A Proposed Method for Teaching Reading, Writing and Spelling by Means of Controlled Phonograms

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A PROPOSED METHOD FOR
TEACHING READING, WRITING, AND SPELLING BY MEANS OF
CONTROLLED PHONOGRAMS

by

FORREST HAMPTON WELLS
SUBMITTED IN PARTIAL FULFILLMENT
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Grateful acknowledgement is made to the loyal and intelligent "guinea-pigs" without whom this project could not have been worked out;

The experimenter's children Anne, Martha, George, Elizabeth, and Katherine.
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CHAPTER I

THE PROBLEM AND DEFINITION OF TERMS USED

Contemporary methods of teaching Reading, Writing, and Spelling receive very widespread acceptance among teachers and publishers, with the result that substantial uniformity exists without regard to locality or the particular textbook employed. At the same time, dissatisfaction has been expressed by parents, employers, and college instructors with the degree of literacy generally attained under these methods. In addition, draft examinations in connection with World War II revealed a disquieting amount of functional illiteracy.

1. The Project

Purpose of the project. It was the purpose of this project (1) to ascertain those features of current methods of instruction in the first steps of Language Arts which might be substantially improved; (2) to develop a new system of instruction which might reasonably be expected to yield such improvement; and (3) to make logical comparisons between current methods and textbooks and those developed as part of the project. This report is confined to an account of these three operations. Whether the system developed herein is in fact superior or inferior to current methods must await controlled
experiments on a substantial scale in actual classrooms.
A proposed design for such an experiment is included
in this report, under "Recommendations".

Justification. The effectiveness of the typical
elementary school in imparting the Language Arts has
been sharply criticised in recent years. (10 p 5)
Widespread dissatisfaction has been expressed by parents,
employers, and the faculties of secondary schools and
colleges. (15 p 11) Newspapers and periodicals frequently
draw attention to an allegedly general public discontent
with current results in the field of the "three R's".
Frequent recent revisions of textbooks, and the large
number of investigations and theses in this field,
indicate that educators themselves feel considerable
preoccupation with the fields of Reading, Writing, and
Spelling. (15 p 7) Among U.S. citizens who are older
than twenty-five, one in four will not of choice read
anything more difficult than comics and fiction magazines.
Worse yet, fourteen per cent of this whole group are
functionally illiterate. (3 p 135) It would be difficult
to over-estimate the menace of these conditions in a
nation where purchasing power is very broadly distributed,
where adult suffrage is universal, and where decisions
of world-wide importance are constantly being made on
the basis of public opinion.

It is generally conceded that the incomplete literacy of large fractions of the buying and voting public cannot reasonably be ascribed to any single cause. Nevertheless, it is a conclusion widely held, and with much to recommend it, that the principal cause is ineffectual instruction in the early grades. (12 p 167) (10 p 11) Moreover, it is a tenable assumption that although most other causes would be difficult to eradicate, primary instruction offers possibilities of swift improvement. The investigator accordingly decided to concentrate attention upon possible correctives for conditions which at present cause total or partial dyslexia in numerous primary children, especially in grade one.

Limitations of the project. For the foregoing reasons, the project dealt primarily with the operations needed to bring the completely naive child into an understanding of the concept of recording thought upon paper or extracting thought from such records, and to give him facility in the use of the symbols involved. It was the conviction of the investigator that non-readers are primarily the products of bewilderment and discouragement occasioned in the very earliest stages of
this process, which accordingly is of crucial importance to the school success of the individual.

It was realised that the situation could hardly be corrected by mere improvement in the materials and methods currently in use. Therefore it was a basic limitation that an attempt be made to develop a logically tenable but essentially new approach to the teaching of Language Arts.

No attempt was made to cover all possible approaches to the problem, or all possible educational viewpoints. The basic assumption was made that in respect to acquiring simple mental skills, the pupil is an organism which can be so conditioned that certain responses will be made to certain stimuli; and that the most profitable approach will therefore be found in structuring and systematising this training. The viewpoint may be termed atomistic and mechanistic, but it is one which industry finds effective in many fields connected with imparting simple skills. It should perhaps go without saying that this approach involves no neglect of the importance of adequate motivation on the part of the learner.

Only an incidental handling of the problem of insuring that children understand what they read was included in this project. It appeared to the investigator that all systems of teaching Reading are in substantial
agreement as to how this understanding is to be sought, add no additional or divergent measures have suggested themselves. It is accordingly assumed that beginners using the method of this project will achieve understanding of what they read in the usual ways, which include:

1. Restriction of first-semester lessons almost exclusively to those words which typical children understand in their spoken form before reaching school age.
2. Classroom routine which involves re-statement into the pupil's own words of material he has read.
3. Introduction of new word, whenever possible, in a context which will define it.
4. Use of illustration to supplement context.
5. Classroom procedure which provides the definition of a new word as soon as it is encountered.

In this report the discussion of Reading will accordingly be confined to that section of the process which involves the conversion of printed symbols into spoken sound or into the mental equivalent thereof.

There is general agreement among contemporary educators that manuscript writing (hand-print) is more easily learned by beginners than is cursive script, and
also that the former is more legible. (11) (6 p 239) In the
method of this project cursive script is therefore not
attempted until the latter part of the second year.
(Provision is made for even longer postponement at the
option of the individual teacher.)

Nothing in the method of this project affects the
application of measures relating to eye movements,
vision span, left to right attack, and similar items of
the mechanics of Reading. Accordingly, such matters are
not treated herein.

The preparation in rough form of a Teacher's
Handbook was a necessary part of the investigations
made. It was necessarily bulky, hand lettered, and hand
illustrated; it consequently was not available for
incorporation in multiple into this report. Only brief
and scattered extracts are included herein.

This report is not the account of an experiment set
up to test a hypothesis. Neither is it a compilation of
the findings and opinions of others, gathered from
books. Instead, it is the account of certain things done
by the investigator, together with his own reasons for
doing them. An extensive bibliography would therefore
not only be unnecessary but would also give an incorrect
picture of the actual work done, which for the most part
was along lines evolved by the investigator himself. The
bibliography is accordingly brief.

2. Definitions of Terms Used

**Pictorial language.**

**Ideo**graphic language. Any written language wherein each idea is represented by a symbol which has no relation to spoken sounds. To read such a language requires the individual recognition of each unrelated symbol. (3 p 423)

**Phonetic language.** Any written language, however complicated its orthography, in which diacritical marking can be used to show pronunciation. In these languages the written form is a representation of the sounds of the spoken word.

**Phonetic system of reading.** A system wherein the ambiguities of varied spellings are eliminated by the use of diacritical markings on new or confusing words. (11 p 134)

**Phonogram.** A letter, or group of letters, used to represent a specific sound. Where sometimes one sound and sometimes another is represented, as in the case of "th" in the and in thin, each such relation is a separate phonogram. Where a sound is sometimes represented in one way and sometimes in another, as in the initial sound of
king and cool, each such relation is a separate phonogram. (9 p 239)

**Phonic system of reading.** A system wherein the beginner is first taught the sound equivalents of disconnected phonograms. Afterward he converts print to sound by translating successive phonograms inside each word. (11 p 221)

**Syllabic system of reading.** A modification of the phonic, in which the beginner learns phonograms combined into meaningless syllables before attempting words.

**The Course.** The course in Language Arts which was designed, partially completed, and outlined in a rough Teacher's Handbook as one of the materials used in this project. It covers exercises in Reading, Writing, and Spelling for first, second, and third grades, together with descriptive notes for the guidance of the teacher.

**Whole-word system of reading.**

**Sight-reading.**

**Flash-recognition.**

**Look-and-say method.** For clarity of discussion, these terms are used herein to denote only the pure form of a method which in practice is almost invariably found mixed with some proportion of the phonic. As a concept, however, this method treats each word as one indivisible whole. It entirely eschews phonics, syllabication, and
the concept that words are composed of separate letters.

**Hybrid systems of reading.** Methods in which the basic approach is by the whole-word method, but the attention of the pupil is ultimately directed to phonograms by grouping words into such families as *tie*, *die*, *pie*, *lie*, and the like. (11 p 221)

**Standard word list.** **Standard vocabulary.** The scientifically compiled list generally accepted by educators as comprising those words commonly understood by children of primary ages when used verbally. (15 p 84)(11 p 204)(14)(17)

**Controlled vocabulary.** The words used in a book intended for readers of a specified mental age, selected entirely from a standard word list for that particular age.

**Controlled phonogram vocabulary.** A vocabulary which fits the preceding definition, but which has in addition the following characteristics:

1. Phonograms are introduced one at a time and in a planned sequence.
2. At any given stage, all words used are wholly composed of such phonograms as have thus far been introduced.

**Alternative-free vocabulary.** A vocabulary which fits
the preceding definition, but which has in addition
the following characteristics:

(1) Only single-letter phonograms appear.

(2) Where a letter is capable of signifying more
    than one sound, it is employed to signify one
    and that one only.

(3) Where a sound may be symbolized by more than
    one letter, it is invariably symbolized in
    only one way.

**Conventional.** As applied in this project to
Writing, Spelling, or Reading texts, this adjective
indicates that although the text in question has the
customary controlled vocabulary, it has neither a
"controlled-phonogram" nor an "alternative-free"
 vocabulary. These omissions cause all such texts to differ
markedly in structure from the texts developed in this
project.
CHAPTER II

REVIEW OF THE LITERATURE

1. Problems Arising from the Special Characteristics of the English Language

All of the source languages from which the English language derives are phonetic languages. However, at the time of the adoption of printing the amalgamation of root languages was far from complete. In consequence, some words expressed their sounds in the phonograms of one language and other words used the phonograms of other languages.(6 p 1xxxii) In addition there were dialectical differences in pronouncing the same word, and divergent regional customs in respect to the method of writing the same sound.

Written English settled into its present form while still retaining a great many such variations, so that the language as a whole has no single phonic structure, although almost every individual word follows some set of phonic rules. Hence there has never been a simple method of teaching Reading or Spelling by phonics. The divergences among teaching methods, both present and past, have arisen mainly from conditions set by the structure of written English. Since letters and letter groups which signify certain sounds in one group of words
may signify quite different sounds in other words, it is impossible to make dependable decisions as to how to pronounce the components of a word encountered for the first time. This is true even of the short words found in primary books. For example, the beginner familiar with the "ow" of bowl will go wrong if he applies that knowledge to the reading or spelling of howl or growl.

2. Approaches to the Teaching of Primary Reading, Writing, and Spelling

In dealing with the difficulties of the English language, measures which are adequate under one set of circumstances may prove highly unsatisfactory when conditions change. This fact has been a major cause of the innovations which have occurred in the past whereby a method of instruction once in very general use has been greatly altered or even abandoned altogether.

Ideographic methods. In general, it appears that a learner who requires only a small vocabulary to fill his needs can master written English most effectively under a system which deals with the language as if it were actually ideographic. So long as the total vocabulary is in the lower hundreds, it is simplest merely to learn individual words by rote; because any phonetic system demands mastery of at least two hundred phonograms, whose use or disuse in a given situation cannot be prescribed by any simple set
of rules, so that combinations of alternatives make the total task one of formidable size. It is the avoidance of this situation which enables whole-word methods to show quick and positive results in the instruction of children just beginning to read. These methods are also entirely adequate for those adults whose needs are satisfied by the meager vocabulary of a trade, plus comic books, sport pages, and the like.

Conditions are completely otherwise when the objective of instruction is a vocabulary of ten thousand words or more—by no means an unreasonable figure for an educated adult. The rote-memorization of a stock of words of that size is a far more difficult task than the recognition of two hundred and fifty phonograms, whatever their duplications. It is the experience of those nations which have genuinely ideographic languages that the acquisition of a large vocabulary demands the labor of a lifetime devoted to little else, a circumstance which renders universal literacy a mechanical impossibility. In our own school systems at the present time the demands of other pursuits sharply limit the time which can be devoted to the rote-memorization of words, especially in grades above primary. Crowded conditions in the typical classroom allow scant time for the person to person imparting of individual words which is possible under a tutorial situation. Moreover, compulsory school laws
with rising age limits cause retention in today's classrooms of a proportion of pupils whose limited verbal capacities would have caused their transfer to industry or agriculture from the schools of a generation or so ago.

Few writers question the efficacy of the ideographic method in introducing the first-grade child to the new activity of Reading, since this is done inside a frame of fifty words or less. (11 p 87) Satisfaction with its retention beyond the primary grades, however, is not unanimous. (2)(4)(10)

Phonetic methods. In the preceding century and the early part of the present, the accepted method of teaching Reading and Spelling was by syllables. (11) A child's first lessons were devoted entirely to repetitious drill on disconnected syllables. It is important to note that these were so presented as never to carry meaning. The pupil merely learned that "a" and "b" together made ab, and so on down to "z", "u", zu. Such drills might go on for months before the beginner encountered his first word. Still, the system had advantages of great value. Once mastered, it conferred a great deal more than can be derived from an acquaintance with a specific list of words of the same numerical extent. A competent syllabic reader could convert into spoken words the whole range of printed English. Up to
the limits of his personal listening vocabulary, meanings were obvious; others were indicated by context; and for the residue a dictionary could readily be used by one familiar with syllables. Without assistance from living interpreters, the syllabic reader could make his own way into every field of culture and learning, of commercial and industrial knowledge, as far as these were covered by the printed word.

He also possessed a practical ability to spell any word he could speak. His orthography might be neither faultless nor conventional, but whatever he wrote could be re-converted to sound and understood regardless of that.

**Hybrid methods.** The present century has been characterised by a total rejection of the syllabic method, possibly because schools are now forced to retain pupils incapable of the persistence and mental effort required to reach even the beginning of meaningful Reading; possibly because increasing demands from expanding curricula leave inadequate time for the preparatory period; and possibly because teaching a few words by rote-memory to beginner readers gives quick and showy results gratifying alike to teacher, pupil, and parent. (10 p 21) However, during the current decade there is a strong tendency to turn more and more to phonic methods in the form of an overlay upon
a whole-word beginning. (4) As the pupil's whole-word vocabulary builds up, his attention is invited to families of words which have one phonogram identical, as face, lace, grace, and the like. The objective is the ultimate conversion of the pupil's approach to new words into one of phonic attack, replacing his original passive habit of waiting for another person to tell him how the new word is spoken.

All hybrid methods offer more promise of the ultimate attainment of an extensive vocabulary than does the purely whole-word approach. (6 p 119, 131) At the same time, none of them give unimpeachable satisfaction. In no decade and no area have our schools succeeded in producing a degree of mass literacy which would justify complacency in respect either to methods of teaching the Language Arts which have been tried in the past or to methods currently being used.
CHAPTER III

METHOD OF PROCEDURE

In outlining the steps which appeared most likely to result in a satisfactory Course Of Instruction, the procedure followed was to set down certain considerations affecting the problem. From these, deductions were made which eventually shaped the development of this project. It will be noted that some of these considerations were facts of common knowledge, and others were information available in the literature. At the same time, some were mere opinion, some were pure conjecture, and in at least two instances they were errors. Accordingly, it is not intended to imply that all the considerations herein given are proven facts. Their function, provable or not, was to shape the deductions.

1. The Compilation of Lesson Vocabularies

consideration. The average primary pupil enters school with a very large stock of words which he understands when he hears them, even when he does not personally use them. Their number is generally agreed to be in excess of two thousand five hundred. (17 p 7) (15 p 87) The specific words to be found in this group have been the subject of a substantial amount of research, and children's
Deduction 1. By employing this standard vocabulary as the foundation of the Course, the problem of meaning will be almost wholly deferred until the pupil has completed the first two grades, because the new words of each stage can typically be defined by the class itself, with only occasional resort to explanation by the teacher. So long as tasks lie mainly inside the standard pre-school listening vocabulary, the work required of the pupil will be almost wholly confined to the area of symbol-sound relations. Before the beginner is called on to expand his vocabulary he will learn to read, and to use context and analysis, inside a vocabulary of words whose meanings are known to him. During this period, printed symbols become meaningful as fast as they are converted into spoken sound.

Consideration. The syllabic and other purely phonic methods have received ample trial and their unsuitability for modern school conditions has been demonstrated. The pure whole-word method is merely bulk memorization, a pedestrian process which offers scant possibility of further improvement through organization or structuring.

Deduction 2. Search for improvement may profitably
be limited to the field of hybrid methods.

**Consideration.** The ability to name each letter is of doubtful value; but this circumstance does not alter the fact that the ability to differentiate every letter from every other letter is an indispensable component of any Reading method, not excepting the whole-word. For example, if the middle letter of a certain three-letter word be obscured so that it reads "b: g", the most accomplished whole-word reader will find it quite impossible to say whether the word is bag, beg, big, bog, or bug. Similarly the identification of much longer words can depend upon a single letter, as in the case of parish and pariah. The ability to distinguish changes in sequence among the same letters is equally indispensable, as when reading the words scared and scared. By its very nature, the whole-word system cannot teach these skills specifically; nevertheless the beginner must acquire them as best he can. The investigator formed the opinion that many if not most failures in Reading begin in this area. The six year old child has in most cases had little training in the sorting of two-dimensional designs before he comes to school, and even less in the use of arbitrary symbols. There are numerous letters, such as "c" and "o", or "b" and "d", which are such near twins as to make swift discrimination
by an untrained eye a total impossibility. It follows
that when to differentiate between even two letters is so
difficult, it is unreasonable to demand of the utter
beginner that he start out by differentiating whole words.

**Deduction 3.** The Course should incorporate
planned and systematic measures for teaching the swift
discrimination of any letter of the alphabet in relation
to all the others.

**Consideration.** The discriminations to be learned
are formidable in number. Moreover, they are necessarily
learned one at a time. (9 p 25)

**Deduction 4.** The practice of conventional primers
in plunging at once into the use of a complete alphabet in
the very first Reading exercises produces confusion and
discouragement in the learner, and is the major if not the
sole cause of such divagations as pseudo-reading by
remembering which words or phrases go with each illustration,
or identification of words by the number of letters they
contain, or by the position of an upward or downward
projection. The Course should therefore present words in
such an order as to introduce only one new letter at a time,
begining with the smallest practical number.

**Consideration.** The task of letter identification is
greatly complicated when there are three variant forms for each letter, which occurs when the pupil is expected to deal with the printer's form, the hand-lettered form, and the cursive form from the beginning of his work. Possible confusions increase geometrically, since a given form of one letter may too closely resemble any one of three forms of another letter.

**Deduction 5.** The pupil should begin work with primers printed from a manuscript font, while cursive letters should be deferred at least a full term.

**Consideration.** When the pupil ultimately begins to write in running script, maximum transfer will not be secured unless he has been using a manuscript alphabet wherein the sequence and direction of strokes in making every letter are, as closely as possible, the same as in running script. (Not all manuscript alphabets meet this condition.)

**Deduction 6.** The manuscript alphabet should be derived from the cursive letters by maximum simplification, preserving sequence and direction of principle strokes.

**Consideration.** Even in a manuscript font there are a certain number of capital letters which differ from their lower-case forms so markedly that to the naive eye they constitute completely new symbols. The use of capitals
in primers adds from eight to a dozen unnecessary items to the total number of symbols among which the beginner must learn to discriminate.

**Deduction 7.** In the earliest Reading exercises, given, proper, and place names should be selected exclusively from those whose first letter is the same in both fonts, except that the capital is larger. When possible, the same choice should be made of words standing first in a sentence. When this is not possible, such words should be left uncapitalized.

**Consideration.** The number of symbols to be differentiated is increased by the use of punctuation marks, each of which is a symbol just as a letter is a symbol.

**Deduction 8.** Reading tasks should begin with word or phrase labels under illustrations, since then no punctuation is required. The next step should be simple sentences short enough for each to be placed on its own line and so require neither punctuation nor capitalization.

**Consideration.** By the time he enters school, the normal child is well practiced in the use of language in its spoken form. He has a listening vocabulary of considerable size, an awareness of the practical mechanics of sentence structure, and a working knowledge of communication as a
process. If no attempt be made in the early stages to add words to his vocabulary, acquiring the ability to read becomes essentially the learning of a code. He is not entering new fields of thought, but rather learning equivalent units in a second channel of expressing it.

One may therefore expect the process of learning to read to bear an extremely close resemblance to the process of learning to receive telegraphic signals, or that of putting a coded message into clear, or that of translating from a foreign language. The basic process in all of these is the swift completion of a large number of paired associations. Upon visual inspection of the word he, for example, the reader associates the first symbol with a particular aspirate and the second symbol with a particular long vowel. Each printed symbol in reading matter is a stimulus; the pupil can not read until he has been conditioned to make the correct response.

It would appear that a fruitful area in which to seek for ways of simplifying the first steps in learning to read is that of reducing the number of associations which must be made. It is of proven effectiveness in many other fields of the acquisition of skill, to teach the association of one response to one stimulus as the unit of learning. This is the way in which industry teaches the operation of machines; it is the way in which complicated
performances in both military and industrial life are imparted to the beginner, and it is the way in which such skills as telegraphy are entered upon.

It can be demonstrated experimentally and also mathematically that the possibility of erroneous associations increases with pyramiding rapidity when the pairs to be dealt with are increased to more than a few. The beginner who has but one symbol and one meaning to associate can make zero incorrect associations. With two symbols to identify and two meanings to associate he can make two identification errors, with each of which he can make one wrong association. In a six-symbol problem, however, each symbol may be wrongly identified as any one of five others, so that there are thirty opportunities for identification error. In applying any one of six associations to these thirty situations, there are always five that are incorrect, so that the total opportunities for error reach the figure of five times thirty, or one hundred and fifty. With seven pairs to be associated the number increases still faster, and so on.

It may reasonably be doubted whether any beginner at any skill, regardless of his mode of instruction, ever deals at any given stage with more than four or five imperfectly learned associations. Effective progress appears to halt at some such number until the mastery of
one association reduces the size of the field wherein choices are to be made.

The application of this conception to any learning process leads to the conclusion that the maximum rate of learning can be achieved only by presenting a single new stimulus—response demand at any time, all others being deferred until that response is being made with reasonable regularity.

Deduction 9. The earliest tasks assigned in the learning of the Language Arts should be so constructed as to involve the fewest possible letters, others being added, one at a time, only when those preceding are being dealt with successfully.

2. First Attempts at Simplification

Elimination of certain letters. An inspection of the standard vocabulary showed that no word really needed for the composition of a beginning primer would be lost if every word containing "z" were excluded. It is to be noted that the elimination of even this one letter would reduce the field of symbols by almost four per cent.

It was found that there are other letters whose appearance in simple words is very infrequent. Moreover, such words as do employ them usually have synonyms composed of common letters, permitting easy substitution. For
example, the sole appearance of the letter "x" in a certain primer might be in a dog's name, *Rex*. Shifting to practically any other name for this animal would not diminish the clarity or interest of the text, but it would reduce the field of stimuli by nearly four per cent. In a similar manner, "q" may easily be abolished from most primers without damage to their effectiveness. Its only appearance in an entire book may be in some such sentence as "'Quick, quick,' said Joe." Rerphrasing as "Hurry, hurry" will remove "q" from the very earliest stages, in which it is a needless complication, and defer it for introduction at a later point.

Variations were accordingly tried in the re-wording of typical primer texts, with a view to removing the largest possible number of letters from the initial recognition load. Owing to the wealth of synonyms available in English, results were highly encouraging. However, it was soon apparent that no way exists in which letters may be considered as simple and basic units in themselves. For the purposes of this project the letter "a" in *hat* and the letter "a" in *hate* are not the same symbol at all, but actually two very diverse units which unfortunately have the same appearance to the eye when standing alone.

*Characteristics of English literature*. Complications
such as the foregoing are very frequent in English words. They are of two general classes. The first is due to the adoption into English of words from tongues which either have no written form or which do not use the Latin alphabet. An importation might be set down by the use of certain phonograms, while another importation might be written with other phonograms for some of the same sounds, as will be seen in calico of Madrassi origin and khaki of Persian origin. The second and more numerous class is occasioned by the gross deficiencies of the English alphabet as a tool for representing voice sounds. Containing only twenty-six letters, it cannot possibly assign an individual, one-letter symbol to each of the forty-four distinct sounds employed in human speech. (10 p xxii)

In English, this inadequacy is pieced out by expedients of two kinds, each of which creates many ambiguities. The first employs the same letter to represent more than one sound; the "o" of got, for example, is not at all the same as the "o" of go. The second expedient is the combination of two or more letters into an artificial group which has a sound of its own, differing from the summation of the individual letter sounds. For example, the sound of "c" followed by the sound of "h" will not produce the sound which the group "ch" has in church. In a mechanically adequate alphabet this particular "ch" would have a symbol
of its own.

The development of our written language was not confined to the adoption of just sufficient multi-letter and duplicate-value phonograms to supply sounds not otherwise symbolized. Instead, various sounds have developed from two to a dozen different literations apiece, so that the same sound changes its spelling from word to word. The table of English equivalents of the International Phonetic Alphabet shows that there is but one sound (that of "th" in think) which is always and invariably spelled in the same way. In consequence, alternative translations are plentiful in the reverse operation of reading. In many cases it is quite impossible for a reader, however skilled, to deduce the pronunciation of a word the first time he sees it. For instance, the sequence "ough" is found in dough, bough, rough, through, cough, and brought. If the coined word pough be examined in the light of these examples, should it be pronounced poe, paw, puff, pawf, poe, or paw? There is no intrinsic solution to such questions.

Even the number of phonograms into which English words subdivide depends upon the system favored by a given writer. One may consider, for example, that "ou" in couple is a two-letter phonogram. Another may hold that the phonogram is the solitary "u" as in cup, and that the "o" is merely a silent and superfluous letter of no phonetic
significance.

Examination of various systems will show, however, that the phonograms which an English reader must interpret in phonic reading number in the vicinity of two hundred and fifty items. This is to say that in reading aloud he must select the correct one of forty-four sound responses when the stimuli amount to two hundred and fifty, many of which are optically indistinguishable from two or more mates of identical lettering. For example, the letter "a" represents eight different phonograms.

3. Controlled Phonograms

The fact that a given letter or group of letters may have one sound association on one occasion and a different sound association on the next demands from all readers a much higher level of mental performance than would be called for if the same response were always correct for each stimulus. As the language stands, choices must continually be made among alternative responses, by noting and employing factors outside the phonogram itself. For example, the reader who sees the word _sow_ cannot respond with the correct sound until he finds, from additional evidence, whether the reference is to a female hog or to the act of putting seeds into soil. Similarly, the words _cease_ and _cook_ demonstrate that the letter "c"
is sometimes the stimulus for one sound and sometimes for another.

If a language existed in which the relation between every symbol and its sound was invariable and unduplicated, such complications could not occur. Once he had learned the associations, a reader could pronounce correctly any word he saw in print, even for the first time; because alternatives would not exist. From the same cause, spelling would require no choices. A pupil could spell with complete correctness every word he could speak correctly.

The speculation occurred to the investigator that such a situation might be set up in English by excluding from the vocabulary all occasions for choice. This was effected by the following measures:

(1) Words containing multiple-letter phonograms such as "ow" in cow were dropped from the standard vocabulary.

(2) Words containing double letters were dropped.

(3) For each single letter which was in actuality more than one phonogram, one was chosen for retention, and all words were dropped which employed that letter in any other manner.

In applying (3), consonant choices were made in such a way as to retain the largest possible number of words in the residual vocabulary. For instance, it was found
that fewer words were discarded when "s" as in his was chosen in preference to "s" as in sit. In the case of vowels, choice fell upon the short sound; because the long sound as in mate, seat, snow, and the like is so often indicated by an additional and silent letter which is in itself a serious complication.

The residual vocabulary proved to be ample for the composition of Reading and Spelling lessons for the beginner. By construction, every task in such lessons was a simple association, never requiring the selection of the correct alternative among several choices. It was then determined to seek still further simplification by discarding letters one by one, dropping those of least utility first. The object was to arrive at a word list for the very first lesson which should contain the smallest number of variables which would serve to form usable words.

A vowel census of the alternative-free vocabulary showed that "a" appeared most frequently. With "n" as first consonant, two words were at once available, and the increment of new words increased rapidly with each additional letter:

- n........0 words
- an........2 words— an Nan
- tan........6 words— at ant tan Nat
- dad .........8 words— dad and

Ability to associate sounds with only ten symbols made
possible the reading of sixtyfour words at first sight. Six more symbols brought the words available up to two hundred and sixtyfour. It was then realised that it was feasible to set up a series of reading lessons based upon the girl Nan and the boy Nat in the customary style of primers, but with all words meeting the requirements of the no-alternative vocabulary. Such a primer would employ a mechanically perfect language, the association between each symbol and its sound being in all cases fixed, invariable, and unduplicated. The primer would begin with only two symbols and thereafter increase its field by only one new symbol at a time. No primer known to the investigator possesses this degree of simplicity, and it was confidently expected that its application to the difficult and puzzling period when a child is first attempting to read would greatly facilitate easy initiation into the process.

**Nature of learning involved.** It is important to note two circumstances about the type of paired associations with which the beginner deals at this point in the Course. The first is that it is a non-sequential type; that is, it contrasts with the memorizing of a poem or the successive items in a repetitious operation. The pupil will not learn the word *abab*, then *bade*, then *def*. Instead, the pupil is to learn to read and spell words in which, with insignificant
exceptions, any phonogram may precede or follow any other.

The size of the mental task presented by a word is always a matter of simple addition. In a two-phonogram word like at the associations to be made are two; in a three-phonogram word like hat there are three, and so on. However, in dad there are but two, so that the difficulty of a word is to be measured by phonogram content and not by gross size.

The second point is that within the no-alternative vocabulary all the associations are ambidirectional. In Reading the symbol is the stimulus and the sound is the response; in Spelling the sound is the stimulus and the symbol the response. It follows that in this initial portion of the Course, even the utter beginner can spell any word he can read. This condition holds for the first three hundred and thirty words; i.e., until the pupil has completed the no-alternative vocabulary and must proceed to the study of ambiguous phonograms. It gives to the early lessons in both Reading and Spelling a clarity, unity, and simplicity which it is structurally impossible for conventional courses to equal.

The practice of adding only one letter at a time to the repertoire of the beginner makes it possible to integrate Writing into all lessons from the very first. Taking up any new phonogram requires only that the pupil learn to make a single new letter. He can then write every new word in the current stage, whether he knows two letters,
three, seventeen, or any other number. At the addition of each new letter, all the words which it thereby becomes possible to add to the current vocabulary will perforce contain that letter and give maximum practice in forming it. Moreover, since the increment of new words is usually greater for each letter than for the one before it, new letters appear in the Course at ever-increasing intervals and with larger and larger amounts of practice being given a new letter before the next is introduced.

Classroom procedure. The teaching technique of this part of the Course begins each stage by teaching the class to make and to sound one new letter. Next a list of new words, all containing this letter, is displayed on chart or blackboard, to be copied as a Writing exercise. The Reading exercise, using all or most of the new words, is then held. This is never difficult, since all words are composed of review phonograms plus the single new one just practised. Finally a dictated Spelling lesson is given on words which by now are reasonably familiar, and which are much easier to spell than any list of random words because all are structured upon the single new phonogram and all are free from possible alternative spellings. The pupil has been taught only one way to record any sound these words can contain, and never needs to choose among
several possible spellings.

Under conventional methods the first grade pupil does not do any great amount of writing, since it takes most of the term to attain reasonable facility in making twentysix letters and twentysix capitals. This circumstance also prevents written spelling until about the middle of the second year. By contrast, the system of this project begins writing (with a single letter) in the first week of school; and spelling (with two words) follows immediately. Similar integration of the earliest stages of all three Language Arts is not possible to conventional texts.

4. Control of Phonograms When Alternative Forms Must be Introduced

When all the exercises based upon the no-alternative vocabulary have been completed, the pupil must begin to deal with those phonograms which have the same visual appearance but deal with different sounds, and those which represent the same sound but are of divergent appearance. The experimenter decided that the considerations which made it profitable to introduce phonograms one at a time up to this point were equally applicable to phonograms which have plural values. The next step was therefore to rank all remaining phonograms into the most efficient order. (In all questions relating to the number
and composition of phonograms the system used by the Iowa Child Welfare Research Station was followed, with a few minor simplifications where fine distinctions appeared dispensable for primary work.)

Certain phonograms obviously could be put in the latter part of a ranking intended for pupils in the first three grades. The "p" in pneumatic, pneumonia and the like is not only confusing to beginners but is moreover of infrequent occurrence in primary texts. A similar situation obtains with respect to the "ph" in elephant. In the entire standard vocabulary fewer than twenty words employ it and none of them are indispensable to primary sentences. It may be noted in this connection, however, that the mere number of words in which a phonogram is found is not in itself a sufficient criterion of its value. The phonogram "voiced th" does not appear in many words; but those words include they, those, these, them, there, this, that, and the. These words are used again and again in typical primary text, so the phonogram merits early attention.

It was deemed desirable to introduce phonograms in blocks of like kind, in order that the pupil may absorb some picture of the structure of the English language without any attempt at formal instruction in this area or any memorization of rules. All short vowels constitute a typical block, all doubled letters another, and so on.
This grouping makes a number of rules obvious without their ever being formally stated. While the optimum sequence of phonograms within each block is difficult to settle beyond all question, an order was arrived at such that reason can be cited for the rank of every item.

It will be apparent that a letter which is an ingredient of several different phonograms must appear in different aspects at different points in the Course. For instance, the letter "s" is introduced four separate times; as in has; as in sit; as part of a digraph, as in she; and as a double, as in dress. In a similar manner the same sound may reappear several times. For example, the first sound of fish, represented by "f", appears early. Doubled as in puff it appears later. Spelled "ph" as in telephone it is found toward the end of the Course, and appears last of all in the uncommon phonogram "gh" as in rough.

The vocabulary was prepared for sorting by being typed on a continuous strip of adding machine tape in single column, triple spaced. It was decided to accept as the total vocabulary for the primary grades the combined contents of two juvenile dictionaries, (14)(17) since these had been compiled from standard word lists plus additional research. Accordingly, one dictionary was placed at each side of the typewriter; and as a word was copied from the book at the right, the same alphabetical spot was checked
in the book at the left for the possible presence of additional items. A list of more than two thousand five hundred words was obtained.

The sorting of this vocabulary was a tedious and time-consuming operation, since for each phonogram removed an examination of the full length of the tape was necessary. In searching for a given phonogram, every word which contained it was scratched off the tape and recorded on a sheet of paper devoted to that phonogram. The next word-by-word examination of the tape produced another sheet of words devoted to the next phonogram, and so on, the content of the tape diminishing as each sheet was compiled. It was a fundamental condition of this operation that search was made for phonograms in the REVERSE order of their ranking, the most infrequent and the most complicated coming off the tape earliest. Moreover, the sheets were stacked in the order compiled, the earliest on the bottom and the last on top. In consequence, the stack of word sheets eventually contained the total vocabulary, sorted and classified by phonograms in such an order that the simpler and more common a phonogram the earlier it appears.

By this means the learner is enabled to meet the standard vocabulary in a series of minutely graduated steps, each sheet being one unit. At no time will he be required to deal with more than one new phonogram,
and this phonogram will be given maximum repetition since it appears in every word on the sheet he is currently studying. His stock of words will expand at a rapid rate even in the beginning when he has learned relatively few phonograms, since the most common phonograms are presented first. The method of exclusion used in sorting makes it certain that no phonogram will ever appear in any word until after that phonogram has been studied in due order on its appropriate sheet of words. On every sheet, all the words will be compounded of the phonogram currently being studied plus phonograms previously acquired. The effect of this classification enables the learner to deal at all times with complete words, meeting the phonograms of English one by one incidentally. At any given point, whether he knows two phonograms, twenty, two hundred, or whatever number, he can always produce a tentative pronunciation, and usually a correct one, for every word on the newest sheet as soon as he has comprehended a single new phonogram.

The master tape was eventually checked about two hundred and fifty times before its total destruction, becoming constantly shorter as dead sections were scissorsed out and the gap re-spliced with a stapler.

Had the compiler’s tentative estimate of the frequency with which any given phonogram would appear turned
out to be correct in every case, the lists thus compiled would have met the desired condition of having every phonogram presented at the point of maximum efficiency. That is, of all phonograms available at a given part of the Course, that one would be taken up which would increase the pupil's current repertoire by more new words than could be added by taking up any other phonogram. Actually, word counts of the successive lists showed numerous instances where this desideratum was not attained at the first sorting. Re-adjustment of the order of presentation of word sheets was a somewhat complicated process because of the interlinkage of all the lists. The details of the corrective technique used are given in the Appendix.

5. The Development of Exercises From Lesson Vocabularies

Spelling exercises. At each stage the list of new words containing the phonogram of that stage formed a ready-made Spelling exercise. However, as more and more phonograms are added to the repertoire of the learner, the number of words available at a given point frequently exceeds the number really needed to exemplify adequately the newest phonogram. In such cases words were given distinguishing marks having the following significance:

# ten words needing closest attention because
of some exceptional feature. These were to be copied from the board as writing practice.

- ten most valuable words on such considerations as frequency of use in English, number of times each re-employs phonograms recently learned, and amount of writing practice each affords by use of letters recently learned. These formed the written spelling test which followed each Reading lesson.

- ten next most valuable words, for use if needed for extra coaching.

- words appearing in the dictation sentences which were the final item in every stage.

Except in very lengthy lists, a number of words usually carried more than one of the foregoing marks. The classification gives pre-selected groups of ten so chosen as to give most effective practice, and frees the teacher from the necessity of making an individual value analysis of every word.

**Vocabulary expansion.** Such genuine needs for written communication as are likely to come to a child in the primary grades are practically certain to be satisfied by an extremely small vocabulary. It was accordingly decided to regard Writing and Spelling as auxiliary pursuits to that of Reading; to allow the latter to fix the scope of vocabulary; and to include in the Spelling exercises only the commonest and most useful words available at a given stage. In fact, during the development of the project the experimenter reached complete concurrence with the large
body of contemporary opinion which holds that the imparting of ability in Spelling is best effected by treating it as a byproduct of ability in Reading plus an understanding of the word-family structure of the language.

On the other hand, the experimenter reached conclusions in respect to Reading vocabulary which admittedly go very far beyond those embodied in most contemporary textbooks. The first of these is that to devote the pupil's first three years merely to the acquisition in printed form of those words whose meaning he typically knew on his first day of school is to set a grossly inadequate goal. During these three years he is maturing linguistically at a rate spurred by the fact that for the first time in his life he is outside his home environment for a large fraction of his waking time. He is in a social situation which makes vastly increased demands for word comprehension. Normally he will enter the fourth grade with a speaking or at least a listening vocabulary far greater than the one with which he entered school. The experimenter concluded that it is this fourth-grade vocabulary which should fix the scope of the primary vocabulary instruction. He also concluded that this vocabulary is probably far larger than is recognised in typical fourth-grade textbooks, owing to the overheard conversation of elders, to the adult vocabulary met in church, and above all to the expansion of
his listening vocabulary through the agencies of the talking movie, the talking radio, and the talking television, to all of which the contemporary child is exposed in a manner unforeseen even one generation ago.

The experimenter accordingly decided to set up three different criteria regarding the employment of "hard" words in Reading exercises. In the initial period, the process of Reading was new to the child. Here maximum simplicity was held to be of paramount importance. Only the eighteen simplest one-letter phonograms were employed, and except for a few special words required to clarify a particular phonogram, word selections were restricted to those whose meanings were almost certain to be known to the beginner.

In the middle period a more liberal policy was followed. Words not found in the standard vocabulary were admitted to the Reading exercises whenever they could be constructed with available phonograms, provided it appeared that their comprehension would not be particularly difficult for a primary child. Examples of words in this category are fever, snort, and barber. In most cases at least one member of the class will be able to define a word of this sort, so that meanings will be brought out in class discussion without the necessity for exposition by the teacher.
A still more radical departure was made for the final period. This began when the pupil had covered about a thousand words, and had progressed from picture captions to connected narrative of some length. Criteria for words employed in these lessons demanded merely that the word be capable of construction with available phonograms, be reasonably well clarified by the context in which it first appeared, and convey an idea which was within the comprehension of a typical primary child provided teacher or classmate explained it to him. It is frankly admitted that this has resulted in the admission to later portions of the Course of words which heavily overload the reader, if what constitutes an overload must be measured by the practice of conventional readers.

The experimenter declined to concede the validity of such a measure, on the following grounds:

(1) It appears probable that the listening vocabulary of today's primary children is very much wider than is assumed in current texts.

(2) When an entire sheet of new words can be acquired by learning a single new phonogram, most of the mechanical problems of vocabulary expansion are eliminated.

(3) Deducing the meaning of new words from context is a natural part of a child’s growth and a process at which most children are adept.
(4) Too rigid restriction of textbook vocabularies to standard word lists may prevent children learning words they are entirely capable of handling.

(5) It is highly desirable to train pupils in the expansion of their own vocabularies by phonetic analysis; but practice in this skill can only be given by presenting words whose identities are not instantly apparent.

(6) Skill in deducing meaning from context can best be fostered by exercises which frequently call for that skill.

(7) One way of combating the tendency to skip an occasional hard word is to provide exercises wherein the necessity for handling unfamiliar words is routine.

Reading exercises. The final and most difficult operation was the composition of a Reading lesson to introduce and familiarise each individual phonogram. This could not be effected merely by selecting or composing text in which that phonogram was of frequent occurrence, although such frequency was one of the desiderata. In addition, the minutely structured nature of the Course set up the strict requirement that not one word be used
which did not appear either on the current word list or one of those preceding it. If every Reading exercise had not been kept within that limitation, the pupil would have been faced at each dereliction with a phonogram of which he knew nothing. Thus at each stage in the Course the word lists available up to that point constituted a rigid dictionary, individual to the one Reading exercise which was part of that stage. In preparing the Course it was consequently necessary to write over two hundred exercises, each tailored to a different dictionary.

Although the foregoing limitations made the composition of each exercise a matter of long and meticulous labor, the vocabulary available per stage expanded at a far greater rate than is possible under the conventional method of imparting words. The whole-word system increases the vocabulary one word at a time, since each must be introduced, defined, and pronounced by an instructor. Hybrid methods offer little remedy for this defect. In this Course, however, the unit of learning is not the word but the phonogram, and each new phonogram combines with all preceding ones to increase the current vocabulary in geometrical progression. Extracts from the Teacher's Handbook, illustrative of this advantage, are included in this chapter.

The nature of successive exercises followed the conventional plan of contemporary Readers. First presentations
were single words as labels under illustrations; phrases of increasing length followed, to be succeeded by sentences. When sufficient words had been presented, the Reading exercises were increased to the dimensions of short tales. However, there was one important divergence from common practice; no effort whatever was made to give frequent repetition to specific words. The pupil's need for repetition was fully met, but the unit was the phonogram, not the word.

6. Extracts from a Teacher's Handbook

*From Book I sec. 500.*

**Rapid Increase in Vocabulary as the First Eighteen Letters are Learned**

The pupil covers the stages of the initial vocabulary by learning only one new letter per stage. The new words made available by the addition of the most recent letter form the material of Writing, Spelling, and Reading lessons during that stage. Thus each new letter becomes familiar in three areas before the next letter is taken up. The rapid increase in the number of words available is indicated by the following samplings:

<table>
<thead>
<tr>
<th>lesson number</th>
<th>letters available</th>
<th>new words in current lesson</th>
<th>total words available</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>6</td>
<td>14</td>
</tr>
<tr>
<td>8</td>
<td>8</td>
<td>9</td>
<td>42</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>27</td>
<td>120</td>
</tr>
<tr>
<td>16</td>
<td>16</td>
<td>35</td>
<td>264</td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>36</td>
<td>338</td>
</tr>
</tbody>
</table>

It should be noted that only 18 identifications enable the student to read more than three hundred words. To acquire a vocabulary of that size under the whole-word
system would require the pupil to learn 332 identifications. Under a purely phonetic system it would require a larger number, difficult to estimate; since about two hundred and fifty basic phonograms would need to be dealt with under conditions requiring numerous choices and rejections within every word.

From Book I sec. 504

<table>
<thead>
<tr>
<th>Total letters available</th>
<th>Newest letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>t</td>
</tr>
</tbody>
</table>

Picture captions:
- an ant  Nat  Nan and dad
- Nat and dad  Nan and Nat and dad

(These captions also constitute the Writing and Spelling exercises).

From Book I sec. 516

<table>
<thead>
<tr>
<th>Total letters available</th>
<th>Newest letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>c</td>
</tr>
</tbody>
</table>

Picture caption:
- the big crab can grab Ned and nip his hand

Writing exercise:
- Nan can hop and limp but can not run.

31 new words for Spelling:
- can  cat  cap  act  cot
- clot  camel  cram  cramp  camp
- cab  crab  crag  crept  cob
- cub  club  clam  clamp  clump
- clap  cleft  crop  picnic  public
- cut  cup  coud  clog  cod
- clod

From Book III sec. 200

<table>
<thead>
<tr>
<th>New phonogram, oo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review th, er, or, ar</td>
</tr>
</tbody>
</table>

A Ride in a Cart

Last winter Benjamin and his sister Brenda lived in an
apartment. Then in April their father and mother went to live on a farm for a short time, and so Ben and Brenda went there too. It was fun. There were hens, roosters, cats, dogs, and other animals; but the best were the plump horses that lived in the barn. The farmer considered them his partners, made pets of them, and fed lots of corn to them. "I have no tractor," the farmer told Ben, "and the horses are a most important help."

The farmer wanted to mend a stone floor in his barn, and so he had to send a farm hand to the store to get two bags of lime and also a bag of concrete. He told Ben's father, "If Brenda and Ben want to come to the store after lime, send the two of them to get into the cart."

Brenda and Ben ran fast to get into the cart before it started, and Ben boosted his sister over the side. At ten in the morning the cart left the barn.

The name of the horse was Carl. He was the smartest horse on the farm; but he was also the oldest. He was fat and not a bit fast. He just went "Clump, clump, clump," and never "Trot-trot, trot-trot". The dust was deep, the sun was hot on the open cart, and poor Brenda and Ben soon began to tire. "Let Carl run fast!" Brenda demanded. But the driver told her, "Poor old Carl is too fat and the noon sun is too warm. He can not run even for a short time. I do not want to harm him."

"Bump, bump, bump," went the cart over the hard stones. It jolted in the deep ruts. It was not far from the farm to the store and then home; but it was two in the afternoon before that trip was over. That was the last time Brenda and Ben wanted to ride in the big red cart.

Note to the Teacher

The purpose of this exercise is the introduction of "oo" including four words which spell it with a single "o". The italics indicate how often this phonogram is worked into the reading exercise. It may also be seen that the review phonograms are of frequent occurrence.

The items which this exercise does not contain, however, are of far greater significance structurally. The letters "k", "q", "x", "y", and "z" do not appear even once. The following artificial letters do not appear; "ch", "sh", "ng", "aw", "ow", "oi", "wh", "oo" as in foot, and "th" as in thin. There are no doubled letters, with the single exception that floor is introduced as a contrast to the current phonogram.
There are no words wherein an adjacent silent vowel is used to indicate that the other vowel is long, as in weak, road, and numerous other two-letter phonograms. There are no cases of one letter substituting for another, although English is full of "y" used for "i", "c" used for "s" and the like. There are no useless letters, such as the "b" in limb, and no obsolete or non-English spellings such as the French "eau" in beauty.

Thus although this exercise will probably appear to be quite beyond the second-grade level in the eyes of a teacher habituated to the whole-word method, it is of great simplicity when viewed as a task in the interpretation of a few uncomplicated phonograms.

New words.
All are to be used in sentences orally, but only the most useful ten (marked *) are to be required in the Writing exercise.

<table>
<thead>
<tr>
<th>spoon</th>
<th>boots</th>
<th>boom</th>
<th>boost</th>
<th>tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>coon</td>
<td>root</td>
<td>room *</td>
<td>roost</td>
<td>stool *</td>
</tr>
<tr>
<td>loon</td>
<td>rooter</td>
<td>broom</td>
<td>rooster</td>
<td>drool</td>
</tr>
<tr>
<td>moon *</td>
<td>root</td>
<td>bedroom</td>
<td>rooster</td>
<td>spool</td>
</tr>
<tr>
<td>noon *</td>
<td>root</td>
<td>groom</td>
<td>drool</td>
<td>pool</td>
</tr>
<tr>
<td>swoon</td>
<td>loop</td>
<td>doom</td>
<td>smooth *</td>
<td>fool</td>
</tr>
<tr>
<td>soon *</td>
<td>loop</td>
<td>bloom</td>
<td>smoother</td>
<td>cool *</td>
</tr>
<tr>
<td>boon</td>
<td>sleep</td>
<td>bloom</td>
<td>smoother</td>
<td>cooler</td>
</tr>
<tr>
<td>sooner</td>
<td>snoop</td>
<td>smoothest</td>
<td>cooler</td>
<td>coolest</td>
</tr>
<tr>
<td>soonest</td>
<td>stoop</td>
<td>moor</td>
<td>smoothest</td>
<td>cooler</td>
</tr>
<tr>
<td>afternoon</td>
<td>troop</td>
<td>poor *</td>
<td>food *</td>
<td>too *</td>
</tr>
<tr>
<td>forenoon</td>
<td>trooper</td>
<td>poorer</td>
<td>mood</td>
<td>too *</td>
</tr>
<tr>
<td></td>
<td>droop</td>
<td>poorest</td>
<td>woo</td>
<td>moo</td>
</tr>
<tr>
<td></td>
<td>swoop</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Sentences to be dictated without specific previous study:-

A hot fire soon warms a cool room.
Do not drop food from the spoon.
It is too cool to swim in the pool.

Note to the teacher.

At this point the pupil has covered a Reading and Spelling vocabulary of a thousand common English words; yet of the two hundred and fifty phonograms in the language he has met only thirtyfour. Except for such simple alternatives
as the two sounds of "s" and the placement of the indicating "e" in two locations, as in beet and concrete, no duplicate or ambiguous phonograms have been encountered; hence the mental work involved has not greatly exceeded the amount required from a pupil who learns to read thirty-four words under the wholeword system. It should be noted that the thousand words of this course have been covered in Writing and Spelling also.

7. Preliminary Tests Made

During the development of this system of instruction, numerous informal tests were made of separate portions. Full-scale comparative tests did not become possible until completion of all exercises at which point the project stopped. A design for a controlled experiment is therefore included in Chapter V. Preliminary work done with three subjects is summarized in case-history form.

Elizabeth. This girl was aged four at the beginning of work. She was instructed with fair regularity for two years, with not more than one lesson per day. These lessons averaged approximately twenty minutes in length. Subject entered school at age six in the second grade, skipping the first entirely. Did well in second, third, and fourth grades and has been promoted to the fifth.

Kermit. Although this boy was in the sixth grade he was a complete non-reader. His I.Q. was 90. For five weeks he was given three of four lessons per week of
approximately twenty minutes each. He obviously grasped the principle of Reading and developed recognition of about fifteen words. Due to the departure of the instructor, the test ended at this point.

**Katherine.** At the beginning of instruction this girl was aged two years and ten months, and was taught entirely from large wall charts to escape focusing problems. A subject of this immaturity was deliberately chosen as a check on the simplicity of the Course. Because of extreme youth, she was instructed for shorter times and at more irregular intervals than Elizabeth. By age three years zero months she could read early material in the Course, but was unable to deal with conventional pre-primers, of which four specimens were tried. By age five she had completed the Reading section of the Course, and could read conventional first-grade texts with no difficulty and second-grade texts with slight coaching. She began to hand-print at four years and changed to cursive script at five. At age six she entered the second grade, skipping the first grade entirely. In this grade she did reading at third and fourth-grade levels, did well in other subjects, and has been promoted to the third grade.
CHAPTER IV

SUMMARY AND CONCLUSIONS

In the course of this project an original approach to the problems of teaching the Language Arts has been developed, text materials necessary to its practical use composed, and two pupils put completely through the three years' Course. A design has also been prepared for a controlled experiment to evaluate the method in actual classroom situations. Essentially the method is embodied in the order in which words of the standard vocabulary are presented; hence there will be many points upon which no difference will be found between conventional texts and the method of the project.

1. Similarities Between Project Approach and That Used by Conventional Texts

The Course is founded upon the same standard vocabulary used in conventional primary texts and uses all the words of that vocabulary.

No change is involved in the methods by which instruction is given, so that such items as the following are not affected:

1) Equipment used in classroom.

2) Extent of training needed by teacher.
(3) Time consumed per lesson.
(4) Degree of maturation required to begin school work.
(5) Educational concepts and philosophy held by typical schools or individuals.
(6) Use of aids to learning, such as flash cards, tachistoscopes, experience charts, individual Spelling notebooks, associated reading outside the text, and the like.
(7) Lavish use of illustration in primers.
(8) Setting text in extra-large type.

Writing is a skill which conventionally comes into practical use late in the primary period, since the pupil cannot produce random texts such as correspondence, reports, bulletins and invitations until he can form all the letters and all the capitals. Though the Course starts work in classroom writing as soon as the child enters school, it takes more than a year to impart the full alphabet, so that the age at which general writing becomes possible is little changed.

The development of Reading as an experience activity, as by the posting of menus, room labels and the like is not inhibited by any feature of the Course. The same is true of supplementary reading; which in any case
requires a great deal of assistance from the teacher in the identification of new words, no matter what method of teaching may be in use. As this Course presents all new items as whole words, there appears to be no reason why users of the Course should not be as adept in receiving identifications as are the pupils of conventional instruction. It may even be hoped that in view of the rapid vocabulary growth fostered by the Course, they will at any given period require less assistance than children who are learning by conventional methods.

2. Differences between Project Approach and That Used by Conventional Texts

_Single phonograms._ That the Course is so structured as to present only a single new phonogram at any one time produces certain very unusual conditions:-

(1) The beginner is introduced to the pursuit of Reading, Writing, and Spelling within a field of only a few symbols, which is not possible with conventional texts.

(2) Throughout the three years' Course, the learner deals always with one new symbol and no more.

(3) Writing begins at the same time as Reading, and hence so does written Spelling. The same new
words which are introduced at any given point are used in all three types of work, so that in the learning of every item mutual reinforcement is secured through vision, hearing, and kinesthetic sense. Because conventional methods require mastery of the full alphabet before written work can be begun, integration of the three subjects is possible only marginally during the critical first year.

(4) Each new word is composed of known phonograms plus a single new one. Its appearance and pronunciation are imparted to the pupil as the first step of each stage; after which he is capable of translating most of the new words of that stage into sound without further aid. In the reverse process of Spelling, the pupil is never called on to set down more than one new phonogram. These conditions strongly foster development of the habit of attacking new words at sight, perhaps the most important single element in attaining proficiency in the Language Arts. (4)

(5) Abilities acquired by individual pupils in independent identification of new words will diminish the task of the teacher in introducing new words one at a time. This is a time-consuming
and burdensome process for which there is no remedy in the whole-word system.

(6) The introduction of the commonest phonograms earliest in the Course makes certain that those for which the pupil will have greatest need all his life are presented nearest the start of his learning period and reviewed most often during it. Because a conventional course is not structured on the basis of phonograms, it does not possess this feature.

(7) Since letters of the alphabet are introduced singly, distributed over more than a year, systematic attention can be given to mastering the precise formation of each individual letter. This should make legibility more easy of attainment.

(8) The division of three years' work into blocks each of which differs from the preceding only in that it contains one more phonogram gives to the learning gradient a gradualness which it is impossible for a conventional course to parallel. It may also be expected that this minutely scaled progression from the easy to the more difficult will make it much easier to
administer diagnostic tests to pupils received from elsewhere, and to bring such pupils abreast of current work, than in a conventional course where material is only crudely structured.

The no-alternative vocabulary. The fact that the first eighteen phonograms include no duplications either of sound or structure accomplishes the following:-

(9) The first steps in Reading and in Spelling can be taken by the beginner with a confidence and accuracy which is not possible in a conventional course, since conventional texts involve selection among possible choices from the earliest lessons.

(10) The beginner starts the complicated part of Reading with a fund of more than two hundred frequently-used words, and an additional hundred fairly common words, concerning which he can be completely positive.

Group introduction of words. The practise of presenting new words in blocks of marked phonetic similarity offers strong probability of the following benefit:-

(11) A vocabulary of given size can be mastered much more quickly.
3. The Function of Phonics in the Course

The point very probably requires special stressing that the approach developed in this project is neither syllabic nor any other form of phonic, in spite of the classification of individual words according to their phonogram content. The Course does not include instruction in the rules and principles of phonics at any point, nor is there any drill in meaningless syllables or detached phonograms. No phonogram is introduced except as an ingredient in a complete word. Nothing in this method of presentation inhibits the teaching of the entire Course by completely ideographic methods, or any desired degree of hybridization therewith. At the same time, the groups in which words are presented are so structured as to allow the purely phonic approach to be stressed by any teacher who so prefers.

Whatever the method used in a particular classroom, some appreciation of phonetic principles is certain to develop; but this benefit does not involve any of the type of drill in disconnected phonograms which has been so widely and sharply criticised by numerous authorities. Instead, perception will come as the byproduct of the meaningful use of whole words. The same considerations apply with equal strength to the study of Spelling.
If the teacher so prefers, words may be presented as indivisible units. On the other hand, the teacher who prefers a phonetic or a syllabic approach will find the word lists already subdivided and classified into units suitable for that treatment.

4. Originality

The technique of a controlled vocabulary is standard in all contemporary Reading courses known to the investigator; but the control is in all cases based on the complete word. The selection of a given word depends upon the degree to which it is used by children, its apparent difficulty as measured by the numerical count of its letters, and also (it appears) the frequency with which the word has already been used by competing publishers. No texts have been found in which the vocabulary thus selected has been further controlled so as to restrict the phonograms found in any section, or so as to effect the serial introduction of phonograms. It is upon these two features that the fundamental originality of the Course developed in this project rests.

5. Probable Value of Proposed Innovations

The items listed under "Similarities" in an
earlier section of this chapter point to the retention in the Course of all significant advantages of conventional textbooks. This establishes the probability that the Course will at least be as effective as they are. In addition, the items listed under differences offer logical probability that these features will secure to the user marked advantages not found in conventional texts.
CHAPTER V

RECOMMENDATIONS

The high opinion held by the investigator concerning the value of the Course admittedly rests mainly upon logic. There is in addition the testing of the material on two subjects for the equivalent of three school years each, which almost certainly would have revealed any actual flaws in the method. Since the advantages to be expected from a general adoption of this method are potentially very great, and if sustained would justify sweeping changes in current texts and current methods, it is recommended that controlled experiments be made upon an adequate scale. Careful and extensive comparisons under actual schoolroom conditions are warranted by the scope of benefit which could result.

1. Considerations Affecting Experimental Design

The nature of the questions to be answered prescribes certain inescapable requirements for an effective experiment. Since a learning process is involved, and one which is not quickly forgotten, it will be impossible to employ the same individuals successively as subjects and as controls; accordingly, two equated groups must be used. Moreover the experiment must run for three full years,
since that is the time required to traverse the grades covered by the Course. Also, experimenters with children of primary age find that they are stable neither as to health nor as to residence, with the result that it is a practical necessity to begin with two controls equated to each subject. Without this precaution the loss of an individual on whom no work has been done can nevertheless invalidate all the work done on one subject. This means that the experiment must be set up to cover at least one experimental room and two control rooms, for a period of three years, as minimum conditions.

Considerably more than this is highly desirable. The variables of teacher competence, interest, and bias would have entirely too great an effect were the experiment performed on only one class. At least two experimental rooms should be used, which means that the complete group would start in six different first grade rooms. To have this many within easy reach of the experimenter requires that all be in the same area; hence only large urban systems are suitable for use. Such systems have the incidental advantage of removing from the experiment the variables of city versus country residence and bus-transported versus neighborhood populations.
2. Conduct of the Experiment

As early as the mid-point of the first grade, valuable indications may be expected from comparative tests, since one of the most crucial areas in Reading instruction is that of the very first steps. Children are more likely to fail totally to grasp the concept of Reading than they are to make good progress in the first formidable stages and then fail to keep on.

In order to average out differences in teacher interest and ability, and to give experience on both sides of the experiment, teachers should change rooms every semester, alternating between an experimental room and a control room. In no case should a teacher advance in grade with a class she has previously taught. Breaking the experiment into steps one semester long will also enable re-pairing of subjects and controls at the beginning of every semester so as to remedy vacancies caused by the departure of one control. If an experimental subject departs there is no remedy.

In a multi-level experiment of this character it is possible, and highly desirable, to operate it as a continuous process. This is done by setting up additional experimental-control groups each semester in the classes which have just entered school for the first time. The
total population of the experiment will consequently rise throughout its duration, making statistics more and more reliable as their numerical base broadens. Even so, the net gain may not be large, as in similar experiments the attrition has been found to mount as high as fifty percent; so that the continuous type of experiment is a necessity.

It should be noted that conducting this experiment will raise no administrative difficulties in respect to the transfer of either pupils or teachers. New pupils arriving in control rooms at any stage are available for equating at the beginning of the following semester. New pupils arriving in experimental rooms merely become statistical nulls permanently, since no conclusive deductions can be made from the performance of individuals who have not had the Course from the beginning; but they can pick up the classwork with little difficulty since the material is standard. There is at no time any impediment to teacher exchanges, since the test method requires no special experience or ability over that required for teaching Language Arts from conventional texts, and no unusual items of classroom procedure.

Pupils who repeat a semester, whether in a test or a control group, require no special handling and form no impediment to the conduct of the experiment. They are in
fact beneficial, since the presence of hold-overs is a
normal feature of classroom environment. Of course they
can be equated only with each other, and must be treated as
a separate group statistically; but the information
gathered about this group will be a valuable part of the
data. It is a reasonable and necessary requirement, however,
that no experimental or control room contain so unusual a
percentage of either very bright or very dull pupils as to
result in a skewed distribution, unrepresentative
of the school as a whole.

Plans for evaluation at the end of every semester
should require a subjective comment from every teacher who
has taught both methods, since teacher acceptance is a vital
requisite of any plan or method. Ample provision must also
be made for the objective testing of pupils. It will not be
a simple matter to set up equivalent tests for the two groups,
since they do not study the same vocabulary items concurrently
nor use the same reading material. Procedure should therefore
be set up to secure the following data within each group:—

1. Total number of words covered in Reading.
2. Total number of words covered in Spelling.
3. Ability to define words in the foregoing lists.
4. Reading rate and comprehension on own material.
5. Spelling and Writing capacity, own material.
(6) Reading and Spelling capacity on material chosen as an intentional overload, from work a year or more in advance of the group being tested.

Item (6) is one of major importance, since it measures the willingness and ability of the pupil to attack words on which he has not had specific instruction. Material must be carefully composed to confront each group with the same number of words which that group has not had in classwork; the identity of individual words will differ for the two groups. It is possible that the ability to read and to spell words never before seen is more indicative of the future school success of a primary child than any other measure which could be taken; in any event it differentiates between rote-memory and genuine understanding of language structure, and should be rigidly tested.

An alternate plan. In order to afford school administrators a preview before asking them to commit their primary grades to a full-scale experiment, it is desirable to conduct a one-semester, two-room preliminary test. This will also iron out procedural and evaluatory details in advance of the major experiment. Between the difficulties of attrition and of equating, it is probable that not more than seven comparable pairs will result from this
operation. Although an experiment on so small a scale and for so brief a period might have value in guiding future work, it would scarcely be reasonable to cite it as the basis of a conclusion regarding the relative merit of the two methods. It should be remembered that differences between the two teachers in respect to such intangibles as personality, zeal, and bias could be predictive of relative success between the two rooms even before the beginning of the school term.

It would therefore be unwise to enter upon a small-scale experiment unless it is thoroughly understood in advance that the sole benefit to be sought is increased ability to conduct an effective three-year, six-room experiment, and that a final determination of the relative value of the two methods is not the immediate objective.
BIBLIOGRAPHY
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APPENDIX
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METHOD OF ADJUSTING VOCABULARY CLASSES

In a completely efficient sequence of phonograms each successive one should add the maximum number of words to the available vocabulary. It would, for example, be unwise to take up an infrequent phonogram like "x" while short "e" remained unused. However, after the initial sorting of the standard vocabulary, it was evident from the relative numbers of words on successive sheets that errors of this sort (though not of this magnitude) had in fact been made in several places.

For example, if the word count on a series of sheets runs 12, 14, 17, 28, 19, the next to final sheet is probably out of place, and a more even accretion of words might be secured by setting it forward into first place. However, it will not be possible to do this in a single operation, and it may not be possible to do it at all, for reasons which can be demonstrated on the following small and simplified example.

<table>
<thead>
<tr>
<th>Phonogram</th>
<th>Words on that sheet</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>m</td>
<td>ham dim mat</td>
<td>3</td>
</tr>
<tr>
<td>p</td>
<td>pin pan map dip apt</td>
<td>5</td>
</tr>
<tr>
<td>e</td>
<td>men pet net den hem end pen hen met ten mend hemp tent</td>
<td>13</td>
</tr>
</tbody>
</table>
As the "e" list is moved forward, it loses to the "p" list the words hemp, pet, and pen. The accretion of these three words changes the "p" count to 8; their removal changes the "e" count to 10. It so happens that it is still desirable to continue moving the "e" sheet forward; but it is important to note that if the "m" sheet had happened to possess 11 words, such a move would not have been desirable. In the example as given, however, the "e" sheet makes a second move and goes past the "m" sheet, thereby dropping the words men, mend, hem, hemp, and met. This raises the "m" count to 8. Thus the revised arrangement becomes:

<table>
<thead>
<tr>
<th>Phonogram sequence</th>
<th>Words per sheet</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>6</td>
</tr>
<tr>
<td>m</td>
<td>8</td>
</tr>
<tr>
<td>p</td>
<td>8</td>
</tr>
</tbody>
</table>

This is a more efficient arrangement because more words are available on the earlier sheets, and because the individual stages are more uniform in size.

It can be similarly demonstrated that a sheet moved toward the end of the phonogram sequence picks up additional words at almost every sheet it passes, thereby growing to some ultimate size beyond which further movement would create unbalance. Thus any list having too few or too many
words for its sequential position may be relocated until it is of the desired size. Of course it is never desirable to move any sheet completely out of its type-block; i.e., all double letters should be kept together, all long vowels indicated by a following silent vowel should be kept together, and so on.

All word lists in the Course have been fitted by trial and error into that sequence which would give the most even accretion of words possible, and which would at every stage give the learner as large a vocabulary as could be compounded from whatever number of phonograms were available at that stage.
VITA

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Born July 30, 1899, in Boonville, Indiana.
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Graduated from United States Naval Academy, Annapolis,
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