschool child. McNeil and Stone (1965) make the same assertion to explain the superiority of nonsense over real words as stimuli in another sound-analysis training procedure. That study used corrective feedback to teach children to recognize whether a sound was present in a word.

Two variables were introduced into the present study to explore the claim that the child learns sound analysis with greater success if the integrity of the real word is not interrupted. First, a method of training called segmentation was contrasted with the method of iteration. This method consisted of presenting the first sound of the word, followed by a brief pause and the remainder of the word; for example, /bə -- æg/ for bag. Thus the integrity or unity of the word was broken up in the segmentation method. McNeil and Stone's findings led to the inclusion of both nonsense and real word training stimuli.

The procedures used in the present study are a more structured form of those reported by Zhurova. Certain critical variables, such as total training time, had to be set arbitrarily

[1] Symbols of the International Phonetic Alphabet are used to indicate pronunciation.

in the absence of precise information in her report. Transfer tests using new exemplars of the same initial sounds and new initial sounds were incorporated to evaluate the generality of the children's learning—information not available from the original study.

## II
## Method

### Design

Two methods were used to teach children to produce the first sound of a word: iteration and segmentation. Method of training was completely crossed with the four word lists used in the training games: real words in session 1 followed by real words in session 2; real followed by nonsense; nonsense followed by real; or nonsense followed by nonsense. Children were tested on the training list at the end of each session. At the end of session 2, all children received two types of transfer test (same sounds and new sounds), each including both real and nonsense word exemplars.

### Stimulus Materials

A cardboard bridge and six stuffed felt animals representing a pig, a bear, a dog, a seal, a mouse, and a lamb were used in playing the training game. The names assigned to the animals varied with the training session (1 or 2) and the stimulus condition (real or nonsense word) to which the child had been assigned for that session. The names are listed in Table 1. The initial consonant of the series of names for an animal was always the one beginning the animal's natural name (e.g., /p/ for pig).

The stimulus words for the transfer test included six real words and six nonsense words beginning with the same sounds used in training (List A) and an additional set of six real and six nonsense words beginning with new sounds (List B). These words are listed in Table 2.

### Procedures

Subjects (Ss) were randomly assigned to one of the eight cells in the 2 x 4 between S design. Ss participated in two individual sessions on consecutive days; each session lasted 15 to 30 minutes. A female experimenter (E) conducted each session. All sessions were tape-recorded with a Shure lavaliere microphone on a Uher 5000 tape recorder.

For all Ss, the first session began with an explanation of "first sound" based on the child's name. E first asked the child, "What's the first sound in your name?" Failing to get a correct reply, E would pronounce the child's first name, leaving out the initial sound, and ask (first time) "What am I saying wrong?"; (second time) "What am I forgetting to say?"; (third time) "Is /x/ the first sound in your name?" To end the exchange, E repeated the correct answer.

Following this explanation, the child was introduced to the six felt animals and given their names for that session. The child was asked to play a game in which the wicked witch (E) would not allow an animal to cross the cardboard bridge unless the password was given. The child's task was to provide this password, which was the first sound in the animal's name.

If the child could not supply the password correctly in response to the E's first challenge ("What's the first sound in your name?"), the ensuing exchange differed for the two methods of instruction. For Ss in the iteration condition, E would repeat the initial sound three times and then say the word normally; for example, /pə pə pə pɪg/. For Ss in the seg-

Table 1
Names Used in Training Sessions[a]

| Animal | Session 1 | | Session 2 | |
|---|---|---|---|---|
| | Real Word | Nonsense Word | Real Word | Nonsense Word |
| PIG | Pete | /pif/ | pig | /pɪm/ |
| BEAR | Bill | /bɪp/ | bear | /bɛz/ |
| DOG | Dave | /dek/ | dog | /dɒf/ |
| SEAL | Sam | /sæz/ | seal | /sib/ |
| MOUSE | Mike | /maɪv/ | mouse | /mauv/ |
| LAMB | Lynn | /lɪš/ | lamb | /læ)/ |

[a]Nonsense words are written in the International Phonetic Alphabet.

Table 2
Words Used in Transfer Tests[a]

| List A: Same Sounds | | List B: New Sounds | |
|---|---|---|---|
| Real Word | Nonsense Word | Real Word | Nonsense Word |
| pen | /pɛs/ | tail | /tef/ |
| bat | /bæv/ | king | /kɪb/ |
| down | /daup/ | goal | /gon/ |
| soup | /sud/ | zoom | /zuf/ |
| milk | /mɪb/ | knife | /naɪg/ |
| load | /lok/ | van | /væp/ |

[a]Nonsense words are written in the International Phonetic Alphabet.

mentation condition E pronounced the initial sound, paused for a slow count of two, and then said the rest of the word; for example, /pə--ɪg/. The challenge and one of these two forms of feedback were repeated three times before E told the child the correct answer and asked him to move the animal across the bridge. If S mimicked the feedback at any time in either sequence, E replied not with more feedback but with the instruction, "Don't say the whole word, just the first sound." Each animal was presented once. Ordering of the animals was random and was determined independently for each child.

Following the game, the child was tested on the set of six names used in the game: E said each name and asked S to give the first sound. The names were independently randomized for each child.

The training and test procedure for session 2 was identical to that for session 1, except that a new set of names was used. After testing on the training names, two transfer tests were given: List A (independently random-ordered) followed by List B (also independently random-ordered for each child). S was instructed to give the first sound in each word spoken by E.

## Subjects

Ss were 32 kindergarten children attending a predominantly lower middle class elementary school in Madison, Wisconsin. Mean age of the children was 5 years, 11 months.

## III
## Results

The number of correct responses on each of the two training tests was computed for each S. These data were analyzed in a 2 x 4 x 2 Anova with repeated measures on the last factor: training method (iteration or segmentation) by word list series (both real, real followed by nonsense, vice versa, or both nonsense) by training session (1 or 2).

Only one significant effect was found: that of training session. Performance improved on the second test ($F = 13.29$, $df = 1/24$, $p < .01$). Ss scored an average of 1.94 on the test for session 1 and an average of 2.91 on the test for session 2, out of a possible six correct each time. The frequency distributions of scores on the two tests are shown in Figure 1.

Performance on the transfer tests was analyzed in a 2 x 4 x 2 x 2 Anova with repeated measures on the last two factors: training method by word list series by sounds tested (List A, same vs. List B, new) by word type (real or nonsense). The dependent variable was number correct out of a possible six. No significant effect or interaction was found. Means and correlations of the training and transfer test scores are reported in Table 3 for all 32 Ss. All correlations shown there are significant ($p < .01$).

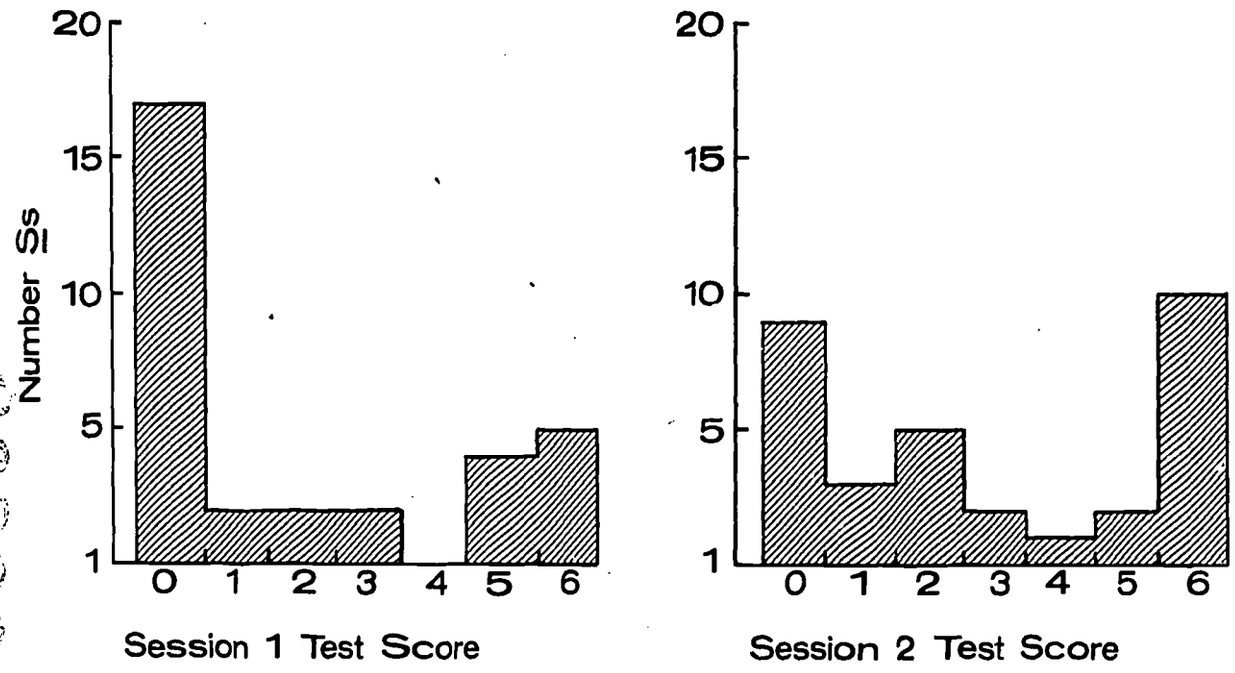


Fig. 1. Frequency distributions of Ss' scores on two training tests.

Table 3

Means and Correlations[a] of Test and Transfer Scores for 32 Ss

| Variable | 1 | 2 | 3 | 4 | 5 | $\bar{X}$ | SD |
|---|---|---|---|---|---|---|---|
| 1. Test, session 1 | | | | | | 1.94 | 2.46 |
| 2. Test, session 2 | .83 | | | | | 2.91 | 2.52 |
| 3. Transfer A, real | .89 | .92 | | | | 2.16 | 2.57 |
| 4. Transfer A, nonsense | .84 | .89 | .96 | | | 2.00 | 2.45 |
| 5. Transfer B, real | .80 | .85 | .93 | .94 | | 1.89 | 2.47 |
| 6. Transfer B, nonsense | .80 | .85 | .94 | .91 | .96 | 1.90 | 2.54 |

[a]All correlations significant, $p < .01$.

## IV
## Discussion

Failure to find a difference between the two methods casts doubt on Zhurova's (1963) assertion that the success of her method depends crucially on retaining the integrity or wholeness of the word. Similarly, failure to find a difference between real and nonsense word test stimuli raises questions about the explanation offered by McNeil and Stone that the lesser "integrity" of a nonsense word would make it easier for the child to analyze. It is possible, of course, that E's segmentation or iteration of the word may have erased a potential difference in analyzability between real and nonsense items.

Most importantly from a pedagogical view, both the iteration and segmentation methods were effective in teaching some children to isolate and produce the first sound of a word. Only four children could respond immediately and correctly to the first question of the first training presentation; by the end of the second training session, 23 of the 32 children could respond correctly on at least one of the six test items. The fact that children did almost as well on all the transfer tests as on the tests of previously trained items and the strikingly high correlations of test and transfer test measures support the interpretation that children were learning the general skill of initial sound isolation and production, rather than specific paired associate responses.

Neither method, on the other hand, was sufficient to teach the skill of initial sound isolation to more than a third of the children within the time limits imposed—a total of some 20 to 40 minutes of training time taken up by the 24 training presentations or "trials." The time allowed seems short from the pedagogical point of view, although long in terms of the usual "laboratory" experiment with children. It is at least plausible to argue that continuing either form of instruction for short sessions on five to ten more days would be sufficient to teach all children the skill. In practical application, either method would require adaptation to small group use.

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