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AUTHOR Rudegeair, Robert E.
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THE GOAL OF INITIAL PHONICS TRAINING

The skills to be learned in initial phonics instruction remain unspecified in detail but are implicit in models, such as the following, of how a child decodes an unfamiliar word:

1) he visually segments the printed word;
2) he generates an articulatory correspondent for each visual segment;
3) he synthesizes (blends) the articulatory segments to produce a whole word.

A substantial number of reading researchers have subscribed to this teaching model in describing various aspects of beginning reading training (Silberman, 1963; Desberg, 1969; Gotkin et al., 1969; Koehler, 1970; Coleman, 1970; Richardson & Collier, 1971). Others have followed it implicitly in conducting experimental research (Dykstra, 1966; McNeil & Coleman, 1967). Most phonics-based reading programs, including the program researched and developed at the Southwest Regional Laboratory, are built on this model.

Acquisition of the skills implicit in the model theoretically results in the child's ability to perform generalized word decoding. Standard procedure is to train the child to perform a set of tasks under the assumption that these tasks reflect the necessary phonics subskills. Thus, failure of a training program to bring the child to a reasonable level of decoding skill may be attributed to either omissions in the program with regard to critical tasks and/or inadequate training on some or a'l of the tasks comprising that program. At present, there is no general agreement about an optimum set of tasks for training word decoding subskills. This is not to say that there is only one set of tasks that will produce Ss with an acceptable level of decoding ability. But within a given approach, based on a certain decoding model, a sequence of tasks should be designed that is both efficient and effective. That different approaches can achieve the same success is not disputed. The point to be made, however, is that sufficient research has not been conducted to evaluate the relative impact of alternative training tasks on generalized word decoding ability.

ANALYSIS OF DECODING SUBSKILL TASKS

A search of the literature reveals varying lists of subskill tasks to be employed in training Ss to decode. Tables 1, 2, and 3 show the lists of subskill tasks presented in research reports by Coleman (1970), McNeil and Coleman (1967), and Gotkin et al. (1969), respectively. Table 4 lists item forms exemplifiying the tasks of the SWRL First Year Communication Skills Program (Sherman & VanHorn, 1971).

RECOGNITION TASKS

The various tasks presented in Tables 1-4 are arrived at by manipulating a small set of task variables. Many of the tasks require a simple recognition response. The child is typically required to choose, from various numbers of alternatives, a match for the stimulus. Stimuli can be sounds or letters and the response choices can be sounds or letters. In this regard, tasks can be distinguished as intramodal

TABLE 1

PARTIAL LIST OF SUBSKILLS REQUIRED IN BEGINNING READING AND SPELLING (from Coleman, 1970)

Skill	Stimuli	Response
	Storing knowledge: Paired-associate memorization	
Memorizing basic data	1. Child perceives the printed word as a whole	He says the word; he recognizes whole word shape
	2. Child sees letter	He says phoneme
	3. Child hears phoneme	He gives letter
	4. Child hears phoneme	He prints letter
	Synthesizing knowledge from rules: Concepts[a]	
Sounding out a word	5. Child sees printed word	He segments into sequence of letters, and/or syllables and/or morphemes
	6. Sequence of letters, and/or syllables, and/or morphemes	He maps into (says) sequence of phonemes, syllables, morphemes
	7. Child hears sequence of isolated sounds (that he says himself)	He blends into word-sounds
Spelling a word	8. Child hears word	He segments into sequence of phonemes
	9. Sequence of phonemes (that he says himself)	Maps into sequence of letters

[a]Child analyzes a high-order unit into subunits; he makes a response to each subunit according to general rules; and then he synthesizes the responses into new high-order unit.

TABLE 2

DEFINITION AND MEASURE OF WORD ANALYSIS SKILLS
(from McNeil & Coleman, 1967)

1. The learner is given sets of letters (3 letters to a set) and is asked to select the one letter in each set that matches a phoneme for that set.

2. The learner is given sets of printed words (3 words to a set) and is asked to select the printed word that matches the spoken word.

3. The learner is given pairs of printed words and is asked to select the one word of each pair that corresponds to a "phoneticized" pronunciation of that word. The alternate choice in each pair does not always differ in constitution of letters but in the way the letters are ordered.

4. The learner is given pairs of words never seen by him before but composed of familiar graphemes and is asked to select the one word of each pair that corresponds to a particular spoken word.

5. Given any one of the graphemes presented in the reading program, the learner will be asked to pronounce it.

6. Given any one of the words presented in the reading program, the learner will be asked to pronounce it.

TABLE 3

SPECIFICATION OF SKILLS IN PHONICS TRAINING SEQUENCE
(from Gotkin et al., 1969)

1. Given an auditory model of a letter sound, the child orally repeats the sound in the presence of the letter image.

2. Given the letter sound, the child points to or presses one of three images.

3. Given the letter image, the child says its letter sound.

4. Given a two-letter (bigram) image and an auditory request to say the sound of both letters together, the child orally produces its letter sound.

5. Given a bigram and an auditory request to say the sound of the first letter and then the last letter, the child orally produces the sound of the first letter and then the last letter.

6. Given an auditory model of an auditory series of letter sounds, the child orally repeats the series in the same order.

7. Given a three-letter word such as pat and the instruction "Say the sound of the first two letters and then the sound of the last letter," the child says "pa" and then "t."

8. Given two letters and auditory instructions, the child says the sound of the first letter, then the last letter, and then both sounds together.

9. Given three letters and auditory instructions, the child says the sound of the first two letters, then the sound of the last letter, and then the sound of the whole word.

TABLE 4

SAMPLE ITEM FORMS WHICH DESCRIBE THE TASKS IN THE SWRL FYCSP
(from Sherman & VanHorn, 1971)

1. Point to the (word, letter, sound) _____.
2. What sound (does this letter, do these letters) make?
3. Point to the word that (begins, ends) with the (sound, letter) _____.
4. Point to the word that is sounded out __ __ __.
5. What sound does the first letter in this word make?
6. Say the sound of the underlined letter(s) in this word.
7. Sound out this word. Now, read the word.
8. Point to the word that is sounded out __ __ __. Now, read the word.
9. Put your finger under the word _____. Sound out this word.

or cross-modal. Intramodal tasks involve an aural stimulus and an aural set of response choices or a visual stimulus and a visual set of response choices. Cross-modal tasks, on the other hand, require Ss to select a sound in response to a letter stimulus or a letter in response to a sound stimulus. Since cross-modal tasks generally require some knowledge of letter-to-sound relationships, performance on intramodal tasks should be better than on cross-modal tasks (all other conditions being equal).

Intramodal tasks derive utility from the notion that auditory discrimination, i.e., discriminating speech sounds from one another or hearing separate sounds in spoken words, and visual discrimination, i.e., discriminating letters, are prerequisite to learning to read. The data on which this notion is based have been obtained, for the most part, from experiments in which auditory discrimination scores or visual discrimination scores or both have been correlated with later reading achievement and found to be good predictors of reading success. Harrington and Durrell (1955) used an auditory discrimination measure to distinguish "high" and "low" ability pupils who were matched with respect to mental age, visual discrimination, and phonics ability. Highly significant differences were found between the groups on a measure of reading ability. Templin (1954) found that a measure of "recognizing a word containing a given sound" significantly discriminated between good and poor readers. Similar findings have been reported by Wheeler and Wheeler (1954) and Reynolds (1953). Thackery (1965) found that, from a battery of reading readiness profiles, the measures of auditory discrimination and visual discrimination correlated most highly (.53 and .50, respectively) with reading achievement. Also with regard to visual discrimination, Gamsky and Lloyd (1971) evaluated the impact of the Frostig Program for the Development of Visual Perception on Kindergarten Pupils and found that the program benefited the students reading ability since achievement scores of participants exceeded those of controls.

While poor auditory discrimination and/or poor visual discrimination have been found to correlate with reading retardation, there has been a failure to isolate causal factors. There are also studies that contradict the findings of the experiments reviewed above. Dykstra (1966) took seven measures of auditory discrimination on 632 pupils at the beginning of first grade and two measures of reading achievement at the end. Results showed intercorrelations among auditory discrimination measures and between each measure and subsequent reading achievement to be uniformly low with few reaching .40. Dykstra suggests that the use of auditory discrimination tests for diagnostic purposes is a dubious practice since tests designed to measure this skill showed little relationship to one another.

While many programs employ intramodal tasks to insure discrimination skills, the exact status of these tasks with regard to generalized word decoding is unclear. Theoretically, simple aural matching or visual matching tasks may provide a great deal of transfer to higher level tasks. Such a hypothesis could easily be tested by simple transfer studies to assess the impact of discrimination training on performance on cross-modal tasks. It is possible that the effects of familiarizing Ss with letter and letter-sound responses independent of other task constraints may prove to facilitate the letter-to-sound correspondence learning necessary to successful (criterion) performance on cross-modal tasks.

Ironically, no intramodal tasks are presented in the lists in Tables 1-4. It can be assumed that training in recognition skills is felt to be subsumed by more complex tasks or that these researchers believe the skills reflected by such tasks are sufficiently well-developed in children entering the reading program.

In terms of the categories established earlier, the only selection tasks that appear on the lists in the tables are aural-visual selection tasks. The absence of a visual-aural selection task is notable when the decoding model sketched earlier is considered. The model, in essence, is a view of the child's strategy in decoding the printed word to speech, i.e., a task involving a visual stimulus. Apparent in the absence of a visual-aural recognition training component is the assumption that the visual-aural and the aural-visual tasks tap the same skill, namely, letter and sound correspondence recognition. Such an assumption is not _prima facie_ valid. It is, in fact, a striking example of the type of hypothesis that needs to be tested in a research program attempting to establish an optimum set of tasks for training generalized word decoding.

Another factor manipulated in the tasks presented in the tables, which may play an important role in the assessment of decoding sub-skills, is the nature of the matching required of the child in a given selection task, in other words, the complexity of the stimulus in relation to the complexity of the response. Table 5 lists eight different ways of constructing selection tasks on the basis of this

TABLE 5

COMPLEXITY FEATURES POSSIBLE IN THE DESIGN OF INTRAMODAL AND CROSS-MODAL SELECTION TASKS

Stimulus	Response
Element Word	Select an element
Subword sequence of elements (e.g., a rhyming portion) Word	Select a subword sequence of elements
Element Subword sequence of element Word Sounded-out word	Select a word

factor. Table 6 shows the selection tasks listed by each of the authors represented in Tables 1-4, as well as the nature of the matches to be made in their own design of the tasks.

The phonics decoding model presented at the beginning of this paper views the child as proceeding from a word (printed) to the sound of individual segments and on to the blended sound of the whole word. This model suggests an initial stage wherein a S goes from word to element or subword sequence of elements. While this stage is reflected in production tasks on all the lists except that of McNeil and Coleman (1967), it is not reflected in any of the selected response tasks suggested by these lists, as can be seen in Table 6. This may or may not be a crucial omission in the set of tasks comprising a given program. It seems strange however to omit,

TABLE 6

SPECIFICATIONS OF SELECTED RESPONSE TASKS PRESENTED IN FOUR RESEARCH REPORTS

Author(s)	Task Category		Nature of Match Required	
	Exemplar	Choices	Stimulus	Response
Coleman	Aural	Visual	Element	Select an element
McNeil & Coleman	Aural	Visual	Element	Select an element
	Aural	Visual	Word	Select a word
	Aural	Visual	Sounded-out word	Select a word
Gotkin et al.	Aural	Visual	Element	Select an element
Sherman & VanHorn	Aural	Visual	Element	Select an element
	Aural	Visual	Word	Select a word
	Aural	Visual	Element	Select a word
	Aural	Visual	Sounded-out word	Select a word

from a sequence of tasks, a recognition task that relates directly to the ultimate strategy being taught (novel word attack) as well as to the subsequent production tasks in the training program, while including others that, on the surface, appear only indirectly related. A question arises again, at this point, concerning the impact of varying tasks along the dimension under consideration. Theoretically, it is possible that vastly different reflections of decoding subskills acquisition can be inferred from different task specifications in terms of the type of match required of Ss in executing selection tasks.

PRODUCTION TASKS

Most of the tasks listed in Tables 1-4 are constructed response or production tasks. One major behavioral objective of almost all phonics training components is the ability to produce oral responses to visual stimuli (printed words). While recognition skills may be viewed as en route skills, production skills are constituent skills of the ultimate decoding skills complex. Such skills, in decoding training, can involve written or oral productions as responses to written or aural stimuli. Since written responses are basic to spelling training, while oral responses are characteristic of word decoding training, the former will not be considered as an integral part of decoding subskills domain. The view that writing outcomes are not essential to decoding print to speech is not universally accepted. The author of one phonics prog: .a states that "the test of a child's knowledge of the sounds is shown by his ability to write the phonograms when only the sounds are given" (Spalding & Spalding, 1969).

The position taken in the present analysis is based on the decoding model introduced at first. While writing exercises may eventually prove valuable for teaching certain concepts basic to a phonics approach, such as the alphabetic principle or the coding principle, writing skills appear external to the most widely-accepted model of word decoding strategy.

Thus, this section is limited to a consideration of tasks in which an oral response is required. In terms of the stimulus modality, two task categories emerge, visual-oral tasks and aural-oral tasks. Visual-oral tasks are assumed to directly reflect the skills involved in stage two of the three-stage decoding model, i.e., generating articulatory correspondents to printed word segments (letters or letter strings). Table 7 lists the various forms a visual-oral task can take according to the complexity of the response in relation to the complexity of the stimulus.

TABLE 7

COMPLEXITY FEATURES POSSIBLE IN THE DESIGN OF VISUAL-ORAL TASK ITEM FORMS

Stimulus	Response
Grapheme	Produce a phoneme
Subword letter string	Produce a syllable
Word	Produce a phoneme Produce a syllable Produce a sounded-out word Produce a word

All six types of visual-oral item forms shown in Table 7 are represented in the task lists presented earlier. Only the grapheme to phoneme task is represented in all lists. The last task in the table, word stimulus to word response, is the ultimate objective of the phonics program. Hence it is not appropriate to speak of this task as a subskill; rather, all other tasks reflect subskills of the word production task. In terms of the model, the item form that consists of presenting a word and requiring a sounded-out word as a response seems most directly related. Presumably, other item forms, e.g., the one specified as grapheme to phoneme, are aimed at training skills *en route* to the sounding-out skill.

The third stage of the model views the child as proceeding from a series of isolated sounds (generated from letter stimuli) to the blended word, i.e., the whole word pronunciation. This stage of the model is represented in typical training procedures by a *blending task*. The stimulus is a series of isolated sounds, generated by the *S* or by the *E*, and the response required is the word in final blended form, i.e., the word is conceived of as being synthesized by *S* from the series of isolated sounds at hand. The blending task can be viewed as an aural-oral task and, as with the other task types, is only one in a whole category of tasks. Other tasks meriting the same description (i.e., aural-oral) are often employed in training sequences. Table 8 shows the possible specifications aural-oral tasks might assume in terms of stimulus and response complexity.

In the task lists that are the object of the present analysis, all aural-oral item forms listed in Table 8 are represented with the exception of those involving "word" as stimulus. All the lists contain the blending task in some form, i.e., *E*-generated or *S*-generated stimuli. In the previous section the notion that auditory discrimination training relates to reading improvement was discussed. It is doubtful that

TABLE 8

COMPLEXITY FEATURES POSSIBLE IN THE DESIGN OF AURAL-ORAL TASK ITEM FORMS

Stimulus	Response
Phoneme	Produce the phoneme
Syllable	Produce the syllable
Word	Produce a specified phoneme Produce a specified portion Produce the word
Sounded-out word	Produce the sounded-out word Produce the whole word

auditory discrimination training directly contributes to word decoding ability; however, such training may contribute to blending ability or lower level aural processing skills that relate to blending and, in this manner, have an influence on the complex decoding ability. If the research relevant to understanding the interrelationships among alternative tasks is to be accomplished, hypotheses about the hierarchical structure of subskill tasks must be proposed and tested.

Experiments attempting to measure the relationship between blending performance and reading achievement scores, have generally shown blending to be an important component contributing to reading achievement. Balmuth (1966) and Chall et al. (1963) both reported studies in which a positive relationship was shown to exist between phoneme blending of nonsense syllables and silent reading achievement among elementary school children. Data such as these, while suggestive, are hardly conclusive. No causality can be ascribed between blending and reading achievement and neither report contained possible model formulations that might suggest the nature of the relationship between blending and reading. Such formulations can prove useful in developing appropriate hypothesis to test.

Richardson and Collier (1971) cite the experimental programs of Silberman (1963) and Gotkin et al. (1969) as having had to rely heavily on blending training in order to provide Ss with a generalized ability to decode novel trigrams. Richardson and Collier themselves supported this contention in their own experiment, concluding that "being specifically instructed to analyze the words orally (blended response) significantly increased the number of words [Ss] could decode for both [real and nonsense] categories."

If blending training is as critical as these researchers claim, and if assessment data show a blending deficit, then related tasks, such as those exemplified by the item form specifications in Table 8, may prove necessary components of the training insofar as they can be shown to have a transfer effect to blending performance.

SUMMARY

Features of phonics training tasks have been discussed and an attempt has been made to point out significant areas of research interest. Training task analysis is aimed essentially at isolating the variables that are potentially important in reflecting different subskills of generalized word decoding. Such an analysis can be viewed as the groundwork for a research program that seeks to understand the hierarchical nature of decoding subskills. Subskill specification assumes importance when the practical problem of specifying the outcomes to be included in a beginning reading program is faced. Understanding the interrelations among tasks hypothesized to reflect decoding subskills is the only apparent means of understanding the nature of the subskills themselves.

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