DOCUMENT RESUME

ED 315 740 CS 009 946

AUTHOR	Stahl, Steven A.; And Others
TITLE	"Beginning To Read: Thinking and Learning about Print" by Marilyn Jager Adams. A Summary.
INSTITUTION	Bolt, Beranek and Newman, Inc., Cambridge, Mass.; Illinois Univ., Urbana. Center for the Study of Reading.
SPONS AGENCY	Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE	90
CONTRACT	G0087-C1001
NOTE	159p.
AVAILABLE FROM	University of Illinois, Summary, P.O. Box 2276, Station A, Champaign, IL 61825-2276 ($5.00 a copy, up to 50; $200 for box of 50).
PUB TYPE	Books (010) -- Information Analyses (070)
EDRS PRICE	MF01/PC07 Plus Postage.
DESCRIPTORS	*Beginning Reading; Educational Trends; *Literature Reviews; Phonics; Primary Education; *Reading Instruction; *Reading Research; Research Utilization; State of the Art Reviews; Theory Practice Relationship

ABSTRACT

Prepared for teachers, school administrators, parents, and other members of the interested public, this summary of Marilyn Jager Adams' "Beginning to Read: Thinking and Learning about Print" selects from the complex and extensive body of research in the book to present a more direct but much less detailed account of useful, research-based information on beginning reading. Both the book and the summary review, evaluate, and integrate information from the fields of cognitive psychology, developmental psychology, educational psychology, education, linguistics, computer science, and anthropology. Chapters in the summary include: (1) "Words and Meanings: From an Age-Old Problem to a Contemporary Crisis"; (2) Research about Readers: Two Perspectives"; (3) "Preparing Young Children to Read"; (4) "Moving into Reading"; and (5) "Words and Meaning: Toward a Resolution." Nineteen pages of references and notes are attached. (RS)

E G I N N I N G
T O R E A D:

Thinking and Learning about Print

Marilyn Jager Adams

A Summary

Center for the Study of Reading
The Reading Research and Education Center
University of Illinois at Urbana-Champaign

BEGINNING TO READ:

Thinking and Learning about Print

by
Marilyn Jager Adams

A Summary

Prepared by
Steven A. Stahl
Jean Osborn
Fran Lehr

Center for the Study of Reading
The Reading Research and Education Center
University of Illinois at Urbana-Champaign

1990

The work on which this publication was based was supported in part by the Office of Educational Research and Improvement, Office of Research, under Cooperative Agreement #G0087-C1001. This publication does not necessarily reflect the views of the agency supporting the research.

Contents

Introduction

The little book you have in your hands is a summary of Marilyn Jager Adams's large and wide-ranging book, *Beginning to Read: Thinking and Learning about Print*. In her book, published by The MIT Press, Adams reviews, evaluates, and integrates a vast and growing body of research that has implications for children learning to read — as well as for the adults whose charge it is to help them. She draws information from the fields of cognitive psychology, developmental psychology, educational psychology, education, linguistics, computer science, and anthropology. She gives special attention to some of the areas within these fields, for example, the research from reading education, the studies of classroom planning and organization, the reports of social ethnography, and the growing body of information from eye movement research.

Adams begins her examination of this large and diverse body of research with the following paragraph:

> Before you pick this book up, you should understand that the topic at issue is that of reading words. Before you put this book down, however, you should understand fully that the ability to read words, quickly, accurately, and effortlessly, is absolutely critical to skillful reading comprehension — both in the obvious ways and in a number of more subtle ways.

We believe the paragraph that opens her book is also an appropriate way to introduce its summary.

Why a Summary?

Why, you may ask, a summary? We know that the information in the book is of importance to many people involved with the

education of young children. We also know that much of the information is drawn from highly technical disciplines, and that many people involved with teaching young children are not specialists in these disciplines. It is for these people that we prepared the summary.

How does the summary differ from the book? The differences are evident: the book is both long and scholarly — it contains hundreds of pages and cites well over 600 references. The summary is considerably shorter, and although its content is derived directly from the scholarship of the book, its presentation is more direct and is necessarily much less detailed. We believe, however, that the summary preserves the heart and maintains the intent of the book.

Part of the fascination of Adams's work comes from the range of research she pulls together and applies to the topic of reading words. In preparing this summary, we determined to select from that complex and extensive body of research, information that would be particularly useful to teachers, school administrators, parents, and other members of the interested public. Our intent was to create a document that this audience would find enlightening, perhaps provocative, but above all, useful.

From Controversy to Common Ground

It is our belief that discussions of beginning reading are in deep need of the kind of useful, research-based information that Adams has assembled with such care and intelligence. In her book, she keeps reminding us of how much converging and confirming information comes to us from the diverse bodies of research she examines. Yet we observe that discussions of beginning reading are too often contentious and inconclusive — as if little were known about the subject. These discussions occur in many places — teachers' lounges, university seminar rooms, meeting rooms of boards of education, lecture rooms of professional organizations, living rooms of interested parents, and planning rooms of the publishers of reading programs. It is quite usual for people with one set of firmly held opinions and beliefs to be pitted against people with an opposing set of equally firmly held opinions and beliefs. What is particularly depressing is that such discussions have been going on — unresolved — for decades.

The bitterness and duration of these discussions would suggest that little has been determined about beginning reading. But, as Adams's review so clearly reveals, this is not the case. Her book allows us to agree on common knowledge and therefore gives us a common ground. Many things *are known*

about beginning reading. The value of sharing and reaching agreement on these things is indisputable.

Phonics and Reading Instruction

Much of the controversy in beginning reading centers on phonics. But like beauty, what people mean by phonics is often in the eye of the beholder. To some, phonics is irrelevant. To others, it is essential. To some, phonics instruction is a mind-numbing collection of worksheets that are assigned to keep students busy and that seem to be divorced from any real practice in reading. To others, phonics instruction is a teacher working with a group of children to initiate them directly into written language by revealing its code. Phonics can be all of these things, and even in instructional programs that claim not to teach phonics, phonics instruction can take place. It may be possible to teach reading without paying some attention to the forms of written words. On the other hand, it is possible, but not desirable, to teach only phonics and ignore the meaning of written words.

Is phonics the focus of Adams's exploration of research? The answer to that question must be both a resounding **yes** and a resounding **no**. The answer is yes, because she carefully and exhaustively reviews the research about the teaching of phonics, teaching that builds upon the alphabetic principle of written English — and that has as a central component the teaching of correspondences between letters or groups of letters and their pronunciations. But the answer also is no, because she firmly places information about phonics within an equally extensive discussion of the other factors essential to the successful reading of words — and therefore of skillful reading comprehension.

The Creation and Use of the Summary

In taking on the daunting task of summarizing such a complex and extensive book, we had to make many decisions. We selected information from the book that we felt would be particularly useful to our intended audience. We worked hard to make concepts and terms that are clear to researchers clear to other readers as well. We condensed, paraphrased, and sometimes omitted. Obviously, and unfortunately, we sometimes had to omit the details of the often complex research evidence that Adams uses to support many of the conclusions she reaches. If any of what you read in the summary doesn't convince you, we suggest that you refer to the book for its more comprehensive discussions. (We have included an order form for Adams's book, along with one for this summary, at the back

of this book). In no way, however, should the summary be considered a watered down "easy read." To make full use of it, readers must not only have a real interest in learning more about the topic, they must also be prepared to engage in some careful reading.

Most readers will probably read the summary from beginning to end. On the other hand, our reviewers have convinced us that the summary can be read in a number of ways and for a number of purposes. Some of the reviewers began with the sections that interested them the most before reading other sections. One reviewer found the first section fascinating, but the model of skillful reading described in the second section difficult. She read the rest of the summary and then returned to the model and found it much easier to understand. Another reviewer didn't find the background and history of the opening section at all interesting, she just wanted to get to the research that would give her information about the teaching of beginning reading. An enthusiastic elementary school principal suggested that individual chapters be the basis for inservice workshops with kindergarten and primary-grade teachers. Another reviewer, a professor of education, used a prepublication version of the summary as a textbook in an undergraduate course in beginning reading, and in a summer workshop for experienced teachers.

Summary Overview

The first section of the summary, **Words and Meanings: From an Age-Old Problem to a Contemporary Crisis**, begins with a short history of the development of written language and a discussion of the development of its purposes. This information serves as background to a review of the teaching of reading in the United States that includes both an examination of the research associated with phonics instruction and a vivid recounting of the history of bitter invective and dramatic shifts in belief that have characterized discussions of beginning reading instruction in this country.

What research from a number of disciplines tells us about both skillful adult readers and the characteristics in young children that predict success in beginning reading are the topics of the second section, **Research about Readers: Two Perspectives**. This section also contains a discussion of a model of the processes involved in skillful reading.

The following section, **Preparing Young Children to Read**, first discusses research about what and how children learn about the sounds in spoken words — their phonemic awareness — and the importance of this knowledge. It then

reviews the extensive and perhaps more commonly known research about how children learn about print. The instructional implications of these extensive bodies of research are thoroughly discussed.

The next section, **Moving into Reading**, focuses on some of the issues that surround reading instruction — the teaching of phonics, how decoding and context relate to the development of reading fluency, and spelling and writing.

The final section, **Words and Meanings: Toward a Resolution**, discusses the importance of finding a balance in beginning reading instruction, and offers a number of suggestions to help teachers and program planners find that balance. The summary ends with a discussion of concerns about classroom practice and a listing of conclusions from the research that we believe will contribute toward the building of the common ground so important to beginning reading instruction.

Acknowledgements
We want to thank the number of people who helped us as we put together the summary. We will begin with Marilyn Adams, who in addition to writing the book, became the first and most knowledgeable reader of its summary. She was of invaluable help in working with us to create a document that was true to the original yet consistent with our goals for the summary.

We thank P. David Pearson and Richard C. Anderson, our colleagues at the Center for the Study of Reading, who provided support — actual and moral — for this endeavor. Our special thanks to Delores Plowman, Deborah Gough, and Grace Miller for their expert contributions to the technical preparation of the manuscript.

The reviewers who read the manuscript in its various stages of preparation and who made important and often influential suggestions for its improvement were Barbara Kapinus, Maryland State Department of Education; Stafford Calvin, Academy Learning Centers, St. Paul; Judith Scott, Diane Stephens, Ellen Weiss, and Phyllis Wilken, all from the Center; and the students in Education 533 at Western Illinois University and Education 370 at the University of Illinois at Urbana-Champaign.

Our special thanks go to Ellen Weiss and Carleen McCormick of the Center's dissemination staff, whose work has just begun. Their task is to get this summary into the hands of the people who want to read it.

We also, of course, gratefully acknowledge that *Beginning to Read: Thinking and Learning about Print* — the book as

well as the summary — has been supported by the U. S. Department of Education Cooperative Agreement with the Reading Research and Education Center at the University of Illinois at Urbana-Champaign. We give particular thanks to Dr. Anne Sweet of the Office of Educational Research and Improvement. As the Department of Education's liaison to the Center, she gives special meaning to the word *cooperation*. Anne has been both a gracious and strong supporter of the Center's research and dissemination efforts for over five years. She has been especially supportive of this project. As always, we find that her support has made a difference.

Steven A. Stahl, Jean Osborn, Fran Lehr
Center for the Study of Reading, University of Illinois
October 1, 1989

Words and Meanings: From an Age-Old Problem to a Contemporary Crisis

Concerns and Conflicts

The question of how best to teach beginning reading may be the most politicized topic in the field of education. One reason is that we all care passionately about the success of beginning reading instruction. It is the key to education, and education is the key to success for both individuals and a democratic society.

But concern is not enough to politicize an issue. For this, there must also be partisanship and, indeed, the partisanship surrounding reading instruction is fierce. On one side are those who believe that because the very purpose of reading is comprehension, comprehension only should be emphasized from the start. On the other side are those who believe that a central challenge of beginning reading instruction must be that of developing the skills involved in recognizing written words; these skills, after all, are both singularly lacking in the beginner and prerequisite to reading, however one defines it.

Concern is not enough to politicize an issue. For this, there must also be partisanship and, indeed, the partisanship surrounding reading instruction is fierce. ■

So where is the conflict? Don't we all want our children to be able to read words *and* understand them? Of course we do. Don't virtually all beginning reading programs endeavor to help children to learn both? Of course they do. But the "sides" of the debate are deeply rooted in the nature of the English writing system. And so, to understand the conflict, I believe some background is in order.

The Purposes Versus the Methods of Writing

Writing is a system for conveying or recording language through groups of visual symbols. By this definition, any number of such systems is conceivable. But, to be ideal, any such system must meet three criteria:

- The system must be capable of representing the range of information that its culture wishes to record or convey.
- The symbols must be reasonably easy to produce.
- The written message must be interpretable in the sense that it must readily symbolize for the reader what it was intended to symbolize by the writer.

Of the major writing systems that exist today, none perfectly satisfies all three of these criteria, and it is a safe bet that none ever will.

The earliest "written" records were pictures. As long as what was to be communicated remained simple, pictures were nearly ideal. A picture of a dog may symbolize a dog to anyone, with no need of explanation or schooling. On the other hand, for purposes of transmitting complex messages, pictures are not ideal. Complex pictures are too easily misinterpreted.

A solution to this problem was to use a separate picture to represent each word or idea unit. Under such *logographic* systems of writing, complex ideas can be presented through a series of individual pictures. To interpret the message, the reader need only translate each picture in a sequence into its corresponding word.

But not all words can be made into pictures. So the custom developed of representing such words with strings of sound-alikes from the logographic system. Toward the invention of our own writing system, an important transition had taken place — symbols were used for their phonological not their pictorial significance. This practice gradually evolved into *syllabic* writing systems. Because all words in any language can be analyzed into syllables, these systems had all the power one could ask for. Further, because the number of syllables in a language is typically far smaller than the number of words, syllabic systems are more economical than logographic systems. A syllabary is practical, however, only if the number of syllables in the language is relatively small. By one estimate, English is comprised of about 5,000 syllables.[1] This is far fewer than the number of different English words, nevertheless, a syllabic writing system would present a formidable teaching and learning task in our language.

The Alphabet

At some point in the evolution of writing systems, people began representing whole syllables with nothing more than a symbol for their initial consonants.[2] This consonant-only

shorthand was passed around from language to language until it reached the Phoenicians, who developed a system containing nineteen consonant symbols.

Eventually the Phoenician consonant symbols were adopted by the Greeks. However, not all of th.. nineteen sounds represented by the symbols were present in Greek speech. Not being able to hear, much less pronounce the extra consonants properly, the Greeks assumed they were vowel sounds.[3] The alphabetic principle was thereby set: one symbol for each elementary speech sound, or phoneme, in the language.

The invention of the alphabet is often said to be the single most important invention in the social history of the world. Indeed, the advantages of an alphabetic system are clear. Writing systems composed of large numbers of symbols were naturally the possession of the elite — they were passed on only to those few whom it was felt should, could, and would take the time and expend the effort required for their memorization. In contrast to these systems, the number of symbols in an alphabetic system tend to range between twenty and thirty-five[4] — few enough to be memorized by almost anyone and, once memorized, adequate (at least in a perfectly alphabetic system) for purposes of reading and writing any word in the language.

The merits of an alphabet are that the symbols are easy to reproduce and interpret, but the cost of this ease is that we have to learn an abstract and conceptually complex code. ■

Is the Alphabetic Writing System Ideal?

Sadly, no. As the alphabet evolved out of pictographs representing concrete objects, the significance of the symbols became more and more abstract. Ultimately, they became so abstract there was no remaining link to the objects once represented by the pictographs.

The merits of an alphabet are that the symbols are easy to reproduce and interpret, but the cost of this ease is that we have to learn an abstract and conceptually complex code.

For purposes of learning to read and write, the subtlety of the alphabetic principle is, as we shall see, a significant problem all by itself. However, this problem is greatly compounded for us by the fact that written English is by no means perfectly alphabetic. English words do not necessarily map one-to-one onto sounds. Sometimes the phonemic significance of a letter is modified by the letter or even letters next door (*ran* versus *rain*, *sit* versus *sight*), sometimes by one or more nonadjacent letters (*bit* versus *bite*, *nation* versus *nationality*), and sometimes only by the word it is in (*father/fathead*).

In view of these complications, how should reading be taught? How should teachers go about teaching such an abstract and complicated code, and how do they do so without

losing sight of the very purpose of reading instruction — comprehension?

It is from the tension between these two questions that America's controversy over how best to teach reading derives, and this tension has only grown over the years. The trail of protests over and changes in our methods of reading instruction reflect earnest concern on both sides.

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Reading Instruction in the United States

In Colonial times, reading instruction in the United States followed a straightforward, two-step process: Teach the children the code, then have them read.[5]

What was taught about the code was based directly on the alphabetic principle. Students were first required to learn the alphabet. The phonemic significance of the letters was instilled, for example, through the presentation of key words (for example, G is for *glass*), practice in reading simple syllables, and exercise in spelling.

What students were asked to read were principally the Bible and, after the Revolutionary War, various nationalistic and patriotic essays. These selections reinforced generally held notions of the purpose of reading (and besides, there wasn't much else available to read). The selections were neither specially written nor adapted for young minds, and as a consequence, all of the complicating questions about how that might be done best, were still unimportant.

The approach reflected an uncomplicated translation of the nature of the writing system: Teach the means, and get on with the purpose. And so it pretty much remained through the middle of the nineteenth century.

The Evolution of Meaning-First Curricula

By the middle of the nineteenth century, a broadening view of the social value of reading led to a concern about how reading was taught.[6] In particular, this concern focused on how best to instill in students the desire to learn with how best to prepare them to focus on meaning, on ideas, and on the true rewards of education.

Those involved in education began to ask questions: If children are asked to read only materials for which they are intellectually ready, won't the meaning-bearing value of the text be self-evident? And if the mechanics of reading are properly subordinated to meaning from the beginning, won't the mechanics also be easier and more pleasant to master? But if students are immersed only in the "dull drill and practice" of letter-to-sound correspondences, won't they be deprived of—

even, perhaps, permanently jaded against—the higher order mental activities of true reading? Indeed, given the seeming irregularity of English spelling, did instruction in letter-to-sound correspondence—or phonics, as it had come to be called—even make sense?

Somehow phonics and comprehension had come to be seen as mutually incompatible . . . and highly political. Horace Mann, then Secretary of the Massachusetts Board of Education, decried the "odor and fungousness of spelling-book paper" from which "a soporific effluvium seems to emanate . . . steeping [children's] faculties in lethargy." Describing the letters children encountered in their readers as "skeleton-shaped, bloodless, ghostly apparitions," Mann proclaimed, "it is no wonder that the children look and feel so death-like, when compelled to face them." In place of "this emptiness, blankness, silence and death that we compel children to fasten their eyes [on]," he suggested that children be taught to read whole, meaningful words first.[7]

Somehow phonics and comprehension had come to be seen as mutually incompatible . . . and highly political. ■

Mann's whole-word challenge was, at first, angrily received by many leading educators, but little by little, his influence grew. All-purpose reading books were replaced with graded series of books designed to match the children's age and achievement levels in linguistic complexity and content. And the emphasis on meaning in reading became more and more prevalent.

The meaning-first curriculum, however, did not gain true dominance until the 1920s, when education was promoted as the key to dealing with the needs and demands of a multicultural society. The meaning-first curriculum was to foster the productive, creative, and responsible citizenry that emerges from knowledgeable and intellectually independent individuals. Its design and progression was to be based upon the growing child's nature and needs.

From the 1930s through the 1940s, major beginning reading programs focused on comprehension. Words were introduced through meanings first, to be recognized holistically, by sight. When straight recognition failed, the children were encouraged to rely on context and pictures. Meanwhile, phonics was relegated to the position of a tool to be introduced gradually, invoked sparingly, and only exercised in coordination with the meaning-bearing dimensions of text.[8]

An Angry Protest

Then, in the 1950s, many began to worry that educators had let go of a good thing. This worry was prompted in large part by *Why Johnny Can't Read*, an emotional book by Rudolph Flesch,[9]

in which he argued that for English, as for any alphabetic language, phonics instruction is the only natural system of learning how to read: Teach children the identities of the letters, teach them the sounds that each represents, and teach them by having them write. Once this is done, he asserted, the children will forever after be able to read and write, not just the words they are taught, but any word in the language. Good readers, he argued, were good readers because they spontaneously caught on to the alphabetic nature of print.

It was not from Flesch's arguments—which were not new—that the book derived its impact. It was from his presentation of the arguments. His appeal was as intensely political . . .

> There is a connection between phonics and democracy—a fundamental connection. Equal opportunity for all is one of the inalienable rights, and the word method interferes with that right.[10]

as it was impassioned . . .

> It seems to me a plain fact that the word method consists essentially of treating children as if they were dogs. It is not a method of teaching at all; it is clearly a method of animal training. It's the most inhuman, mean, stupid way of foisting something on a child's mind.[11]

Response to the Protest

The hue and cry of Flesch and his followers eventually prompted scholars and researchers to study whether, polemics aside, there was something to the Flesch argument. These investigations (some of which are reviewed in the next few pages) found that beginning reading programs that included early, systematic phonics instruction generally produced better results than those that did not.

In response, today's beginning reading programs are more eclectic, presenting systematic instruction in spelling-to-sound correspondences along with stories and exercises intended to reinforce and develop comprehension skills.[12] Happily and, perhaps, because of this systematic instruction, the basic skills performance of young readers has improved.[13]

But along with this positive consequence of Flesch's book came two definite negatives. First, Flesch did not confine his passion and politics to the issues at hand. He named names and pointed fingers. He called out the profit motive and impugned the intellect and honesty of experts, schools, and publishers. He developed conspiratorial motives, alluded to

communists, and made insinuations about the intellectual predispositions and capacities of females and minorities. Thus not only was the debate politicized, it was politicized on dimensions that were wholly irrelevant to the question of how best to teach reading.

Second, Flesch vastly oversimplified the issues, reducing them to a choice between phonics versus look-say pedagogy. Yet as we shall see, there is much more to skillful word recognition than the memorization of the alphabet and its letter-to-sound correspondences. Similarly, the issues surrounding the proper development of comprehension are complex and extend far beyond the ways in which one might come to identify whole words.

Flesch not only blurred the issues but suppressed rational debate of their larger substance. Today one cannot promote "whole language" instruction without having many perceive it as a thinly veiled push for "look-say" approaches to word recognition. To some, the very term "whole language" is translated to mean an uninformed and irresponsible effort to replace necessary instruction with "touchy-feely" classroom gratification — and worse. Similarly, the term "code-emphasis" is translated by others into an unenlightened commitment to unending drill and practice at the expense of the motivation and higher order dimensions of text that make reading worthwhile — and worse.

By misinterpreting each other, the two sides prolong a fruitless debate, and they do this at the cost of precious progress and of children's potential reading achievement. It is not just that the teaching of reading is now more important than ever, but that it must be taught better and more broadly than ever. The social and economic values of reading and writing are multiplying in both number and importance. Levels of literacy that we have until very recently held to be satisfactory, will be marginal by the year 2000.[14]

It is in view of all this that I undertake an examination of phonics instruction. The goal this time is not one of deciding whether systematic instruction on word recognition is worthwhile. It is instead one of providing guidance as to how such instruction can be achieved in the most efficient and most effective ways that will provide the best support possible for the purpose of learning to read — comprehension.

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Why Phonics?

I will start this discussion by examining the research evidence that seems to urge phonics instruction upon us. As the discussion will make clear, this evidence suggests strongly that

something about phonics instruction is of genuine and lasting value. In particular, it suggests that, to become proficient readers, students must appreciate the alphabetic principle. They must acquire a sense of the correspondence between letters and sounds upon which it is based.

Before diving into this examination, a cautionary note is in order. "Necessary" is not the same as "sufficient." However critical letter-to-sound correspondences may be, they are not, in and of themselves, enough. To become skillful readers, children need much more. I will return to questions of what else they need later in the book.

The examination begins in the period following the publication of Flesch's book, when the debate over the best way to teach beginning reading was at a peak.

However critical letter-to-sound correspondences may be, they are not, in and of themselves, enough. ■

"The Great Debate"

In 1959, Jeanne S. Chall began work on a project that was intended to provide the necessary focus for evaluating existing instructional methods and for synthesizing previous research in beginning reading. The project, funded by the Carnegie Foundation, resulted in *Learning to Read: The Great Debate*, which was published in 1967, and updated and reissued in 1983.[15]

Chall's investigation was ambitious in scope. Already well-steeped in the rhetoric on alternative instructional strategies, she directed her attention to their causes and effects.

Starting with the causes, she asked what, explicitly, were the assumptions and objectives that underlay alternative programs and what were the differences among them? To gain first-hand answers to these questions, she turned directly to the people responsible for creating and promoting both the reigning reading programs as well as their hottest contenders.

To refine and corroborate the information gained from her authorities, she looked next to the teachers' manuals and classroom materials themselves, analyzing twenty-two programs, including the two major basal series and at least one representative of each of the most widely discussed alternative approaches of the day. Chall then visited more than 300 kindergarten, first-, second-, and third-grade classrooms in the United States, England, and Scotland. Finally, she reviewed the existing research on beginning reading.

The data she collected seemed to suggest that — as a complement to connected and meaningful reading — systematic phonics instruction was a valuable component of beginning reading instruction. Its positive effects appeared to be both strong and extensive.

Many of the studies Chall examined were old. Many were conducted prior to the widespread use of modern statistical techniques, and many had design flaws. To address these shortcomings, a new wave of program comparison research projects was undertaken. Perhaps the best known of these projects are the United States Office of Education (USOE) Cooperative Research Program and the Follow Through studies.

The USOE Cooperative Research Program in First-Grade Reading Instruction

Involving twenty-seven individual projects, the USOE Cooperative Research Program's goals were not only to compare and contrast the effectiveness of the alternative approaches to beginning reading but also to identify how characteristics of the students, teachers, and schools affected learning to read.

To achieve these goals, each individual project focused on a particular subset of the most urgent questions. The projects were collectively selected and designed so as to extend, complement, and replicate one another.

The combined analyses of the projects were directed toward answering three questions: What approaches were most effective? Did the relative effectiveness of the approaches vary with the readiness of the students? and To what extent is first-grade reading achievement determined by community, school, classroom, teacher, and student characteristics?[16] Let's look at the answers to these questions one by one.

What approaches were most effective? According to the analyses, the approaches that, one way or another, included systematic phonics instruction consistently exceeded the straight basal programs in word recognition achievement scores. The approaches that included *both* systematic phonics *and* considerable emphasis on connected reading and meaning surpassed the basal-alone approaches on virtually all outcome measures. (The exceptions were in the speed and accuracy of oral reading for which there were no significant differences between approaches.) In addition, the data indicated that exercise in writing was a positive component of beginning reading instruction.

Did the relative effectiveness of the approaches vary with the readiness of the students? In general, the answer was no. The programs that were superior with one group of students tended to be superior with every group of students. Additionally, this was true regardless of the particular measure by which student readiness was gauged. There appeared to be no basis for the widely held belief that systematic phonics instruc-

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tion is only useful for brighter students.[17]

To what extent is first-grade reading achievement determined by community, school, classroom, teacher, and student characteristics? Although the projects collected a host of information on students, communities, schools, classrooms, and teachers, the answer to this question was not clear.

Certain student characteristics, however, were strong predictors of end-of-the-year achievement. The single best predictor of students' end-of-year reading achievement — regardless of instructional approaches — was their ability at the beginning of the year to recognize and name upper and lower case letters. Again, this finding suggests the fundamental value of letter and sound knowledge. *And also...* The analyses revealed one more thing: Within every instructional method studied, there were students who learned to read with thorough success and others who experienced difficulty.

The single best predictor of students' end-of-year reading achievement — regardless of instructional approaches — was their ability at the beginning of the year to recognize and name upper and lower case letters. ■

Furthermore, students in some school systems markedly outperformed those in other systems for no traceable reason. This was true regardless of the instructional approach and even when differences in reading readiness were statistically controlled. And this could not be statistically related to any of the many teacher, school, or community characteristics that were measured. Indeed, when the progress of these students was reassessed at the end of the second grade, the results indicated that the particular projects in which students had participated influenced their reading ability roughly as much as the particular method or materials through which they had been taught.[18]

The implication is that to improve reading achievement, both programs and classroom delivery must be improved. Each seems to contribute separately but significantly to children's progress.

Follow Through

Conducted in the early 1970s, the Follow Through studies stand as another enormous federally sponsored experiment on primary education. The studies were prompted by findings that the gains made by Head Start students during preschool tended to disappear when they left the program. Therefore, the studies were intended to answer the question of what general educational approach or model succeeds best in fostering and maintaining educational progress of disadvantaged children across the primary school years.

The twenty-two instructional models examined fell into three groups: (1) those emphasizing basic academic skills, (2) those emphasizing cognitive or conceptual development,

and (3) those emphasizing affective development through child-centered activity. Analyses of the data from the Follow-Through studies showed tremendous variations from school to school in educational outcomes. There was so much variation, in fact, that there were low-achieving schools even in instructional models that, on average, produced relatively high achievement.

Nevertheless, of the three categories of instructional models assessed, those emphasizing basic academic skills tended to yield the best achievement scores in general. And, within that category, the reading program that yielded the highest reading achievement was highly structured, describing and even scripting classroom activities in great detail. Its emphasis, moreover, was squarely and systematically on teaching the code.

The advantage of this program was strongest in the first- and second-grade evaluations, weaker in the third grade, and seemingly gone in the fourth. This diminishing pattern of results may be explained by the fact that the reading tests used for evaluation shift emphasis from word recognition skills to comprehension at about the fourth-grade level. However, among the hundreds of fifth and sixth graders and high school seniors examined in follow-up studies, the advantages of the direct instruction approach re-emerge. In the studies of fifth- and sixth-grade students, researchers found that, although students' academic growth was slower than would be predicted from their primary-grade achievement scores, the direct instruction students continued to outscore their non-Follow Through peers on standardized tests of reading.[19] In another study, assessment of more than 1,000 of these students in their senior year in high school indicated that they were still outperforming their non-Follow Through peers, not just in reading achievement but on a variety of general measures of school success, such as not dropping out of school and pursuing postsecondary education.[20]

Noting the unusual success of one of the schools in this program, an analysis was undertaken to see if there was anything in particular that it had done differently.[21] There was. Specifically, it was found that students in this school had been heavily engaged in reading and interpreting stories from the very first year of the program. Commenting on this finding, Chall remarked that "It would appear, then, that an early opportunity to do meaningful connected reading in addition to learning how to decode is needed to integrate both abilities."[22]

Summary of the Program Comparisons

There were, of course, many other program comparison studies conducted during this period. And some of these yielded contradictory results. However, the vast majority of the studies indicated that approaches including intensive, explicit phonics instruction resulted in comprehension skills that are at least comparable to, and word recognition and spelling skills that are significantly better than those that do not. Furthermore, approaches in which systematic code instruction is included along with meaningful connected reading result in superior reading achievement overall. And these conclusions seem at least as valid with low reading-readiness students as they are for better and more advantaged students.

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Before leaving this topic, I need to add a caveat. We know that there are enormous differences in the outcomes of any program depending upon the particular schools, teachers, children, and implementation vagaries involved. Yet despite all of these very real and significant differences, there seems to be something about the very broad class of instruction known as phonics that is of general, substantive, and lasting value.

What specifically is it within this instruction that is so good? The program comparison research does not begin to answer this question — except to argue that explicit phonics (the process of building instruction systematically from letters to words) is more effective than implicit phonics (the process of teaching from words to letter-sounds). As the following discussion shows, there are both finer and broader issues that must be addressed to find the answer.

Exactly What Is Good about Phonics Instruction?

To answer this question, it is first necessary to answer questions about what exactly phonics is. In its simplest sense, phonics refers to a system of teaching reading that builds upon the alphabetic principle, a system of which a central component is the teaching of correspondences between letters or groups of letters and their pronunciations. In terms of practice, however, phonics is harder to box in: What specifically are the instructional procedures it covers?

As I mentioned earlier, virtually every reading program teaches phonics at some level. Nevertheless, some of these term themselves "phonics programs" and some do not. Thus the distinction between phonics and non-phonics programs is generally one of emphasis. If this is the distinction we care about, the issue translates from one of "what" into one of "how much."

How Much Is the Right Amount?

How much phonics is the *right* amount? Isn't it really a question of balance? Of course. But unless that proper balance can be described, recognizing the problem as one of emphasis does little toward resolving it. What we really want to know is not just how much, but how much of what kinds. We want to know when, in what order, and through what materials and procedures this instruction can be achieved most effectively. When the answer to each of these questions is established, the more global issue of "how much" will be solved.

What Do Phonics Programs Teach?

The difficulty in answering this question lies in the fact that so many phonics programs exist. To be sure, a central belief of each of these programs is that knowledge of the letter-to-sound correspondences underlying our system of writing is key to proficient reading. Beyond that, however, they differ greatly.

The programs differ in starting point as well as stopping point. They differ in the methods, materials, procedures, and progression for everything taught in between. And they differ in fundamental assumptions about what to and what not to teach, about when to and when not to teach, and about how to and how not to teach. Moreover, while some of the differences between programs are just differences, others stand as genuine conflicts and incompatibilities.

Where Does This Leave Us?

Taken together, phonics programs represent not just one but a host of theories about what instruction in English orthography ought to comprise. How, in view of this, are we to make sense of those comparative program studies, with their summary conclusion that intensive, explicit phonics instruction is a valuable component of beginning reading instruction? Intensive in what respects? Explicit about what? We are left with at least three fairly obvious ways of interpreting these studies.

The first interpretation is that, any way it is done, emphasizing phonics is a good thing. Alas, that takes us back where we started. What do we mean by "emphasizing phonics"? How much is enough? How much is too much? And how much of what?

The second interpretation is that the assumptions and activities found in phonics programs (or at least the sampling of programs that were included in the comparative program studies) are all pretty good and comparably so. The up side of this interpretation is that it releases us from the problem of deciding how much of what to do — just choose a program and

Alas, that takes us back where we started. What do we mean by "emphasizing phonics"? How much is enough? How much is too much? And how much of what? ■

do as it says. The down side is that it is terribly hard to believe. The programs are so complex and so diverse. How could they possibly be equally good in every way? Mustn't there at least be differences in the appropriateness of their assumptions and activities depending upon the particular students to whom they are given? When one program prescribes what another prohibits, mustn't one or both be on the wrong track?

The third interpretation is that there exist a number of code-emphasis activities that are of genuine benefit to young readers and that most phonics programs do reasonably well at some subset of these activities. Notice how noncommittal this interpretation is. It may be that no existing program is ideal for all students on all dimensions. It may be that most existing programs include some not-so-good activities along with the good ones. It may be that we could build even better programs — ones that are maximally effective, minimally time-consuming, and optimally suited to the needs of our particular students — by selecting, adjusting, and combining the best of existing programs' individual assumptions and activities.

Research indicates that the most critical factor beneath fluent word reading is the ability to recognize letters, spelling patterns, and whole words, effortlessly, automatically, and visually. Moreover, the goal of all reading instruction — comprehension — depends critically on this ability. ■

We ordinarily assume that whatever their method, the success of phonics programs is owed to the importance of teaching children how to sound words out. If we are willing to test this assumption, then a fourth interpretation of the programs' success is possible.

Specifically, it is possible that the ability to sound words out — even while being an invaluable step toward reading independence — is not the primary positive outcome of phonics instruction. In the chapters to follow, it is this argument that gains most support. Research indicates that the most critical factor beneath fluent word reading is the ability to recognize letters, spelling patterns, and whole words, effortlessly, automatically, and visually. Moreover, the goal of all reading instruction — comprehension — depends critically on this ability.

We now must ask what it is that skillful readers know about English written language. We must ask what it is that beginning readers need to learn, and how they might learn it most efficiently, effectively, and usefully. We must assess the wisdom of our major assumptions and instructional activities. We begin, in the next chapter, with a discussion of what research tells us about the reading processes of skillful readers.

Research about Readers: Two Perspectives

What Skillful Readers Know

Skillful reading is a complex system of knowledge and activities. Within this system, the knowledge and activities involved in visually recognizing individual printed words are useless in and of themselves. They are only valuable and, in a strong sense, only possible as they are guided by the activity of language comprehension. However, unless the processes involved in individual word recognition operate properly, nothing else in the system can either.

This chapter looks at what research and theory tell us about the reading processes of skillful readers.

What Do Skillful Readers Do?

Perhaps the single most striking characteristic of skillful readers is the speed and effortlessness with which they can breeze through text.[1] In particular they appear to recognize whole words at a glance, gleaning their appropriate meaning at once.[2] How do they do so?

Perhaps the single most striking characteristic of skillful readers is the speed and effortlessness with which they can breeze through text. In particular they appear to recognize whole words at a glance, gleaning their appropriate meaning at once. ■

Some Questions

Do skillful readers, in fact, recognize words as whole, relying on their overall patterns or shapes rather than close analysis of their spellings? If so, then doesn't it seem counterproductive to train children to focus on the letter-by-letter spelling of words?

Do skillful readers get to the meaning of a word directly from its sight? If so, then doesn't it seem counterproductive to teach children to sound words out?

Do skillful readers use context to anticipate upcoming words so as to reduce the visual detail they need from the text? If so, then in place of rigorous decoding instruction, wouldn't it

be better to teach children to use context together with such minimal distinguishing cues of words as first letters and overall length?

Do skillful readers use context to anticipate the meanings of words they will see, such that their comprehension consists as much of confirming as of interpreting meaning? If so, then shouldn't a central focus of beginning reading instruction be one of strengthening children's ability to guess the upcoming words of a text?

Some Answers from Research

Each of these notions has been seriously entertained by researchers at one time or another, and the instructional implications of each are prominently realized in many curricula and classroom practices. Under scrutiny, however, each of these notions has proved incorrect. More than that, each has proved incorrect in ways that strongly argue against their instructional translations.

Skillful readers visually process virtually every individual letter of every word as they read, and this is true whether they are reading isolated words or meaningful, connected text. ■

As it turns out, research shows that skillful readers are relatively indifferent to the shapes of the words they read.[3] Even when the letters are randomly sampled from a variety of type styles and sizes in both upper case and lower case fonts, skillful readers seem to recognize familiar words as wholes.[4] At the same time, skillful readers visually process virtually every individual letter of every word as they read, and this is true whether they are reading isolated words or meaningful, connected text.[5] To be sure, readers do not necessarily notice misspellings and misprints at a conscious level. But, conscious or not, studies show that even the slightest misprint, tucked deep within a long and highly predictable word, is often detected by the visual systems of skillful readers.[6]

Research also negates the notion that skillful readers use contextual guidance to preselect the meanings of the words they will read. Consider the following sentences:

They all *rose*.[7]

John saw several spiders, roaches, and *bugs*.[8]

The last word of each of these sentences is, in itself, ambiguous— but would you have noticed if that hadn't been pointed out? Although it feels as though context preselects the appropriate meanings of such words, that is not exactly what happens. Research demonstrates that both (all) of the meanings of an ambiguous word are aroused in the course of perception. Very shortly (tenths of a second) thereafter — too quickly for us to become aware of the confusion — context selects the most appropriate meaning from among the alternatives.[9]

Last but not least, research proves that skillful readers

habitually translate spellings to sounds as they read.[10] But why? If visually familiar words do indeed arouse their meanings directly — and they do — then of what conceivable value are such phonological translations? The answer to this question has come only through many years of work and many research studies: Such spelling-to-sound translations are vital to both fluent reading and its acquisition. To see why, we must look more deeply into the reading system.

The Operation of the Reading System

To clarify the relation of word recognition processes to the rest of the system, an analogy might be useful. Let's say that the system that supports our ability to read is like a car. Within this analogy, print is like gas. The engine and the mechanics of the car are the perceptual and conceptual machinery that make the car go.

It is obvious that print is essential to reading — no gas, no driving. But print alone is not enough to make the reading system go. Just as cars will not start without spark plugs, reading cannot begin without the spark of recognition. And while cars require more than one spark plug for power and smoothness of operation, so the reading system processes more than one letter at once and in coordination. Associations among letters, like the crankshaft in a car, keep the reading system rolling — despite occasional problems. The letter that is misperceived or even illegible does not stop the reading machine, any more than the occasional misfire of a spark plug will stop a car.

But the engine is only indirectly responsible for making a car go. The engine turns gas to kinetic energy, and the energy turns the wheels. Similarly, the perceptual system turns print to mental energy, such that it can be understood.

Obviously a car *couldn't* be driven without gas, without spark plugs, without a crankshaft, and without a differential and wheels. But it is also important to recognize that it *wouldn't* be driven if it didn't run well. Imagine that you had to push a button every time you wanted a spark plug to fire. Imagine that the car would only go a couple of miles per hour or that it unpredictably stalled every few moments. You would very likely choose not to drive at all.

By the same token, readers who are unable to recognize individual letters and spelling patterns quickly, effortlessly, and automatically and to transform them to words and meanings are very likely to choose not to read at all. To the extent that children do not read, they do not get the practice with letters and letter patterns needed to make efficient their percep-

It is obvious that print is essential to reading — no gas, no driving. But print alone is not enough to make the reading system go. Just as cars will not start without spark plugs, reading cannot begin without the spark of recognition. ■

tion. And so they continue to have difficulty reading, falling farther and farther behind their peers as they get older.

Clearly, without gas and without an engine and mechanics in adequate working order, a car won't go. Suppose, however, that your reading system has plenty of print to consume and a fine mechanical system. Are you on your way?

No. First, you have to want to go somewhere, and you have to have some idea of how to get there. As you travel, you must monitor and control your route, periodically take assessment of how far you've gone, and make sure you're on the right road. You must also pay careful attention to the details of the road and control your car through them. Depending on such variables as the familiarity of the route and whether it is bumpy, windy, congested, or unpredictable, you will have to invest considerable active attention in your progress.

But the more you direct attention to the mechanics of reading, the less attention you have available to support understanding. ■

Similarly, understanding texts that are unfamiliar in concept or difficult in wording requires your active attention. But the more you direct attention to the *mechanics* of reading, the less attention you have available to support *understanding*. Only if your ability to recognize and capture the meanings of words is rapid, effortless, and automatic will you have available the cognitive energy and resources upon which comprehension depends.

As it happens, *everybody* wants to go someplace. Everybody wants stimulation and the sense of growth and accomplishment that comes with meeting challenges. If reading is unstimulating or unproductive, some individuals will choose other ways to spend their time. If reading seems aversive, some will avoid it altogether. Forty percent of the fourth-grade poor readers in a Texas school recently claimed that they would rather clean their rooms than read. One child stated "I'd rather clean the mold around the bathtub than read."[11]

Fortunately, for purposes of schooling, most young children will go almost anywhere they are led — so long as they are not frustrated, unsuccessful, or bored. But even as this eases our task as reading educators, it greatly increases our responsibility. It is up to us to lead our children in the right direction.

And it is here that the car analogy breaks down. So apt for describing the operation of the system, it is wholly inappropriate for modeling its acquisition. Building a car is a modular, hierarchical activity. From the bottom up, the discrete parts of the car's subsystems are fastened together. Then, one by one, the subsystems are connected to each other.

In contrast, the parts of the reading system are not

discrete. We cannot proceed by completing each individual subsystem and then fastening it to another. Rather, the parts of the reading system must *grow* together. They must grow *to* one another and *from* one another.

For the connections and even the connected parts to develop properly, they must be linked in the very course of acquisition. And this dependency works in both directions. We cannot properly develop the higher order processes without due attention to the lower; we cannot focus on the lower order processes without constantly clarifying and exercising their connections to the higher.

It is only when we understand the parts of the system and their interrelations that we can reflect methodically and productively on the needs and progress of each of our students.

Reading depends first and foremost on visual letter recognition. ■

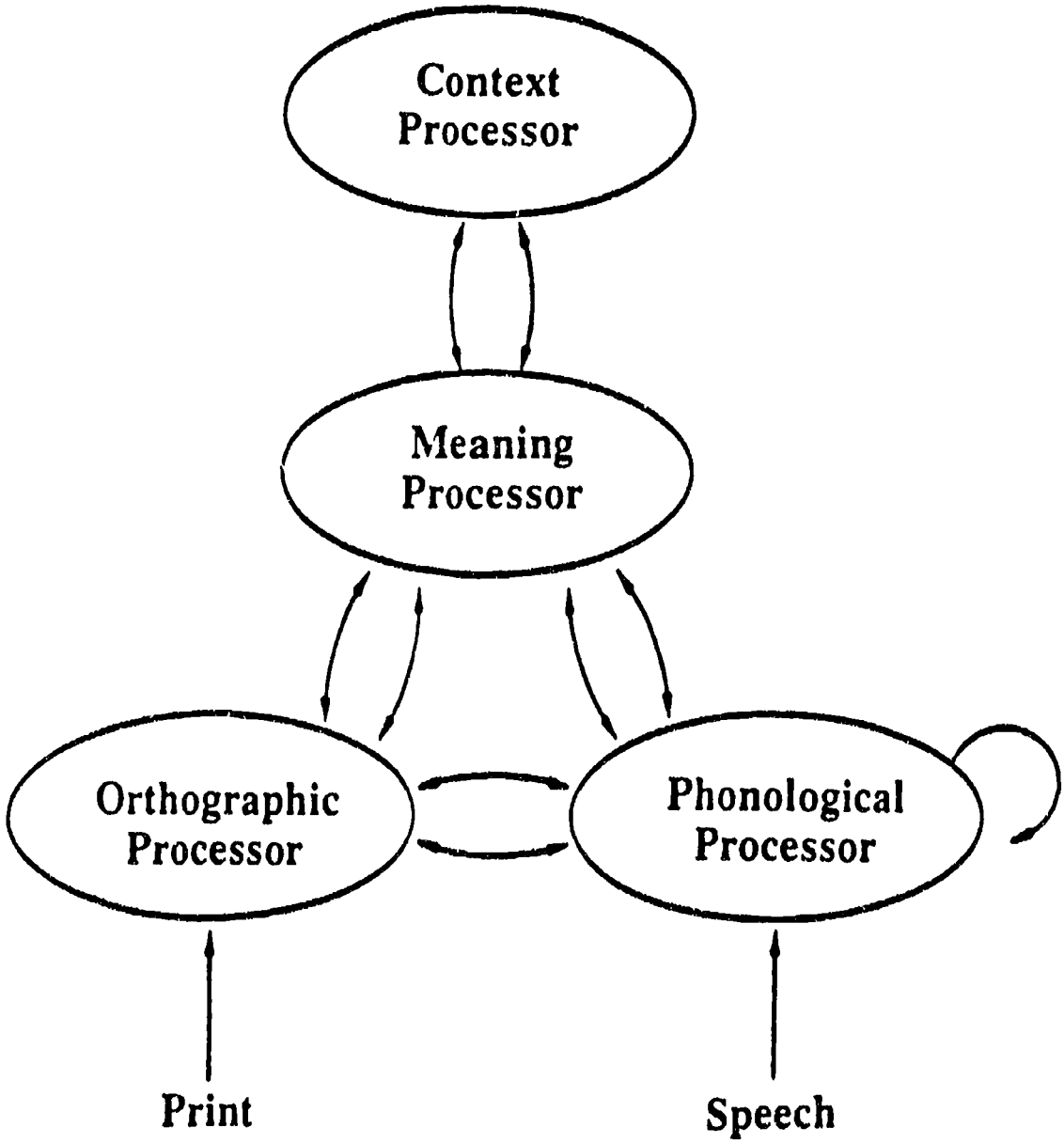
Modeling the Reading System: Four Processors

Models are representations developed by researchers to combine findings from many studies into a whole. Models can suggest how the parts of a system might work together. By developing more comprehensive models of the nature of the reading system and the interrelations of its parts, researchers are helping us to understand the reading process as a whole. Anchored in psychological research and built through laboratory studies and simulations, these models are complex. However, it is because they have been developed with such analytic care that their instructional implications carry special weight.

Reading depends first and foremost on visual letter recognition. To be fluent and productive, however, reading also depends on ready knowledge of words — their spellings, meanings, and pronunciations — and on consideration of the contexts in which they occur. The four processors involved in these activities are shown in the figure on the following page.[12] The orthographic processor is responsible for perceiving the sequences of letters in text. The phonological processor is responsible for mapping the letters onto their spoken equivalents. The meaning processor contains our knowledge of word meanings, and the context processor is in charge of constructing an on-going understanding of the text. As shown by the arrows between them, the four processors work together, continuously receiving information from and returning feedback to each other.

Within each of these processors, knowledge is represented by interconnected sets of simpler units. Within the orthographic processor, for example, individual letters are represented as interconnected combinations of more elemen-

Modeling the Reading System:
Four Processors



tary visual features while printed words are represented as interconnected combinations of letters. Similarly, the meaning of a familiar word corresponds to some interconnected set of meaning elements, and its pronunciation to an interconnected complex of elementary speech sounds.

For the skillful reader, all of these types of knowledge about a word are, in turn, intricately bound to one another. So, within the orthographic processor the letter-by-letter structure of a familiar word merges automatically into the set of units representing the spelling of the word as a whole. At the same time, through connections to the phonological and meaning processors, the letters and spelling patterns automatically evoke the word's pronunciation and meaning in the very course of their perception. Using its cumulating knowledge of the text, the context processor then selects among the meanings so as to maintain the coherence of the message. Meanwhile, as each processor hones in on the word's identity, it relays its hypotheses back to all of the others so that wherever hypotheses agree among processors, their resolution is speeded and strengthened.

In this way, as the units share energy with each other through their interconnections, skillful readers recognize the spelling, sound, and meaning of a familiar word almost automatically and simultaneously, leaving their active attention free for critical and reflective thought. But here lies a key point: The amount of stimulation that any set of units can pass to any other depends strictly on the strength and completeness of the connections between them. The strength and completeness of the connections between them, in turn, depends strictly on learning. In other words, for skillful readers, a sequence of letters merges effortlessly into a word only because, through experience, the readers have acquired connections between the letters corresponding to the spelling of the word. Moreover, skillful reading depends on the overlearning of patterns and relations.

To understand better the knowledge and processes involved, let us examine each of the processors in turn.

Eye movement research informs us that our eyes do not move smoothly through the lines of text while reading. Instead, they leapfrog from word to word, fixating briefly toward the center of each and then jumping to the next. ■

The Orthographic Processor

The orthographic processor is the only processor that receives information directly from the printed page. When we are reading, it is visual, orthographic information that comes first and causes the system to kick in.

Eye movement research informs us that our eyes do not move smoothly through the lines of text while reading. Instead, they leapfrog from word to word, fixating briefly

toward the center of each and then jumping to the next. Given normal print, the eye can clearly resolve up to three or so letters to the left of its fixation point and about twice that many to the right during each fixation. With these letters as its basic data, the system goes to work. To see how it proceeds, let us consider two examples.

First, suppose the reader's eye lands upon the word *the*. Because *the* is a very frequent and familiar word, all of its letters should be strongly interconnected within the reader's orthographic memory. As the reader looks at the word, the units corresponding to each of the letters receive visual stimulation from the page. Because the units are so strongly interconnected in the reader's memory, each will share stimulation with the others, causing them to be recognized nearly at once and to hang together in the reader's mind as a familiar, cohesive spelling pattern.

It is thus the learned associations between individual letters that are responsible for the easy, holistic manner in which we respond to familiar words. ■

Now suppose instead that the eye lands upon the nonword *tqe*. Because this string of letters is so similar to the word *the*, the reader's orthographic memory will attempt to process it in the same way. That is, the *t* and *e* units will pass stimulation to each other. They will also pass stimulation to the *h* unit. This time, however, because the *h* receives no direct visual stimulation, it cannot pass any back. At the same time, because *q* is always followed by *u* in English, the *q* unit will pass its stimulation to the unit for the absent *u*. As the directly stimulated letter units send their activation inappropriately around the letter network, they end up hurting rather than helping each other's progress. Eventually the direct visual stimulation from the page will bring each of the presented letters to peak stimulation, and the reader will see the string as printed: *tqe*. However, the perception of each of its letters will have taken longer and will have gelled independently of the other.[13]

It is thus the *learned* associations between *individual letters* that are responsible for the easy, holistic manner in which we respond to familiar words. It is because of them that words and familiar spelling patterns are easier to read than the sum of their parts. Yet the interletter associations provide other services that are of equal importance to the reader. These services include the processing of letter order and breaking words into syllables.

Processing letter order. Although the visual system is remarkably efficient at extracting information necessary for letter identification, it is quite sloppy about processing letter order. Skillful readers almost never make mistakes in reporting the order of the letters in words they read.[14] Poor readers, in

contrast, often do. Although letter order difficulties were once taken as symptomatic of a basic perceptual deficit, that explanation has been proven incorrect.[15] Such difficulties seem instead to reflect insufficient orthographic learning.

Specifically, among skillful readers, knowledge about the likely ordering of a string of letters is captured in the learned associations between them. In the very course of perception, therefore, this knowledge serves to corroborate the sensory system's transmission of letter order. In keeping with this, good readers rarely err in reporting the order of the letters in either real words or regularly spelled nonwords (such as *bome* and *mave*). Yet when faced with orthographically irregular strings, such as *gtsi* or *ynrh*, they make just as many ordering errors as poor readers — even more, if they were expecting to see a regularly spelled string.[16]

There are several ways in which readers can conquer the letter-order problem even without well-developed interletter associations. One is to stick with print that is sufficiently large and spaced out that no two letters will share the same input channel — as in the time-honored practice of setting primers in large type. Another is for readers to increase the number and/or duration of their fixations on each word — and this, too, is a characteristic difference between good and poor readers.[17] The third is for readers to learn more about likely and unlikely sequences of letters in their orthographies.

Breaking long words into syllables. Struggle as they might, and familiar as the words might be within their oral vocabulary, poor readers characteristically block on long, polysyllabic words. In contrast, skillful readers rarely experience such difficulty. As an example, try reading the following to yourself: *trypsinogen, anfractuosity, prolegomenous, interfascicular*. Although none of these words may be familiar to you, chances are that your attempts to read them were relatively forthcoming as well as correct, or nearly so. If you listened carefully to your performance, you may have heard yourself producing them in a manner much closer to syllable by syllable rather than holistically or letter by letter.

It turns out that skillful readers' ability to read long words depends on their ability to break the words into syllables. This is true for familiar and unfamiliar words. Moreover, laboratory studies prove that skillful readers break words into syllables automatically and in the very course of perceiving their letters. The means by which skillful readers do this is rooted in their overlearned knowledge about likely and unlikely sequences of letters. More specifically, because of the alphabetic principle, strings of speech sounds that represent

It turns out that skillful readers' ability to read long words depends on their ability to break the words into syllables. ■

pronounceable syllables tend to be represented by frequent sequences of letters. As an example, the sequence /*dr*__/ is a frequent syllabic form in English — as in *drag, dress, drip,* and *drove* — while /*dn*__/ is not. Consistent with this, the letter sequence *dr*__ is forty times more likely to occur in print than the sequence *dn*__.[18] Through the learned associations in the reader's letter recognition network, therefore, the letters *d* and *r* will automatically boost each other's perceptibility when seen in print, while the letters *d* and *n* will not.

The importance of this difference is that, although unlikely letter sequences such as *dn* cannot occur within the same syllable, they can and do occur at syllable boundaries (for example, *midnight, baldness, kidnap, Sidney*). As the reader processes such words, the likely combinations of letters within each syllable hang together as a spelling pattern. At the same time, however, the unlikely pairs repel each other, thus pushing separate syllables apart. As a result, the perceived letters are tightly bound together within syllables, but somewhat detached at the boundaries between syllables. In this way, polysyllabic words are perceived as sequences of spelling patterns corresponding to syllabic units.

To ask children to study unlikely letter pairs would be counterproductive. It would serve to increase the strengths of the associations between such letters in memory, which is just the opposite of what is needed. ■

At this point, I need to add a word of caution. The knowledge underlying automatic syllabification skills cannot be directly instilled. To ask children to study unlikely letter pairs would be counterproductive. It would serve to *increase* the strengths of the associations between such letters in memory, which is just the opposite of what is needed. Beyond that, one cannot hope to specify spelling patterns corresponding to syllabic units or their boundaries independent of the larger orthographic context in which they occur. That is, one cannot take any given letter string, say, *par* and proclaim it to be a syllabic unit. Sometimes it will be (*par-tial, par-take*) and sometimes it will not (*part-ly, pa-rade*). In syllabifying words, the orthographic processor responds to the *relative* strengths of the interletter associations. Using knowledge of simple letter sequences as well as larger letter patterns (for example, *fa-ther* versus *fat-head*), it breaks a word into syllables not at predesignated junctures but at the weakest link between its letters. It can do so only to the extent that the reader has acquired a broad and deep knowledge of English orthography.

The Context Processor

The context processor is in charge of constructing a coherent, on-going interpretation of the text. In particular, it is responsible for selecting word meanings appropriate for the text. This is important not just for blatantly ambiguous words (such as

soccer *ball* versus inaugural *ball*) but to a lesser extent for almost any word.

As an example consider the word *Wyoming*. As a proper noun, we might consider *Wyoming* to have a unique stable meaning. Nevertheless, its mention brings very different images to mind in a discussion of presidential campaign strategies and electoral college votes than it does in a discussion of beautiful national parks. In fact, both of these images — and much more besides — are part of the total array of meaning that we have associated with the word *Wyoming*. We are able to follow such discussions with understanding because the context processor selectively emphasizes those aspects of a word's total meaning that are relevant to its on-going interpretation.

The context processor works by sending its own stimulation to the meanings that it expects. This extra stimulation boosts the contextually appropriate dimensions of a word's meaning, causing them to dominate the reader's interpretation of the text. Yet even while the context processor facilitates the reader's awareness of appropriate words and meanings, it does not prevent stimulation of inappropriate ones. To use an earlier example, given a sentence such as: "John saw several spiders, roaches, and bugs," people very briefly show signs (but not conscious awareness) of having interpreted the last word to mean both "insects" and "spying devices."[19]

For skillful readers, context serves to speed and assist the interpretation of orthographic information. However, context does not overcome or take the place of orthographic information. Consistent with this, study after study has shown that context significantly affects the speed or accuracy with which skillful readers perceive familiar words *only* when the experimenter has done something to slow or disrupt the orthographic processing of the word.[20] For skillful readers, reading is first and foremost visually driven. Context, for these readers, has its effect only after the word is identified.

For skillful readers, context serves to speed and assist the interpretation of orthographic information. However, context does not overcome or take the place of orthographic information. ■

The Meaning Processor

The inner workings of the meaning processor are similar to those of the orthographic processor. In particular, the units in the meaning processor do not correspond to whole familiar words. Instead, just as the spellings of familiar words are represented in the orthographic processor as interassociated sets of letters, their meanings are represented in the meaning processor as interassociated sets of more primitive meaning elements. It is this piecewise nature of word meanings that

allows us to focus on one aspect or another as appropriate in context. In addition, it enables us to acquire the meaning of new words gradually by encountering them in context.

Learning new word meanings from context. Suppose that, while reading a story, a child encounters a word that she or he has neither seen nor heard before.[21] As usual, the spelling of this word will be shipped automatically to the meaning processor. There, however, in place of any learned response, all it will find is the pattern of anticipatory stimulation provoked by the context processor. When the orthographic pattern meets these activated meaning units, a bond will begin to form between them.[22]

The likelihood that a child will learn the meaning of a word from a single exposure in meaningful context ranges between 5% and 20%. By implication, the extent of such incidental vocabulary acquisition depends strongly on the amount a child reads. ■

The impact of such an incidental learning experience is expected to be small. Context is rarely pointed enough to predict the precise meaning of a word. On the other hand, it's a start. When the same word is encountered again, it will meet whatever it learned from the prior context plus the meaning set off by its current context. Wherever the meaning units of the old and new contexts overlap, they will become more strongly associated with each other and with the orthographic pattern of the word. Given a number of encounters with this word over a variety of different contexts, the units that are reinforced most often will be those that belong to the meaning of the word itself. In this way, the word may eventually be learned well enough to contribute independently and appropriately to the meaning of a text, if not to allow the child to generate a well-articulated dictionary definition.

Though important, such learning from context is inherently gradual and imprecise. The likelihood that a child will learn the meaning of a word from a single exposure in meaningful context ranges between 5% and 20%.[23] By implication, the extent of such incidental vocabulary acquisition depends strongly on the amount a child reads. The average fifth grader is estimated to read about 1,000,000 words of text per year: 650,000 out of school and the rest in school.[24] Among these 1,000,000 words of text, roughly 16,000 to 24,000 will be unknown.[25] The result, given a 5% chance of learning each, is a vocabulary increase of 800 to 1,200 new words each year through reading.

Learning from context accordingly accounts for a substantial fraction of the 3,000 new words that children are expected to master each year.[26] These estimates, however, are based on the average reader. Some children read millions and millions of words of text each year; their vocabularies are expected to be much stronger. At the same time, others read practically nothing at all outside of school.

Beyond such learning through reading, direct vocabulary instruction is generally shown to result in an increase in both word knowledge and reading comprehension.[27] To be most effective, such instruction should include a number of examples of the word's usage in context in addition to definitional information. Research has shown that in direct vocabulary instruction as in incidental learning, the number of times children encounter a word is a strong predictor of how well they learn it.[28] But almost as important as the sheer number of encounters is the richness and variety of the contexts in which it appears. Of particular interest, through rich and diverse experiences with a word, children appear to gain a special advantage in understanding its connotations or submeanings in specific contexts and in exploiting its extended meaning in story comprehension.[29]

Direct vocabulary instruction is generally shown to result in an increase in both word knowledge and reading comprehension. ■

Prefixes, suffixes, and roots. The direct linkage between the orthographic and meaning processors may also be responsible for skillful readers' perceptual sensitivity to the roots and affixes of polysyllabic words.[30] Moreover, this linkage prompts the idea that teaching children about the derivational morphologies might be a useful step toward both spelling and vocabulary development.

For example, once one sees that *concurrent* consists of "with" (*con-*) plus *current*, the word is no longer a spelling problem. And conversely, knowing the meanings of common roots may qualitatively and profitably change one's understanding of the words in their derivational family. Thus learning that *fid* means "trust" or "faith" may significantly alter and connect one's understanding of words like *confidence*, *fidelity*, *fiduciary*, and *bone fide*; discovering that *path* means "suffering" may alter and connect one's understanding of words like *sympathy*, *psychopath*, and *pathologist*; and so on.

In reverse, morphological clues may be useful for inferring the meanings of new words. It may be, however, that such morphologically based insight never comes automatically, but only through conscious search. Indeed, this may explain the mixed results of teaching children about the derivational morphologies of words.[31] Although such lessons have been shown to increase children's proficiency with both the spellings and meanings of the words studied, they have produced little increase in their ability to interpret new derivationally complex words. Perhaps the objective of such lessons should be one of developing children's inclination to look for such relations in new words as much as teaching them about any particular sets of words.

In any case, when and if the worth of lessons on

derivational morphology is firmly demonstrated, the lessons may nevertheless be best postponed until later years of schooling. Specifically, morphemic and spelling units rarely coincide. For the orthographically inexperienced, it is more important to be facile with spelling units. For example, while the *form* in *information* might shed light on its deeper meaning, familiarity with *for* in *information*, will help a reader read more words (*forty, forget, misfortune*, and so on).

The Phonological Processor

The figure given earlier shows how readers' phonological knowledge and processes are related to the rest of the reading system. As with the orthographic, context, and meaning processors, the phonological processor contains a complex array of units. The auditory image of any particular word, syllable, or phoneme corresponds to the activation of a particular, interconnected set of those units.

Although skillful readers do not depend on phonological translation for recognizing familiar words, they seem to produce them anyway. ■

There are arrows leading in both directions between the phonological and orthographic processors. The arrow that runs from the orthographic to the phonological processor indicates that, as the orthographic processor deals with an image of a string of letters, stimulation is sent to corresponding units in the phonological processor. If the letter string is pronounceable, the phonological processor will then send stimulation back to the orthographic processor; such feedback is represented on the figure by the arrow running in the other direction.

The phonological processor is also connected in both directions to the meaning processor. Therefore, the activation of a word's meaning will send stimulation to the phonological units corresponding to its pronunciation. Also, the activation of its pronunciation automatically will stimulate its meaning.

Like the orthographic processor, the phonological processor accepts information from the outside. However, the information it accepts is *speech*. The orthographic processor is still the only one to receive information directly from the printed page, and so reading depends first and foremost on visual processing.

The knowledge represented within the phonological processor can be activated at our will. Not only can we speak, we can also subvocalize or generate speech images when we wish.

Although skillful readers do not depend on phonological translation for recognizing familiar words, they seem to produce them anyway.[32] Far from being unnecessary, such phonological translation seems to add a critical degree of

redundancy to the system. Without this duplication of information, even the most skillful readers would find themselves faltering for fluency and comprehension except with the easiest text.

Phonological translation and fluent word recognition. A word can map instantly, effortlessly, and accurately from sight to meaning only to the extent that its unique, ordered sequence of letters has been learned and overlearned through experience. Yet printed words vary enormously in their frequency, and, therefore, in their familiarity to a reader.

Analyses of the everyday reading matter of adults reveal that the vast majority of print consists of relatively few, very frequent words.[33] Because each of these words is highly familiar to the skillful reader, each is recognized quickly and easily. However, these often repeated words account for but a small fraction of the number of *different* words readers encounter. The majority of words in print are relatively infrequent — occurring on average just a few times within every million words of running text. Because these words are so rarely seen, the reader's visual familiarity with many of them must be relatively weak and incomplete — often too weak and incomplete to support the perceptual speed and automaticity on which comprehension depends.

Fifty percent of the print in such books is accounted for by only 109 different words; ninety percent by only 5,000 different words. ■

Word counts of students' textbooks reveal a similar pattern. Fifty percent of the print in such books is accounted for by only 109 different words; ninety percent by only 5,000 different words.[34] It is reasonable to suppose that, not too far into their schooling, most children will have become quick to recognize most of these words by sight. But how are they to cope with the tens of thousands of other words they see? It will not do to skip such words or guess at their identities. The coherence of a text depends strongly on its frequent words — *it, that, this, and, because, when, while,* the information in a text depends upon its less frequent words — *doctor, fever, infection, medicine, penicillin, Alexander Fleming, melon, mold, poison, bacteria, antibiotic, protect, germs, disease.*

For skillful readers, automatic phonological translations provide a backup system for recognizing visually less familiar words. Following the alphabetic principle, syllables are represented by frequent spelling patterns. For the skillful reader, even if a word is not visually familiar, fragments of its spelling almost certainly will be. Because of the reader's spelling-sound associations, these spelling patterns will be translated automatically to their phonological equivalents. Thus the reader's knowledge of the word's pronunciation will lead to the meaning of the word. In this way, even the occa-

sional never-before-seen word may be read off with no outward sign of difficulty.

The irrepressible automaticity of skillful readers' spelling-to-sound translations ensures that those many words of marginal visual familiarity will be recognized with the ease and speed required for fluent reading comprehension. Further, as the phonological translations serve both to turn on the word's meaning and its spelling, each such encounter with the word strengthens direct spelling-to-meaning connections.

Phonological translation and comprehension. Automatic phonological translation of the words in a text assists higher order comprehension processes as well. We have seen that the basic data in reading are individual letters. Yet the meaning of a text is several steps removed from its letter-by-letter composition. To make sense of the letters, readers must collect them into words. But this is not enough either. In both spoken and written language, the meanings of words are carefully interrelated through syntax and collected into sentences or basic idea units. In turn, the sentences are ordered so as to convey the larger message of the speaker or writer.

The capacity for sounding words out is at least as important when children are turned to complex texts as it was when they were reading simpler texts. Even skillful readers may need to subvocalize when reading especially difficult or complex texts. ■

The capacity for sounding words out is at least as important when children are turned to complex texts as it was when they were reading simpler texts. Even skillful readers may need to subvocalize when reading especially difficult or complex texts.[35]

Phonological translations of words remain in memory longer than visual images. By thinking or speaking the words to themselves, skillful readers effectively renew the words' phonological activation, thus extending the longevity and holding capacity of their verbatim memory.[36]

The full interpretation of a complex text may require retrieval of particular facts or events that were presented many pages earlier. It may also require consideration of knowledge and construction of arguments that are entirely extraneous to the text. And it certainly requires the critical and inferential activities necessary for putting such information together. It is, in short, this level of interpretation that we think of as true understanding.

But again, interpretation at this level requires active attention and thought. It is not automatic or effortless. It will only be as fruitful as the discipline and effort that readers invest in it. Yet the effort and discipline that readers can invest depends, in turn, on the ease and completeness with which they have executed the levels that support it. Deep and thorough knowledge of letters, spelling patterns, and words, and of the phonological translations of all three, are of inescapable

importance to both skillful reading and its acquisition.

Interactions Between Information Sources

We know that the meaning of a text depends on the meanings of its individual words, however, the converse is also true. The meanings of the individual words become available through the meaningfulness of the text.

Information from the four processors — knowledge of common spelling patterns, of the spoken forms of words, of word meanings, and of the general context — operates together. If information from one processor is weak or ambiguous, information from other processors compensates. Take for example:

TAE CAT

Note that although the two middle letters of each of these words, are, in fact, identical. One "looks like" an *H*, and the other like an *A*. Within the first letter set, however, the H unit is highly familiar while the *A* is not. The reverse is true of the second set. The illusion arises as the surrounding letters in each set make us "see" the familiar letter.

If the hard-to-identify print occurs in context, even greater illegibilities may be overcome:

Pole vaulting was the third <u>event</u> of the meet.

After dinner, John <u>went</u> home.

In this case, stimulation from the context processor reinforces the relevant response in the meaning processor, allowing the reader to understand the message despite the vagueness of the orthographic information. Such words may even "look" more legible in context. The connections between our knowledge of spelling patterns and speech sounds also help us to conquer unfamiliar words. Skillful readers may read an unfamiliar word with little outward sign that they've never seen it before. To illustrate, try reading the following words aloud: *diatessaron, gerentomorphosis, epilimnion, thigmotaxis.* You will probably have little trouble, even if you've never seen them before. However, words with unfamiliar (or foreign) spelling patterns, such as *Karivaradharajan, Wioclawek, Verkhneuinsk, and Quetzalcoatl,* require more effort.

The most obvious demonstrations of the interactive behavior

of the processors are provided by homonyms. Recognition that the word *ball* in the expression *inaugural ball* refers to a gala celebration rather than a bouncy, round projectile is available not from *ball* alone; it requires the information that is jointly associated with *inaugural*.

In the same way — though less blatantly — it is inspection of such semantic overlap that must be responsible for the complete interpretation of any word in context. In interpreting meaningful speech, we readily think of appropriate examples for words. In hearing, for example, that "Jose Canseco smacked the ball over the fence," we do not envision a basketball. Similarly, we readily recognize properties of a class that are more pertinent than others to a particular context. For "The child fell on the *ice*," the slipperiness of ice is highlighted. In "The lemonade needed more *ice*," it is the coldness that is important. This ability depends on analysis, not of the meanings of the individual words, but of the overlap between them.

We do not understand text by attending to its individual words any more than we read words by attending to their individual letters. Instead, comprehending sentences, as does recognizing words, involves putting together overlapping information. But either process can be successful only to the extent that it can be done quickly and accurately.

We do not understand text by attending to its individual words any more than we read words by attending to their individual letters. Instead, comprehending sentences, as does recognizing words, involves putting together overlapping information. But either process can be successful only to the extent that it can be done quickly and accurately. ■

Summing Up

The purpose of this discussion has been to clarify how the interconnected operation of the orthographic, phonological, meaning, and context processors complement and compensate for each other's weaknesses in the course of word recognition.

Although major problems must be fairly rare in the normal, daily reading of skillful readers, lesser difficulties in the ease and speed of resolving the orthography, phonology, and meaning of words must occur within nearly every paragraph they read. Remember that more than 94% of the different words children read occur fewer than ten times in every million words of text. The individual processors' responses to such words must range broadly in both speed and completeness. But as we have seen, the advantages of the interconnections depend on very rapid and complete processing, both within and among processors.

The importance of enhancing the speed and completeness with which readers recognize less frequent words is underscored by the fact that the less frequent a word, the greater the amount of meaning it usually contributes to a passage. Yet less frequent words are generally less familiar to readers; in turn, their identification by any one of the proces-

sors alone is likely to be relatively slow and possibly fuzzy. It is in view of this that the connectivity among the processors is so critical to the comprehension of skillful readers. By mutually facilitating, reinforcing, and reminding each other of their relevant knowledge, the processors ensure that readers recognize words ranging in frequency and familiarity from *the* to *zyzygy*, with the greatest speed and accuracy.

With some idea of what it is that skillful readers know about reading, let us now turn to what it is that prereaders — those who have not yet received formal reading instruction — need to know.

What Young Children Need to Know

Knowing so much about the processes skillful readers use, how do we prepare and instruct young children to become skillful readers? Not all children take to initial reading instruction equally well. What are the characteristics of prereaders that best predict success or failure in learning to read? The question of the best predictors was addressed by some of the studies discussed in the first chapter. This chapter looks closer at the findings of those and other studies and at the implications they hold with respect to how beginning readers might best be taught. In addition, it looks at the question of where prereading skills come from.

Prereaders' letter knowledge was the single best predictor of first-year reading achievement, with their ability to discriminate phonemes auditorily ranking a close second. ■

Predictors of Reading Success

Chall[1] reported that prereaders' knowledge of letter names was a strong predictor of success in early reading achievement, and the USOE First-Grade Studies[2] found that prereaders' letter knowledge was the single best predictor of first-year reading achievement, with their ability to discriminate phonemes auditorily ranking a close second. Furthermore, these two factors were the winners regardless of the instructional approach used. In this section, I take a closer look at these factors, along with two others evaluated in the First-Grade Studies — perceptual skills and mental age — that do not hold up nearly so well as predictors of early reading achievement. I start with the weakest predictor and end with the strongest.

What about Perceptual Skills?

Among the pretests in the USOE First-Grade Studies was one to assess children's ability to copy simple graphic patterns and

another to assess their ability to discriminate between similar and different visual patterns. Interest in these two measures centers on the fact that they seem, on the face of it, to be useful indices of children's capacity for learning to read through whole-word methods. With this in mind, perceptual skills have been carefully re-examined.

In particular, it was reasoned, children are not all alike. Some are global perceivers by nature, and some are analytic; some are auditorily attuned, and some are visually attuned. Maybe phonemic awareness and letter name facility are the best predictors of reading success for the auditory, analytic students. And maybe these students are even in the majority.

But what about the other students? With global, visual predispositions, wouldn't these students be fettered, even frustrated and discouraged, with a phonics approach? More generally, wouldn't it be wise to tailor instructional processes and materials to students' perceptual styles or dominant modalities?

Unhappily, though widely known and held, these views are not supported by research.[3] While many studies have been conducted on this issue, the data do not support the use of different instructional methods with children classified as "auditory" and those classified as "visual."[4] Eight separate reviews of this literature have all concluded that matching beginning reading methods to different aptitudes has not been proven effective.[5] While it is virtually impossible to prove that something does not work, the failure of this approach to produce results, given the amount of research that has investigated it, suggests that it is best to look elsewhere for ways to improve reading instruction.

Similar results have been found for training various perceptual and motor skills, including spatial relations, visual memory, visual discrimination, visual-motor integration, gross and fine motor coordination, and auditory discrimination. Despite the energy invested in such endeavors, and despite the fact that many of the activities involved may be good for children in other ways, they seem not to produce any measurable payoff in learning to read.[6]

While many studies have been conducted on this issue, the data do not support the use of different instructional methods with children classified as "auditory" and those classified as "visual." ■

What about Mental Age?

The visibility of mental age as a predictor of reading success is of particular interest in view of the once common belief that children should not receive reading instruction until they attained a certain mental age. For reading instruction in general, this age was usually given as six and a half years.[7] For phonics instruction, the age was seven.

The magic age of seven for phonics instruction is commonly attributed to a 1937 study in which researchers measured first and second graders' IQs and their ability to match printed words to test words spoken by an experimenter.[8] The results showed that virtually all of the children with mental ages below seven years, as derived from the IQ tests, performed poorly on the "phonic" or word matching test. The researchers concluded, therefore, that a mental age of seven was necessary for a child to *use* phonics.

Now, the ability to *use* phonics depends in part on whether and how a child has been taught about phonics. In reviewing the findings of the 1937 study, Chall pointed out that the children involved had been taught through intrinsic phonics. She noted further that the evidence indicates that when phonics has been taught explicitly and systematically, not only normal kindergartners and preschoolers, but even slow-learning primary-grade students can successfully identify new words.[9] Indeed, more recent studies indicate that explicit, systematic phonics is a singularly successful mode of teaching young or slow learners to read.[10]

Reading readiness is only moderately predicted by IQ scores, but it may be well predicted by other measures of cognitive abilities. ■

Another problem stemming from the 1937 study on mental age is that its findings have often been altered in transmission. Over the years, some have used it to argue that phonics should not be *taught* to children with mental ages of less than seven years — as measured by IQ tests. In waiting on mental age, therefore, we are left in the uncomfortable position of waiting until children are ready in order to teach them precisely those skills that will most make them ready.

It is a stubborn fact that what is meant by mental age or intelligence in virtually all such studies is how well someone performs on standardized IQ tests. Reading readiness is only moderately predicted by IQ scores, but it may be well predicted by other measures of cognitive abilities. In particular, several studies have shown that early reading achievement is quite strongly predicted by children's ability to perform such basic logical and analytical tasks as classification, seriation, and conservation of quantity.[11]

Recently, a group of researchers explored the force of these claims. They administered a test of basic logical and analytical abilities to children at the very beginning of first grade.[12] To evaluate the relative importance of these abilities, the researchers gave the students an IQ test; tests of phonemic, syntactic, and pragmatic awareness; and a print concepts test. At the end of first grade, the print concepts test was administered again, along with tests of decoding proficiency and reading comprehension. At the end of second grade, the

reading achievement tests were given once more. Results showed that the children's logical and analytical abilities were strongly and causally related both to their linguistic awareness and to their concepts about print, which, in turn, were strongly and causally related to reading achievement. In addition, the children's logical and analytical abilities were more strongly related to their linguistic awareness than they were to IQ scores. Wrapping up the study quite neatly, children who entered school with low levels of phonemic awareness but high levels of logical and analytical abilities had more than caught up with their classmates on phonemic measures at the end of the first-grade year. Children who performed poorly on both the phonemic awareness test and on the test of logical and analytical abilities remained significantly behind.

The seemingly inescapable conclusion of this study is that some basic level of logical and analytical abilities makes the processes involved in learning to read much easier. Although these basic cognitive abilities proved quite unrelated to measured IQ, it is hard not to think of them as indices of mental age.

The researchers cautioned, however, that even though the cognitive abilities were strong predictors of reading achievement across two years of school, they seemed to influence reading achievement only indirectly — by hastening the children's acquisition of the relevant linguistic and text-related skills. In view of this, the researchers warned against delaying reading instruction to wait for cognitive maturation. Instead, they suggested, it would be both wiser and more efficient to provide *all* beginning readers with a variety of language games and activities designed to develop their linguistic awareness directly. Indeed, however mental age is defined, it seems to hold, at best, a "sometimes" relationship to children's reading acquisition. To this conclusion, however, I need to add a very sobering afterword. While IQ and general mental skills seem not to have much bearing on early reading achievement, early reading failure seems to result in a progressive diminution in IQ scores and general mental skills. As one researcher points out:

> The longer this developmental sequence is allowed to continue, the more generalized the deficits will become, seeping into more and more areas of cognition and behavior. Or to put it more simply — and sadly — in the words of a tearful nine-year-old, already falling frustratingly behind his peers in reading progress, "Reading affects everything you do."[13]

Having learned phonemes well enough to produce and listen to oral language, there is almost no reason whatsoever for children to give them conscious attention — no reason, that is, unless they need to learn to read an alphabetic script. ■

What about Phonemic Awareness?

The second best predictor of reading success in the USOE First-Grade Studies was children's ability to discriminate between phonemes. Follow-up investigations have not only confirmed the importance of this ability, but clarified and extended it.

Phonemes are the smaller-than-syllable sounds that correspond roughly to individual letters. Although every speaker has functional knowledge of phonemes, lending conscious awareness to them would interfere with listening comprehension: To understand speech, it is necessary to attend to the sense of words and not the sounds. It is because we have so thoroughly automated, so thoroughly mechanized our processing of phonemes that we have attention and capacity for the higher order meaning and nuances of spoken language.

Having learned phonemes well enough to produce and listen to oral language, there is almost no reason whatsoever for children to give them conscious attention — no reason, that is, unless they need to learn to read an alphabetic script. To learn an alphabetic script, children must learn to attend to that which they have learned not to attend to.

After years of working with this issue, researchers now recognize that the major difference between prereaders who get high scores and those who get low scores on readiness tests of phoneme discrimination comes from the ability to understand the instructions.[14] Low-readiness prereaders can *hear* the difference between phonemes as well as high-readiness prereaders can.[15] The difference is that the low-readiness prereaders are simply unprepared to think consciously about the sound structure of words in this way.

Assessing phonemic awareness. In the past decade, researchers have invented tests to assess prereaders' phonemic awareness. The following review is intended to provide a sense of the general nature of the tests, as well as the similarities and differences among them.

Phonemic segmentation tests. The purpose of phonemic segmentation tests is to find out whether children can break a syllable down into its component phonemes. Typical of tests in this category is the tapping test.[16] Very simply, children are asked to listen to a spoken syllable and to tap out the number of phonemes it contains with a wooden dowel. For example, for the word *mat*, a child should tap three times, once for each of the phonemes /m/, /a/, and /t/. In one study, administered at the end of the school year, none of the four year olds and only 17% of the five year olds tested were successful at this task. However, 70% of the six year olds were able to complete the task successfully.[17]

To find out if the performance of the six year olds related to their reading achievement, the researchers administered an achievement test to these students at the beginning of second grade. Half of the six year olds who were unable to do the tapping test were in the lowest third of reading achievement, and none were in the top third.[18]

As provocative as these findings are, it is possible that the ability to tap the number of phonemes is a result of learning to read, as well as a possible cause. Research has found that the better children are at decoding, the better they do on the tapping test, and that performance on the tapping test improves as they learn to decode better.[19]

Phoneme manipulation tests. Another group of tests involves having children manipulate phonemes, such as saying *hill* without the /h/, *monkey* without the /k/, reordering the phonemes in a word, and so forth.[20] These tests, too, are very strong predictors of reading achievement.[21] The tests have been found to be beyond the ability of children before the end of first grade. This should not be surprising because, on close examination, they require all that the tapping test requires and more. As with the tapping tests, the skills underlying manipulation tests may reflect reading ability as much as contribute to it.

Syllable splitting tests. A syllable splitting test requires children to break off the first phoneme of a word or a syllable. In some versions, they then are asked to pronounce the phoneme in isolation — the instructor says *"bear,"* and the students say *"b-b-b."* In other versions, they then are asked to say what is left — the instructor says *"pink,"* the students say *"ink."* Children have only to attend carefully to the sound of the syllable and apply the insight that the initial sound can be broken away. Thus syllable splitting tests are easier than phoneme segmentation or manipulation tests.

But however easy these tests may seem to adults, they are not necessarily a piece of cake for preschoolers. Indeed, the youngest age at which researchers have been able to get children to complete such tests at all has depended in part upon the cleverness with which the instructions are "child-proofed."

When appropriately presented, these tests have been shown to be strong predictors of the extent to which kindergartners will succeed in first-grade reading instruction.[22] Syllable splitting tests can be seen to draw upon an essential, if elementary, form of the sort of phonemic awareness that is presupposed by reading.

Blending tests. In a blending test, the examiner provides

Syllable splitting tests can be seen to draw upon an essential, if elementary, form of the sort of phonemic awareness that is presupposed by reading. ■

children segments of a word (for example, /m/ . . . /a/ . . . /p/) and asks them to put the segments together. While this seems similar to phonemic segmentation tests, blending tests are less sophisticated. In a segmentation test, children have to know which segments are phonemes. In a blending test, all they need to know is that such strange little sounds could be smoothed together into a word. A blending test, moreover, is easier for children with a comfortable familiarity with phonemes produced "in isolation," making it a simple and powerful test of a child's understanding of the nature and function of phonemes.

Oddity tests. In oddity tests, children are presented with a set of three or four spoken words and asked which of the words is different. Sometimes they are asked to base their decision on the first sound of the words, sometimes on the final or middle sounds. Note that when the middle sounds (and often final sounds) are being tested, the task becomes one of rhyme detection.

A blending test, moreover, is easier for children with a comfortable familiarity with phonemes produced "in isolation," making it a simple and powerful test of a child's understanding of the nature and function of phonemes. ■

In one classic study, researchers gave oddity tests to hundreds of four and five year olds and then measured their reading achievement more than three years latter. Even after accounting for differences in age and IQ, the researchers found a highly significant relation between children's performance on the tests and their later reading achievement.[23]

These tests are much simpler than the others discussed so far. Oddity tests require neither the notion that words can be broken down into phonemes nor the familiarity with the sounds of phonemes in isolation. They only require that children be able to compare and contrast similarities and differences in the sounds of syllables. They are thus especially usable with very young children, before they receive formal instruction in reading.

What about knowledge of nursery rhymes? Could there be still simpler tests for assessing phonemic awareness that could be used with still younger children? And where does phonemic awareness come from? Some researchers have come up with the attractive hypothesis that the beginning of phonemic awareness is seeded in children's knowledge of nursery rhymes.[24]

To test their hypothesis, the researchers asked a number of English schoolchildren who were just three years and three months old to recite nursery rhymes. Then every four months until the children were four and a half, the experimenters assessed their progress on various tests, including oddity tests, rhyme and alliteration production, and recognition of letters and words. They found that the children's early knowledge of nursery rhymes seemed to be specifically related

to their development of the more abstract phonological knowledge discussed so far, *and* of emergent reading abilities.

The idea that phonemic awareness and later reading achievement are fostered through children's knowledge of nursery rhymes is extremely attractive. It suggests that the roots of phonemic awareness and therefore success in reading can be found in traditional rhymes and word games such as "Baa Baa Black Sheep" and "Humpty Dumpty."

What about Knowing the Names of the Letters?

Both Chall and the USOE First-Grade Studies reported that the best predictor of beginning reading achievement was a child's knowledge of letter names. This was a highly provocative finding. If true, it implied such a wonderfully direct and simple cure to problems of reading readiness. Obviously children could be taught to name and recognize the letters of the alphabet. Would teaching them to do so really and truly give them an advantage in learning to read?

This question was addressed with a vengeance in the 1960s and 1970s. Ultimately, researchers succeeded in clarifying the role of letter name knowledge. Yes, prereaders' knowledge of letters and their names is a good predictor of the success they will have in learning to read. But no, just teaching them to name the letters of the alphabet won't help very much. It turns out that it is not simply the accuracy with which children can name letters that gives them an advantage in learning to read, it is the ease or fluency with which they can do so. In other words, it is their basic familiarity with the letters.

Thus the speed with which they can name individual letters both strongly predicts success for prereaders[25] and is strongly related to reading achievement among beginning readers.[26]

There are several reasons why speed of letter recognition might relate to reading achievement. For prereaders, speed and accuracy of letter naming is a measure of how thoroughly the letters' identities have been learned. A child who can recognize most letters with thorough confidence will have an easier time learning about letter sounds and word spellings than a child who still has to work at remembering what is what.

Further, there is evidence that a comfortable knowledge of the names of letters hastens the learning of letter sounds because it *mediates* the ability to remember the sounds. That is, if learners know this particular symbol is called *b*, then they can use that fact to help remember that its sound is /*b*/.

Thus the speed with which they can name individual letters both strongly predicts success for prereaders and is strongly related to reading achievement among beginning readers. ■

For older children, the speed of letter naming may be a measure of the automaticity or effortlessness with which letter recognition occurs. Children who automatically see letters as wholes will see words as patterns of letters. Children who do not, will have to work on the patterns of individual letters as well. To the extent that they have to work at identifying letters, children will have less attention left for figuring out words.

Finally, some studies have also found that severely disabled children differ from normally achieving children in the speed with which they name not only letters but also colors, numbers, and objects.[27] This may suggest that differences in retrieving names in general may underlie severe reading failure, but the evidence supporting this hypothesis is not conclusive.

Knowledge of letters and phonemic awareness have been found to bear a strong and direct relationship to success and ease of reading acquisition, and both seem to do so regardless of the instructional approach through which reading is taught. And, it seems further that some special magic lies in the linking of these two basic skills. ■

Putting It All Together

Under the researchers' lens, mental age and IQ have proved to be, at best, weakly and nonspecifically related to early reading development. In addition, researchers have found no compelling evidence either that children's perceptual skills influence their general readiness for reading or that their dominant learning style influences the success they will experience under one instructional approach as opposed to another.

On the other hand, knowledge of letters and phonemic awareness have been found to bear a strong and direct relationship to success and ease of reading acquisition, and both seem to do so regardless of the instructional approach through which reading is taught. And, it seems further that some special magic lies in the linking of these two basic skills.

The predictive strength of letter recognition facility and phonemic awareness bears reflection for two reasons. First, the very strength of the two skills reinforces the notion that emerging familiarity with letter-to-sound relations is of special value to beginning readers. Second, as predictors of reading success, there is something a little strange about them. Specifically, it is not clear how either letter recognition fluency or phonemic segmentation skills can be acquired except through instruction and practice in themselves. What, then, do they tell us about reading readiness? One interpretation impossible to avoid is that the likelihood that a child will succeed in first grade depends, most of all, on how much he or she has already learned about reading before getting there.

Where Do Prereading Skills Come From?

Typically, the way in which children are categorized as "readers" or "nonreaders" is by whether they reach some cut-off

point on some test. Most often, the "nonreaders" are those who are unable to read more than a specified number of words on a test list. But, whatever the particular test, its logic usually requires that the difference between a reader and a nonreader be strictly and categorically defined — each child is placed into one category or the other and nowhere in-between.

Yet reading is not an all-or-nothing skill, any more than is letter recognition or phonemic awareness. The question arises, then: How much might a "nonreader," who has good alphabetic and phonetic skills, know about reading?

Early Experiences

As a partial answer to this question, let me describe my oldest child. As I write this, John is almost five. He has been able to recite the alphabet since he was two, and to recognize all of the capital letters nearly as long; but he still has trouble recognizing some of the lower case letters. He can print very few words on his own (his name, MOM, LOVE) and very occasionally asks us to dictate the letters of other names or words to him. On a couple of occasions, I have caught him inventing spellings in an effort to teach his baby sister how to write. When he prints, he often prints letters backwards. Since age three, he has derived great pleasure from figuring out the first letter of all manner of words. He often asks what a printed word says, mouths along with the phonics exercises on *Sesame Street*, and, every now and then, engages in a binge of trying to sound words out. In addition, rhyming "jokes" are a mainstay of his four-year-old sense of humor.

John's linguistic knowledge cannot be ascribed to rabid interest or precociousness. So where did it come from? I suspect it is owed to the many, many hours of guidance from adults. I estimate that by the time John reaches first grade, we will have spent well over 1,000 hours reading to him. (This is thirty to forty-five minutes each day, equalling 180 to 270 hours per year, over the approximately six years before he enters first grade.) He also will have spent more than 1,000 hours watching *Sesame Street*. And he will have spent a comparable amount of time fooling around with magnetic letters on the refrigerator, writing, participating in reading/writing/language activities at school, playing word and "spelling" games in the car, on the computer, with his sister, and so on.

I suspect that John's reading-related experience is quite typical of that of his middle-class peers in general. But in a fascinating observational study of the home and community lives of three culturally different towns in the southeastern United States, Shirley Brice Heath showed that this kind of

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preschool language and literacy support is also prevalent even within homes of many different racial and ethnic groups that, in economic terms, are quite poor, homes run by adults who are neither college educated nor professionals.[28]

Although the experiences differ from household to household, it is probable that, like John, other children from homes that provide literacy support will have a base of thousands of hours of literacy experiences prior to entering first grade.

The point is that (1) if John — or countless children like him — were to participate in one of our experiments, he would be classified as a *nonreader* with reasonably good phonemic awareness and letter recognition skills, and that (2) when John eventually receives formal reading instruction, he will do fine. Shall we then say that his success was specifically caused by his letter recognition skills and phonemic awareness at age five? Maybe. But bear in mind, John knows a tremendous amount about written English. His letter recognition skills and phonemic awareness are, in some sense, just tips — although critical and quintessential tips — of a reading-readiness iceberg. He will learn to read on schedule because he will have nearly learned to read already.

The single most important activity for building the knowledge and skills eventually required for reading appears to be reading aloud to children. ■

Storybook reading. The single most important activity for building the knowledge and skills eventually required for reading appears to be reading aloud to children.[29] In this, both the sheer amount of and choice of reading materials seem to make a difference.[30] Greatest progress occurs when the vocabulary and syntax of the materials are slightly above the child's own level of linguistic maturity.[31] Studies have found that young children can learn new word meanings from as little as one exposure in a book read aloud.[32]

Rather than reading a story straight through, however, it seems especially important to engage children's active attention. Researchers have shown that when parents are encouraged to expand on their children's comments, suggest alternative possibilities, and pose progressively more challenging questions during storybook reading, their children show strikingly better verbal expressions and vocabulary than do children whose parents do not receive such encouragement.[33]

It is not just reading to children that makes a difference, it is enjoying the books with them and reflecting on their form and content. It is developing and supporting children's curiosity about text and the meanings it conveys. It is encouraging them to examine the print. It is sometimes starting and always inviting discussions of the meanings of words and the relationships of the text's ideas to the world beyond the book.[34]

And it is showing children that we value and enjoy reading and that we hope they will too.[35]

Some problems. Clearly affluence and leisure time bear on the amount and kind of literacy experiences children receive. Yet research makes it clear that poverty is not the major determinant of the literacy preparation children receive at home.

There are, indeed, homes that do not encourage young children's literacy development. Moreover, these homes are best identified neither by income, social class, parental education, nor race, but by the values and styles of the social communities to which they belong. Children from such homes not only miss the literacy coddling of their parents, but they often grow up in a larger environment where reading and writing are peripheral and peripherally valued activities.

Visiting twenty-two homes in such a community, William Teale counted and timed the literacy events that occurred in the presence of each of twenty-four preschool children.[36] He observed that adults in these homes spent roughly ten minutes per day helping their children with such print basics as letter or word identification or with information about the content, nature, or purpose of text. Literacy-related events categorized as "storybook time" occupied, on the average, less than two minutes per day, with many of the children not participating in storybook reading at all.

Assuming that this pattern continues throughout the preschool years, these children will have received about sixty hours of storybook reading and maybe two hundred hours of general guidance about the form and nature of print (assuming that this instruction began around the age of two or three) before they enter first grade.

These averages hide a more disturbing reality. Storybook reading occurred four or five times per week in three of the homes studied. Across the other nineteen homes, it averaged little more than five times per year. For one of the children, storybook reading averaged twenty-six minutes per day; across the other twenty-three children, it averaged less than twenty minutes per month — less than four hours per year.

On entering first grade, it is unlikely that any such children will have learned their alphabet or mastered the skill of phonemic segmentation. Shall we say that this is why they will fail? What about the thousands of school-like reading experiences they also lack? Is there any chance that their first-grade teachers can make up for that difference in 360 hours of one-on-twenty instruction?

For one of the children, storybook reading averaged twenty-six minutes per day; across the other twenty-three children, it averaged less than twenty minutes per month — less than four hours per year. ■

In the end, a great value of the research on prereaders may lie in the clues it gives toward determining what less prepared prereaders need most to learn. For these children, there is not a classroom moment to waste. ■

A Final Word on the Development of Prereading Skills

In the end, a great value of the research on prereaders may lie in the clues it gives toward determining what less prepared prereaders need most to learn. For these children, there is not a classroom moment to waste. The evidence strongly suggests that they must be helped to develop their awareness of the phonemic composition of words. And they must be taught the letters of the alphabet and the phonemic significance of each.

For some children, some of this learning can occur from supportive interactions with a literate environment. Certainly what a child learns about the form and function of print incidentally in 1,000 hours or more of storybook reading will help that child make better sense of beginning reading instruction. But it would be wrong to assume that such exposure is always enough. Although some children learn to read prior to explicit instruction, through the insights they have acquired in interactions with supportive adults, many children with the same amount of exposure do not. For them, instruction is needed to put together the insights they have gained from their experiences. For those many children who have had fewer experiences with print, a school-year's worth of exposure to reading is not enough. Such children need explicit instruction about letters and sounds, but such instruction must take place in an environment where they are surrounded by print in the form of storybooks, notes, displays, charts, and so forth.

Even before our children enter school we must become committed to developing their appreciation of and familiarity with text. We hug them; we give them treats and good things to eat; we try to teach them to be polite, good natured, thoughtful, and fair. We do these things because it is the best way we know to set them off on happy, healthy lives. We must do as much with reading.

Preparing Young Children to Read

Learning about Sounds in Spoken Words

From research, we now know a great deal about the knowledge that children need to become skillful readers. This chapter draws from this body of research to examine how children develop that knowledge. In particular, the chapter looks at how young children become aware of spoken language. The discussion focuses on spoken words, syllables, phonemes, and onsets and rimes (which are units falling between syllables and phonemes).

Becoming Aware of Spoken Language

The problem in developing awareness of the different units in our language, or linguistic awareness, seems to be that the capacity of our active attention is limited. In speaking and listening, our attention is focused on the task of comprehending, the task of making sense out of the collective, ordered stream of words. To focus instead on each individual word, syllable, or phoneme is counterproductive. If we focused on the sounds in conversation, we would quickly lose track of the rest of the spoken stream and miss the message. For purposes of *listening* to language, therefore, it is fortunate that the processing of phonemes, syllables, and words is automatic.

For the purposes of reading or writing, however, children must pay attention to these units. They must push their attention down from the level of comprehension at which it normally works. Not surprisingly, the deeper into the system they must push, the harder it is for them to do. And so, awareness of clauses or propositions develops earlier and easier than awareness of words. Awareness of words develops earlier and easier than awareness of syllables. And awareness of syllables

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develops earlier and easier than awareness of phonemes. Awareness of phonemes, although the most closely tied to decoding skills, seems to come only after a child is aware of larger units.

Becoming Aware of Spoken Words

Words seem such obvious and accessible units of speech to adults. To us, they are fundamental units of meaning. We use them all the time in speaking to children, and they to us. Much of the linguistic growth of preschoolers consists of learning new words. And just a few years before, their speech began with single word utterances. Nevertheless there is evidence that words, as such, are not obvious and accessible units of speech for young children.

Surprising as it may seem, the evidence shows that children are inclined neither to conceive of spoken language as a string of individual words nor to treat words as individual units of meaning. ■

Surprising as it may seem, the evidence shows that children are inclined *neither* to conceive of spoken language as a string of individual words *nor* to treat words as individual units of meaning. What they listen for is the full meaning of an utterance, and that comes only after the meanings of the individual words have been combined — automatically and without their attention.[1]

Early reading instruction begins with the assumption that words are individual units of language. The concept of word and the ability to recognize otherwise familiar words when examined one at a time is presumed. Moreover, the word "word" is nearly unavoidable in instruction about reading. To make any sense whatsoever out of their classroom activities, children must already understand or quickly catch on to the idea of what a word is.

Fortunately, it should be fairly easy to induce children to attend to words. And, indeed, this is so. Even in a single setting, young children can make great progress in segmenting sentences into individual words (although they are extremely resistent to conceding that function words and prepositions are isolable words).[2]

Of course, the number of children who learn about words through such experiments is extremely small. How do the rest of them do it? Many learn through exposure to print. In speaking, we do not produce words one by one. We do not pause between them, but produce our clauses in one single continuous breath of voicing.[3] In print, there are spaces between the words. As children become aware of the one-by-oneness of words in print, they begin to notice and isolate words in speech. Apparently no great amount of reading sophistication is required for this insight. One researcher showed that word awareness increases dramatically along with

the earliest signs of emerging reading ability.[4]

Becoming Aware of Spoken Syllables

Syllables are the smallest units of speech that can be produced in isolation. Further, unlike words, individual syllables are physically distinguishable in speech.

Not surprisingly then, syllabic awareness can be acquired relatively easily. First, even people with little or no reading ability generally can learn to direct their attention to syllables with reasonable ease and success. This has been found to be true for preschool children[5] and for slow beginning readers.[6]

Compared with words, however, syllables are still deeper in the system, still farther removed from meaning, and still closer to phonemes. This suggests that their conscious appreciation might be more difficult and more strongly related to reading acquisition than the conscious appreciation of words. Consistent with this suggestion, studies have shown that the ability to detect syllables in speech or to segment syllables from speech predicts future reading[7] and is related to the reading progress of beginning readers.[8] In addition, it differentiates older disabled readers from normally achieving readers.[9]

The suggestion, in short, is that syllabic awareness constitutes an essential link between the seemingly easy-to-acquire ability underlying our sensitivity to sound similarity and rhyme[10] and that hard-to-acquire capacity to recognize individual phonemes.[11] In particular, the sensitivity to syllables in spoken words may be the beginning of reflection about spoken language that leads through phonemic awareness to learning of letter-sound correspondences.

In particular, the sensitivity to syllables in spoken words may be the beginning of reflection about spoken language that leads through phonemic awareness to learning of letter-sound correspondences. ■

Becoming Aware of Phonemes

To appreciate the alphabetic significance of letters, children must gain conscious access to phonemes. Yet the sounds of individual phonemes are not physically dissectable from the speech stream, but are thoroughly blended within the syllable.[12] The nature and importance of phonemic awareness was reviewed in the previous chapter. This discussion, therefore, focuses on the question of how this awareness might develop.

The reading system is set up to give readers a "double or nothing" return on phonemic knowledge. To the extent that children have learned to "hear" phonemes as individual and separable speech sounds, the system will enhance their ability to remember, or "see," individual letters and spelling patterns. To the extent that they have not learned to "hear" the pho-

nemes, the system cannot help their learning of individual letters and may even work against the efficient learning of spelling patterns.

It is from this perspective that we finally understand those earlier reported findings about the special magic of learning letters and their sounds together. On the one hand, we saw that teaching children to recognize letters produced little reading benefit unless the children were also taught the letters' sounds.[13] On the other hand, we saw that training phonemic awareness produced little reading benefit unless children were also taught the printed letters by which each phoneme was represented.[14] Functional understanding of the alphabetic principle depends equally on knowledge of letters and on explicit awareness of phonemes *because it depends so closely on the association between them.*

Faced with an alphabetic script, children's levels of phonemic awareness on entering school may be the single most powerful determinant of their success — or failure — in learning to read. ■

Faced with an alphabetic script, children's levels of phonemic awareness on entering school may be the single most powerful determinant of their success — or failure — in learning to read. As crucial as phonemic awareness is to the process of learning to read, however, conscious phonemic awareness is also very difficult to acquire. As we found out earlier, children have a highly developed knowledge of phonemes long before learning to read; if they didn't, they could not produce or understand oral language. But, again, this is functional knowledge, not conscious knowledge. It is deeply embedded in the workings of the phonological processor.

Unlike awareness of words or syllables, the capacity to attend to phonemes is not easily attained. In particular, it seems to develop only through explicit training or through the learning of an alphabetic script.[15] As an example, unless they can read an alphabetic language, phonemic awareness is rare even among Chinese scholars.[16]

Although phonemic awareness can be explicitly taught, successful efforts to do so have involved many sessions of training.[17] Further, among normal readers, the ability to count the phonemes in a syllable is only beginning to stabilize by the end of first grade.[18] The ability to delete, transpose, or add phonemes to a syllable continues to develop at least through high school.[19] Thus full attainment of phonemic awareness also takes considerable time.

In view of the extreme importance of phonemic awareness, the difficulty in instilling it is disturbing. Moreover, the difference in difficulty of establishing awareness of phonemes versus syllables seems far too great.[20] We can hardly help but ask — isn't there anything in between?

Becoming Aware of Onsets and Rimes

Acoustically speaking, the syllable is a spoken unit that cannot be analyzed. But psychologically speaking, it is obviously analyzable. That the syllable can be analyzed into phonemes is obvious because (and perhaps *only* because) we have learned the alphabetic script. Researchers also have long been aware that phonemes themselves are composites of still smaller units, corresponding to the place, manner, and voicing with which we produce them. To illustrate each:

Place: /b/, /p/, /m/, and /w/ are made with our lips while /t/, /d/, /s/, /z/, /n/, /l/, and /r/ are made by placement of the tongue on or near the ridge of gum behind our teeth.

Manner: "Stop" consonants, /p/, /b/, /t/, /k/, and /g/, are produced by momentarily but completely obstructing the flow of wind from our mouths at their places of articulation. "Fricatives," /f/, /v/, /th/, /s/, /z/, /sh/, and /h/, are produced by forcing a controlled leak of air through their place of articulation. "Nasals," /n/, /m/, and /ng/, are produced by forcing the air out through the nose.

Voicing: Some of our consonant sounds are all wind, and others include vocal accompaniment. To see this, place your fingertips on your Adam's apple while you pronounce the following, otherwise matched, voiceless versus voiced pairs of phonemes:

/p/ - /b/
/t/ - /d/
/f/ - /v/
/s/ - /z/.

Now, the point is that most of us become aware of these features only in school or by reading something like this. Conscious awareness of them, after all, is not necessary for listening, speaking, reading, or writing. Despite this, these features become everywhere noticeable, once we become aware of them. By extension, if someone would just point it out to us, mightn't there be some intermediate and instructionally useful level of analysis between the syllable and the phoneme? Not too long ago, some linguists and psycholinguists proposed that there is.[21]

They suggested that there are units between the phoneme and syllable, which they called the "onset" and the "rime." The onset is the part of the syllable that precedes the vowel; the rime is the rest. All syllables must have a rime. Not all need have an onset. To clarify, here are some words divided into onsets and rimes:

Now, the point is that most of us become aware of these features only in school or by reading something like this. Conscious awareness of them, after all, is not necessary for listening, speaking, reading, or writing. ■

Word	Onset	Rime
I	.....	I
it	.....	it
itch	.....	itch
sit	s-	-it
spit	sp-	-it
split	spl-	-it
splint	spl-	-int
pie	p-	-ie

Looking at syllables as being made up of onsets and rimes can explain several useful phenomena. For example, it is well known that beginning readers make significantly more errors on consonants at the end of words than at the beginning.[22] If the letters mapped neatly onto phonemes, this would be hard to explain. After all, if children know that *p* says */p/* in *pat*, why would they fail to realize that it said */p/* in *tap*? Further, children have greater problems recognizing a consonant when it is blended (as in *smoo*) than when it is alone (as in *soom*).[23]

In both cases, thinking about onsets and rimes as psychological units provides a useful explanation. In the first case, *p* is recognized more easily when it is alone in the onset than when it is encoded as part of the rime. In the second case, *s* is recognized easier when it is alone in the onset than when it is part of an onset (*sm*).

More evidence for the psychological reality of onsets and rimes comes from syllable splitting tasks in which children insist that the first sound in *swing* is */sw/*, and from studies of children's decoding skills showing that children are better at identifying the spelling of whole rimes than of individual vowel sounds.[24]

Putting It All Together

The basic units of representation in print are words and letters. Before children can acquire a productive understanding of the significance of these units, they must acquire an awareness of their spoken correspondences, words and phonemes. Yet it seems that awareness of neither is a natural by-product of oral language capabilities.

Though not natural, awareness of words seems to come quite easily. Several researchers have suggested that the key to the development of word awareness may lie in children's exposure to print.[25] More specifically, it may derive from the observation that written words are represented as discrete units, as wholes unto themselves and separate from each

other.[26]

In contrast, the development of phonemic awareness is very often both slow and difficult. Among those children who will learn to read successfully but who are not sensitive to phonemes before reading instruction is begun, phonemic awareness seems to develop alongside their word recognition skills.[27] A lack of phonemic awareness, however, appears to be characteristic of children who are failing or have failed to learn to read.[28]

Although phonemic awareness is not spontaneously acquired, it can be taught successfully. Furthermore, when reading instruction is methodically coupled with such training, the success rates are dramatic.[29] Typically, such programs engage children in a variety of games and activities involving nursery rhymes, rhymed stories and rhyme production, segmentation of sentences into individual words, investigations of word length, clapping and dancing to syllabic rhythms and solving puzzles, and finally, isolation and identification, first of initial phonemes, and then of word-final and internal phonemes.[30]

Although phonemic awareness is not spontaneously acquired, it can be taught successfully. Furthermore, when reading instruction is methodically coupled with such training, the success rates are dramatic. ■

With respect to accelerating children's reading and writing achievement, the evidence from such training programs is compelling. Toward the goal of efficient and effective reading instruction, explicit training of phonemic awareness is invaluable.

To this high point, I must add a note of caution. A new trend is developing amidst many well-intentioned school communities. Kindergartners are being given tests of phonemic awareness, and, if they fail, are being held back from first grade. This trend is disturbing on two points. First, the key to phonemic awareness seems to lie more in training than in age or maturation. If these children have not received the proper exposure to print and sound in either their homes or their kindergarten classrooms by age five and a half, what is there to suggest that they will receive such exposure by the time they are six and a half? Second, short of its explicit training, the activities that seem to lead most strongly to the development of phonemic awareness are those involved in learning how to read and spell. Thus, in keeping children back to "wait" for phonemic awareness to develop, we hold them back from what may be, to that point in their lives, the best opportunity to allow it to develop.

Yet there would seem to be an easy escape from this dilemma. Specifically, why not suggest that *all* schools incorporate linguistic awareness games and activities into the standard kindergarten and preschool curricula?

The goal is not to transport the first-grade curriculum down to the kindergarten or the preschool. It is instead to encourage teachers to select and structure preschool and kindergarten games, songs, and storybook sessions with their students' linguistic growth in mind. It is to acknowledge that there is much that must be learned before a student can make sense of formal instruction.

Learning about Print in Written Words

We have seen again and again that skillful reading depends critically upon the speed and completeness with which words can be identified from their visual forms. Yet for the beginning reader, it is visual word recognition — the knowledge that makes the orthographic processor work and links it to the rest of the reading system — that is absent.

In the previous chapter, we saw that acquisition of this knowledge depends in part on children's conscious awareness of the phonological structure of speech. It depends equally on children's conscious awareness of the nature of print. No matter the level of a child's phonemic awareness, to make use of it, she or he must learn to identify the visual forms of individual letters. No matter the child's confidence with individual letters and their sounds, such knowledge can be productive only with the additional awareness that words consist of letters, and that text is made up of words. Moreover, not even word awareness is enough. Linking up the system as a whole, building both to it and from it, depends on the child's having certain expectations and understandings about the basic structure and functions of print. These first steps children take in learning about print are examined in this chapter.

No matter the level of a child's phonemic awareness, to make use of it, she or he must learn to identify the visual forms of individual letters. ■

The Development of Print Awareness

Children seem spontaneously to do things that amuse us and make us proud, such as knowing to greet their grandmother's friends with a polite handshake or that an occasion calls for an especially pretty dress. And they seem spontaneously to know things that drive us crazy, such as what kinds of packages are likely to contain candy — even kinds of candy they have never

seen before. Of course, none of this is really spontaneous. Children are shrewd observers. They watch and make generalizations and distinctions with respect to just about everything in their world. And, for children who grow up in a print-rich environment, that includes print.

What are some of the things a child seems to learn about print?

Print is categorically different from other kinds of visual patterns in the environment. In some vague but characteristic way, print is visually distinct from the other sorts of pictures and patterns. On each occurrence, what it looks like, more than anything else, is other print. And though it contains no familiar, legible pictorial information — adults can, quite mysteriously, extract meaning from it.

Someplace in here, children must induce that print symbolizes language and that print holds information. They begin to see that stories in books, grocery lists, instructions for toys, flavors of ice cream, notes from teachers, all are messages found in print. ■

However it works, *print is print across any of a variety of physical media.* It can appear on paper, fabric, television screens, or signs. It can be colorful or black and white. It can be accompanied by lots of pictures or none at all. It can be formed of ink or paint, plastic letters, electronic lights, or finger marks in the dirt.

Further, once you notice it, *print seems to be all over the place.* Not just in books and newspapers, but on storefronts, trucks, envelopes, cookies, coins, cans, and household appliances. It is inside your clothes and outside your shoes. It is even stamped on the backs of your dolls' necks and on the tops of your blocks.

Different kinds of print are used by adults in different ways. They read picture books aloud to you, but newspapers and books without pictures to themselves. They read signs, labels, and tags in stores and announce decisions when they're done. And there's lots of print that they seem to ignore (but they'll tell you what it says if you ask them to).

Finally, *print can be produced by anyone.* There are pencils, pens, crayons, and markers that you can make print with, though it is strongly preferred that you do it on paper. Adults are pleased when you write, although they can't always read it. There seems to be more to producing it than might appear.

Someplace in here, children must induce that print symbolizes language and that print holds information. They begin to see that stories in books, grocery lists, instructions for toys, flavors of ice cream, notes from teachers, all are messages found in print.

There are a number of case studies, chronologies, and descriptions of prereaders' growing understanding of the nature and uses of print.[1] Such development does not occur in

a vacuum. It depends upon growing up in an environment where print is important. It depends upon interactions with print that are a source of social and intellectual pleasure for the individual children and the people who surround them. It thrives on pride and affection, and develops only through extensive experience.[2]

As discussed earlier, many American children enjoy hundreds of hours of storybook reading and perhaps thousands of hours of overall literacy support during their preschool years. As we have also seen, however, many other children receive but a few minutes of storybook reading per year. Such children grow up without exposure to grownups who like to read, without papers and pencils and books to fool with. How much will these children learn about print in their preschool years?

Research indicates that many such children approach school with very little print knowledge. They don't know what a letter or word is, much less how to read one. They don't know that print reads left-to-right, much less that it contains words and sentences. They don't know the front from the back of a book, much less that its print is meant to convey meaning.[3]

The importance of prereaders' awareness of print is becoming more and more recognized. Researchers have pointed out that awareness of the forms, functions, and uses of print provides not just the motivation but the backdrop against which reading and writing may best be learned.[4] The performance of children on tests designed to measure concepts about print has been found to predict future reading achievement[5] and to be strongly related to other, more traditional measures of reading readiness and achievement.[6] More than that, analyses of other measures of reading achievement and readiness indicate that such basic knowledge about print generally appears to serve as the foundation upon which orthographic and phonological skills are built.[7]

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Becoming Aware of Words in Print

As discussed in the last chapter, conscious appreciation of individual spoken words seems not to arise spontaneously among children. Nor is it something that they are regularly taught in any explicit or methodical way. Still, most children must catch on at some point, or they would never master print. The ability to conceive of words as individually speakable, printable, and understandable units is critical not just to learning spelling-sound correspondences but, even before that, to gaining any initial insight into how written language works.

Indeed, it may well be *through* interest in print that

most children *do* catch on.[8] Given the ease with which children can learn to segment words when they are required to do so, this explanation seems credible. Print corresponds to speech, word by word. For many children, this in itself may be all that is needed to provoke word awareness.

Yet here may be a source of concern. When children are left to catch on to an idea by their own devices, who knows what parts of it they will catch on to? Children think. And so, even for so simple a concept as "word," their misunderstandings can be quite elaborate. For children who already have the insight that words are separable units of language, the function of that extra, blank space between them in print may well be self-evident. For children who have not had this insight, however, that extra space may not be enough to tip them off. Studies have confirmed what many teachers have observed — that some beginning readers do not understand the purpose of the spaces between words as they read.[9]

In the end, because the nature and function of words are not always obvious, training in word awareness seems another ideal candidate for the preschool or kindergarten curriculum. Once children have become attuned to words, it is important to show them that those strings of letters between the spaces are the same units that they can find in their speech. To ensure that children understand that this convention of extra-space-between-words is one that works in general, rather than, say, one that only works on the school chalkboard, it is important to point to the words in their storybooks while reading aloud to them.[10]

Exploration of word length is another worthwhile component of print awareness activities.[11] Exploring and contrasting the lengths of printed words may, in fact, serve different purposes. First, it should help clarify the difference between syllables and words, and thereby hasten the insight that a printed word should be meaningful. Second, it should help speed awareness of those short function words whose status proves elusive to so many children.[12] Third, it might nip in the bud the common first-grade notion that all words should be about three to five letters in length.[13] Finally, it is a way of showing children that words that take longer to say also look longer in print; this correspondence between the printed and spoken length of words reflects a basic relationship between speech and (alphabetic) writing.[14]

Awareness of the relationship between the spoken and printed lengths of words is also a strong separator of reading-ready and reading-unready children. In one study, some kindergarten children were presented with pairs of words, one

long and one short, and told, for example, "One of these words is 'mow.' The other is 'motorcycle.'" Then they were asked, "Which one is 'mow'?" Of the reading-unready children, only 10% could chose correctly on seven of eight of the pairs, while 43% of the reading-ready children met this criterion.[15]

Many popular children's books are ready-made for developing word awareness. Dr. Seuss, for example, has been so insightful as to "design" the print in his books rather than just typeset it. In particular, it is often the very word that he has led children to anticipate that he has made graphically distinct. If children are given time to voice these words, his print is ready to answer — there's the word; it's large, colorful, and right in the middle of the page. In addition, Dr. Seuss has a wonderful flair for playing with word length —"Z is for *zyzzer-zazzer-zuzz*,"[16] that seems unfailingly to tickle his young audience.

Becoming Aware That Printed Words Consist of Letters

As has been noted, attention to the print that fills their environment can be the critical first step children take toward reading.[17] In view of this, more precise understanding of what children learn from such "environmental print" is warranted.

Children commonly recognize a variety of environmental print that they encounter day to day. One study showed that children as young as two can "read" the McDonald's™ sign, toothpaste cartons, stop signs, and soft drink logos.[18] Moreover, this ability to "read" labels and logos appears to emerge without apparent teaching.

On closer examination, such "untaught" reading of environmental print depends on a complex array of visual cues. Studies have found that as cues of design and color are removed, the labels and logos become more difficult to identify.[19] Moreover, from several studies, it appears that children's "reading" of such labels and logos is typically quite independent of the print they contain, and that actually they perceive logos as pictures.

But suppose a child's attention is directed to the printed part of a logo. The child might then examine the pattern of print more carefully. Though a step removed from the kind of inductive "emergent" learning we might hope for, it is plausible that, under these conditions, environmental print would support letter learning.

But it is barely plausible. After all, that which characterizes a good logo or label is its distinctiveness. The lettering used on one brand of soup is intended to be visually distinct from that used on any other. Just from the visual similarities

and differences of the print on labels and logos, how long would it take anyone to realize that, functionally speaking, there were just twenty-six letters? Note that, in contrast to the print children see in their environment, books —including preprimers and primers — are usually printed in a relatively uniform typeface.

When children do come to perceive printed words as sequences of individual and individually identified letters, environmental print may contribute much to word recognition growth. To do so, however, the children must first have begun to learn about the individual letters.[20]

Learning the visual identities of letters is not a snap even for children who are interested in doing so. It takes time and practice and requires careful visual attention. ■

Learning the Visual Identities of Letters

Research indicates that before entering school, most children have learned to identify and name most of the letters of the alphabet — or at least most of the upper case letters.[21] Further, as discussed earlier, children's facility in identifying and naming letters has been shown repeatedly to be a powerful predictor of their reading achievement. First, it has been shown that learning about letters frequently turns easily into interest in their sounds and in the spellings of words.[22] Second, familiarity with letters is strongly related to the ability to remember the forms of written words and with the tendency to treat print as an ordered sequence of letters rather than a holistic pattern.[23] Finally, not being able to recognize or name letters is coupled with extreme difficulty in learning letter sounds[24] and word recognition.[25]

It is easy to conclude that learning to recognize and discriminate between the letters of the alphabet is an important first step toward reading. What is it about the visual forms of letters that makes them hard to master?

The Difficulty of Learning to Recognize Letters

The letters of our alphabet are graphically sparse and confusable, looking as much like each other as anything else a child will have learned to date. They are abstract — how much easier it would be if an *a* in some way resembled an ant, a *b* a ball, and so on. In addition, the letters defy the child's learned indifference to orientation: A cup is a cup turned any whichway, but *d*, *b*, *p*, and *q* are distinctly different letters. They must be learned in such a way that they will be recognizable across a variety of hands and typefaces. And, in fact, there is not one set of twenty-six basic letters to be learned, but four, including both upper case and lower case in both manuscript and cursive. Learning the visual identities of letters is not a snap even for children who are interested in doing so. It takes time and

practice and requires careful visual attention.

Research indicates that the shapes of letters are not remembered as holistic patterns. Instead, the visual system analyzes each letter into its elementary features — its horizontal, vertical, and diagonal line segments and its arcs — and then represents the letter's overall shape in terms of the relative positions, orientations, lengths, and sizes of these elements.[26] Thus we are indifferent to changes in the size or distortions in letters — what is important is the *relative* size, obliqueness, or extent of their *parts*.

Over time and with increasing familiarity with print, children become sensitive to the types of spatial relationships that distinguish one character from another. Given a set of novel, letterlike characters to inspect, children become progressively more attuned to gaps or openings between the features (as in the difference between *C* and *O*, *F* and *P*, and *A* and *H*) or to changes in rotation or orientation (as in the differences between *b*, *d*, *p*, and *q*). Meanwhile, children also become progressively indifferent to the kinds of visual differences that do not distinguish one character from another.[27]

Letter reversals seem to be merely a symptom of low print knowledge, rather than a cause of reading problems. ■

In the past poor readers' errors with letter orientation were often interpreted as signs of neurological dysfunction or immaturity.[28] Current research suggests instead that such errors reflect nothing more than insufficient knowledge of letter shapes.[29] Letter reversals seem to be merely a symptom of low print knowledge, rather than a cause of reading problems. Moreover, training children to attend to the relevant contrasts between letters has been shown to hasten their ability to recognize and distinguish between them.[30]

Teaching Children to Recognize Letters

Research indicates that the way in which children are most often introduced to letters at home is through the alphabet song and, further, that these children typically learn to recite the names of the letters long before they can recognize them. For teachers planning letter recognition instruction, there are a couple of useful points lurking in these observations.

First, letter learning for these children typically does not proceed by showing them the letters and then teaching them the names. That's backwards. Most children, instead, are taught the letters only after they know their names. By thoroughly learning the names first, children have a peg to which their perceptions can be attached. More than that, they have a set of conceptual anchors with which to sort out relevant and irrelevant differences in the letters' appearances. Second, it is significant that the initial ability to recite the alphabet is so

often achieved through the alphabet song: Songs, with their rhyme, rhythm, and tune, are far easier to learn than unintoned lists. Third, these children typically learn the names of letters long before being introduced to their sounds. When it is time to learn the sounds of the letters, their solid, overlearned familiarity with the letter names probably protects them from confusing the two.

For children who enter school with little knowledge about letters, potential confusions between their names and sounds are far more likely. And, although the sound of a letter is often similar to its name, there are important functional differences between the sound and name of a letter. In the interest of preventing any such confusion, a few programs avoid the use of letter names altogether, relying instead on the sounds of the letters for purposes of reference.

With respect to teaching upper case and lower case letters, current learning theory holds only one suggestion: When working with children who have little or no letter recognition facility, teachers should not try to teach both versions of all twenty-six letters at the same time. ■

Although the motivation for this practice is well founded, it must be implemented with special care. Because learning about the sounds associated with the letters is itself a difficult task, the pace of learning the identities of letters must be relatively slow in such a program. To support adequate overall progress, the curriculum must be carefully designed to maximize reading and writing activities with the letters taught thus far. Without such care, it may be easier to make sure that children firmly recognize letters before formal instruction on spelling-sound relations or word recognition.

Upper case and lower case letters. With respect to teaching upper case and lower case letters, current learning theory holds only one suggestion: When working with children who have little or no letter recognition facility, teachers should not try to teach both versions of all twenty-six letters at the same time. To try simultaneously to teach two visually distinct forms with identical responses amidst fifty other often confusable forms with confusable sounds and labels will almost guarantee learning difficulties.

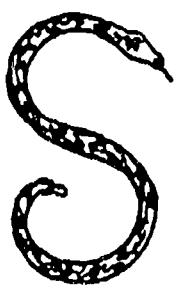
Eventually, of course, children must learn to recognize both upper case and lower case letters. At some point, each must be taught. Which should be taught first? With preschool children, the upper case letters are probably the best bet: Upper case letters are visually more discriminable from one another.[31] In addition, whatever letter knowledge the children already have is most likely to be about upper case letters.[32] On the other hand, the ability to recognize lower case letters is more important for reading text. Therefore, if working with first graders with little letter knowledge, it may be wiser to give priority to the lower case letters.

The question of how best to deal with confusable letter

forms becomes acute in teaching lower case letters. To minimize confusion between visually similar letters, such as *b* and *d*, research suggests it is best to separate their introduction so that the children are thoroughly familiar with the first before they are asked to learn the second.[33]

Research also suggests that it is a good idea to encourage children to print from the start. Learning to print is a powerful means of developing letter recognition skills. In addition, knowing how to print allows children to write words as soon as they are introduced — and, as we shall see, writing is a solidly productive activity for the young reader along many dimensions.

Finally, whenever letter-sound instruction is begun, research endorses the use of letter/keyword/picture displays, such as this one:



Such displays provide useful mnemonic support as they present an integrated reminder of the letter's shape and sound at once.

Ideally, children should become familiar with letters long before they get to school. The goal is to ensure that they recognize letter shapes, and can discriminate among them before they are faced with the tasks of learning the letters' sounds, or, more generally, of learning to read words. After children have become thoroughly familiar with the letters and their names, reading and writing activities follow more easily. Recall that it is not just accuracy of letter recognition but how automatic the recognition is that contributes to eventual reading success. This automatic recognition comes from practice and familiarity.

Ideally, children should become familiar with letters long before they get to school. ■

The Value of Pictures

Pictures are a prominent feature of most children's textbooks. Two major justifications are generally offered for their presence: (1) pictures may provide cues for identifying words that are otherwise hard to recognize; and (2) pictures may stimulate interest in reading a text and promote a better understanding of the information in the text.

Given the prevalence of illustrations in trade books and textbooks alike, the more important question is probably whether their presence helps or hurts children's tendency to learn about the words of connected text. ■

Pictures as Aids for Word Recognition

It used to be that the practice of presenting an identifying picture along with each new sight word was very common in basal reading programs. Against this practice it has been suggested that the presence of identifying pictures might actually interfere with printed word learning. After all, if children can derive their response from pictures, mightn't that displace or at least detract from the attention they might otherwise pay to print?[34]

Several studies have since provided answers to this question. If the goal is to help children to identify an unfamiliar, isolated word, accompanying pictures are generally helpful. On the other hand, if the goal is to induce children to attend to and learn about details of the print, the pictures are better omitted.[35]

Pictures as Aids to Interest and Comprehension

Given the prevalence of illustrations in trade books and textbooks alike, the more important question is probably whether their presence helps or hurts children's tendency to learn about the words of connected text. The research on this issue is sparse, but — so far at least — the answer seems to be neither.[36]

Basal reading programs often suggest the use of pictures for purposes of promoting children's interest in and understanding of the text prior to reading.[37] The teachers are to ask such questions as "What is going on in the picture?" and "What do you think will happen?" The children then are supposed to read the text and find out.

The underlying assumption is that children will transfer this questioning approach to their own, independent reading. Do they? In fact, from research we know that when reading silently, children take more time reading illustrated than unillustrated texts. They also pay more attention to the pictures when the text is relatively difficult for them.[38]

The suggestion, then, is that the children do attend to the pictures when left to their own devices. But do they do so in a way that is constructive? The evidence is sparse, but there is none to the contrary. In general, we know that information that is illustrated tends to be better remembered, particularly at the level of details. In addition, illustrations appear to be an effective means of inserting information that is consistent with but supplementary to the text (although incongruous illustrations can disrupt memory for text). And, importantly, the presence of supportive illustrations seems not to diminish comprehension for unillustrated sections of text.[39]

In short, the research provides no arguments against

the presence of text-compatible illustrations. Toward the goal of instilling the most positive attitudes toward text, however, there is a strong argument for their presence and for making books as enticing and attractive as possible.

For younger children, who are not yet reading themselves, intuitions suggest that pictures often provide an important and pleasing means of comprehension support. Extending our intuitions, research indicates that — in both quantity and quality — parent-child discussions of pictures are key to the appreciation of language and literature that grows from picture book reading.[40]

Promoting Awareness of Print

In preschool and kindergarten programs, enhancement of children's concepts about print should be a central goal. The classroom itself should be full of print and the print should be varied, functional, and significant to children. In addition to displays of current activity themes and the children's names and birthdays, cubbies and nooks should be labeled, sign-up lists posted, and so on. Visits to the school or public library are well worth the hassle. And research everywhere indicates that reading books with children is especially valuable.[41]

Big books are the classroom version of bedtime stories, and, like bedtime stories, they are meant to be read over and over, as often as they are enchanting. ■

Sharing Big Books with Children

Books should be read in such a way that children can examine the pictures, discuss all aspects of meaning, and become aware of the format and function of print. To this end, the use of "big books," or oversized versions of texts, offers many possibilities.[42] Teachers can use these books to share print with a whole group of children as visibly and interactively as they might share a normal-sized book with just a few.

Big books are the classroom version of bedtime stories, and, like bedtime stories, they are meant to be read over and over, as often as they are enchanting. Stories with predictable patterns, such as "The Gingerbread Man" and "The Three Billy Goats Gruff" are favorite candidates for big books. The semi-repetitive schemes of these stories invite the prediction of events. Moreover the repetitive refrains invite prediction of and, so, engagement in the wording.

Repeated readings and repetitive texts set the stage for the acquisition of a broad sight vocabulary. Children can hunt down repeated words, and may acquire them as sight words. Acquisition of a few sight words early in the learning process is surely a good thing.

In reading a big book aloud to children, it is suggested that the teacher point to each word as it is read.[43] This serves to

introduce the status of printed words, and to illustrate that text proceeds from top-to-bottom and left-to-right.

As children become more familiar with the nature of texts, word exploration can become more methodical. For example, reading situations can be used to lead children to discover the visual differences between one word and two words or between long words and short words.

Rhyming texts may be ideal for introducing the basic concept of spelling-sound correspondences. For more focused discussions of spelling patterns, a cardboard mask can be used.[44] By exposing just one word or letter through the center of the mask, the teacher can direct children's attention to that one word or letter. By progressively unmasking the letters of a word as they are read, the teacher can help children to understand that letters, too, proceed left-to-right.

Language Experience Activities

As important as books are, there is a more basic message to be conveyed about written text. Specifically, text is language.

The language experience approach was designed to convey this point in the most self-evident manner: Let students see that print is "talk written down." The variety of classroom opportunities for capturing talk in writing is limited only by imagination. One method is the use of experience charts. Experience charts are developed by writing down children's own oral language and then leading them to understand that what has been written is what they have said. Thus experience charts are intended to be a natural bridge between oral language and literacy.

For example, language experience activities can be used for preparing a class exercise or, afterwards, for discussing it. Before a unit on spiders, for example, the teacher can make a poster listing a comment about spiders from each child. After the unit, the teacher can make another poster eliciting new knowledge.

In managing such discussions, the teacher may be tempted to paraphrase a child's contribution or to summarize the contributions of the group. To do so, however, runs awry of the spirit of the approach. Although the teacher may profitably take the opportunity, for example, to refine the syntax of a contribution, the words that are written should be the words that the children feel that they have produced. Not just the personal involvement of each learner, but more importantly, the very "Aha!" experience that the approach is intended to produce, depend on the children's seeing that the print represents their own words.

As with big books, language experience activities provide a natural medium for clarifying the concept of *word*, for pointing out that individual words are separated by spaces, and for pointing out that print is written from left to right and top to bottom and that the end of the line is not always the end of a thought.[45]

It has been argued additionally that, because comprehension is not a problem with self-produced materials and, moreover, because the message is familiar before it is read, language experience charts offer certain distinct opportunities for conveying information about the sound-symbol structure of print. Specifically, the children may be led to notice that words consist of sets of ordered letters that look roughly the same every time a word is written, that words are made up of letters, and that "each letter of the alphabet stands for one or more sounds I make when I talk."[46]

Advocates of the language experience approach suggest that the texts under study be progressively expanded from transcripts of children's own speech to texts written by others, including storybooks, signs, and so on.

Given its strengths and possibilities, it is not surprising that the language experience approach has sometimes been used as the central vehicle for reading instruction. Research, however, indicates that it produces achievement no better than traditional programs, and may be less effective in developing comprehension.[47] On the other hand, the approach has been found especially effective for developing basic print awareness. For the purposes of conveying and refining the relation between print and language, what better means could there be than giving children written displays of their spoken thoughts?

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Putting It All Together

The ability to read does not emerge spontaneously, but through regular and active engagement with print. For a child who is well prepared to learn to read, the beginning of formal reading instruction should not be an abrupt step, but a further step on a journey already well under way.

While preschool knowledge about written language is typically developed at home, schools can play an important role. Print awareness, letter familiarity, and phonemic awareness can all be developed through classroom instruction in the preschool, kindergarten, and first grade.

Moving into Reading

Issues in the Teaching of Phonics

The reading process, as we have seen, is driven by the visual recognition of individual letters in familiar, ordered sequence, and it is critically supported by the translation of those letter sequences into their phonological correspondences. Throughout this book, it has been suggested that activities requiring children to attend to the individual letters of words, their sequencing, and their phonological translations should be included in any beginning reading program. This chapter examines the structure and assumptions of phonics instruction more closely.

Teaching Individual Letter-Sound Correspondences

Written English is fundamentally alphabetic. The purported advantage of an alphabetic script is that if one learns the speech sounds corresponding to each of its individual letters, one has the requisite knowledge to read and write any word in the language. Thus, Rudolph Flesch insisted: "Teach the children individual letter-sound correspondences. Teach them to read words by chaining these individual correspondences together. Memorization of a score or so of elementary symbol-sound pairs yields mastery of tens of thousands of words and uncountable sentences and ideas."[1]

Yet looking at the map and traveling the route are often two very different things. Anyone who has tried to pull it off knows that, in practice, the seemingly smooth and direct route can, for some, be slow and tortuous going. This is true especially in beginning reading instruction, and especially when a teacher is working with students who are not well prepared for reading. Let us examine some of the complications.

Yet looking at the map and traveling the route are often two very different things. Anyone who has tried to pull it off knows that, in practice, the seemingly smooth and direct route can, for some, be slow and tortuous going. ■

To make sure that all necessary letter-sound pairs are learned well, teachers must see to it that students receive sufficient practice with each pair, and that they evaluate what their students are learning. ■

The Right Amount of Practice

The first complication comes from the fact that both letters and their sound correspondences are abstract and easily confusable. Because of this, letter-sound pairings are not very easy to remember; in fact, they are very easy to forget or confuse.

As discussed earlier, for children who enter the classroom with lots of prior experience with print, the content of letter-sound lessons consists more of review and clarification than of new information. For them, the lessons are relatively easy. Furthermore, the purpose of the lessons is clear and the children's motivation should be relatively high. It follows that, for these children, the letter-sound lessons may proceed quite quickly.

In contrast, children who enter school with almost no relevant knowledge about print are likely to have less interest in these lessons and less appreciation of their point. We might therefore expect their learning to be slower and their patience to be slimmer.

At the same time, however, mastery of the letter-sound relations will require more study for these children. Some of them may still be having difficulty discriminating between the letter shapes. Their entering level of phonemic awareness often is relatively low, as is their knowledge of letter-sound relationships. Much of the content of the beginning reading lessons will be new in detail and concept and, as a consequence, more confusing and harder to put together.

To make sure that all necessary letter-sound pairs are learned well, teachers must see to it that students receive sufficient practice with each pair, and that they evaluate what their students are learning.[2] The implication, in short, is that the teaching of individual letter-sound correspondences cannot proceed terribly quickly for children who have limited knowledge about print. It must be spread over time.

How much time? As a first answer, we may look to published reading programs. We may assume that the teaching schedule they propose reflects the estimates of their experienced developers as to the pace at which first graders can absorb these correspondences.

One study analyzed eight beginning reading programs designated for use by students entering school without high levels of literacy preparation.[3] Although each of the eight programs included phonics instruction, they differed in philosophy. In particular, four of the programs emphasized teaching symbol-sound relations, while the remaining four emphasized engaging students in the reading of meaningful whole words, sentences, and stories from the start.

Across the first semester of first grade, the number of letter-sound correspondences taught in these programs ranged from seven to thirty-seven with a median of twenty-three or twenty-four. Given an eighteen-week school semester, the pace of these programs ranged from two weeks per correspondence to two correspondences per week. Even throwing a few weeks away for "adjustment time" and so on, it is clear that, averaged over the semester, none of the programs was designed to introduce more than two or three letter-sound pairs per week.

Is that an encouragingly fast pace or a discouragingly slow one? Let us reserve judgment while we examine a few more dimensions of the issue.

How Many Pairs Must Be Learned?

If English were perfectly alphabetic — if each letter corresponded to exactly one sound and vice versa — then the number of letter-sound pairs to be learned would equal twenty-six.

Because the correspondence is not consistently one-to-one, however, but often one-to-several in both directions, there are many more than twenty-six letter-sound pairs to be learned. Exactly how many? A number of studies have tried to find out.

Just to represent the spelling-sound correspondences of a good majority (80% to 90%) of English words — that is, ignoring true exceptions — it has been found that hundreds of correspondences are involved.[4] In a study where concern was restricted to the one- and two-syllable words common to the reading materials of six to nine year olds, the number of relevant spelling-sound correspondences was found to be 211.[5]

Against a grand total of hundreds of correspondences, the pace of even the most fast-moving of the eight programs analyzed may seem disturbingly slow. It is important to recognize, however, that not all of the nameable correspondences are equally useful. Not all are required with equal frequency. Not all need to be learned in the first grade. And not all that eventually will be learned by the maturing reader need be taught explicitly. For example, while the silent *e* pattern seems useful, memorizing the six pronunciations of *ough* seems excessive. It might be better to ask *which* correspondences should be taught rather than how many.

On this point, however, there is no available research to guide us. Beyond the most basic of basics and despite a long history and broad use, the various presentations of phonics lessons in reading programs contain little in the way of agreement as to the best set of letter-sound pairs to teach explicitly to students.

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How Should the Correspondences Be Taught?

Instructional programs on letter-sound correspondences are, by and large, based on principles. A major reason for the disagreement among programs as to methods and schedules of instruction is that one program's principles are markedly different from those of another program. It appears that every program has a different way to handle the issues of

- how best to establish the alphabetic principle,
- how to deal with phoneme accessibility,
- how best to avoid confusing instruction, and
- how to deal with letters with multiple sounds.

The following discussion examines each of these issues.

Early on, teachers want students to understand that all twenty-six of those strange little symbols that comprise the alphabet are worth learning and discriminating, one from the other, because each stands for at least one of the sounds that occur in spoken words. ■

Establishing the alphabetic principle. Perhaps the single most important goal in giving students a productive knowledge of letter-sound correspondences is to convey to them the basic alphabetic principle. Early on, teachers want students to understand that all twenty-six of those strange little symbols that comprise the alphabet are worth learning and discriminating, one from the other, because each stands for at least one of the sounds that occur in spoken words. How can teachers possibly convey this insight? Novel, abstract concepts can't be explained well, to children or to anyone else. Such concepts must be illustrated. Teachers must show students that letters do, indeed, represent sounds. They must persuade students that this is true not of only one letter or even of a few, but, of much more importance, that it is the core principle of our writing system.

So how might teachers best illustrate this principle? Most obviously, it is through the consonants. The mapping from single consonants to phonemes tends to be one-to-one. In the initial position and in short (two- and three-letter) words, this is all the more true, making the consonants appealing for beginning instruction. Introducing the letters *y* and *w* as consonants allows teachers to address the significance of twenty-one of the twenty-six letters through this approach. Alternate pronunciations of *y* and *w*, as well as those few true consonants that do misbehave (for example, *c* as in *city* instead of *cat*, *g* as in *giant* instead of *got*, *s* as in *sure* instead of *sun*, and *h* as in *hour* instead of *hit*), can be postponed until after the alphabetic principle has been established.

In contrast to the consonants, the vowels are rampantly irregular in the English writing system. Yet five of the letters in the alphabet can be treated only as vowels, and they too must be introduced. Quite fortunately, when vowels occur singly in three-letter words, they most often take on a regular, "short" pronunciation. Most of the phonics-emphasis programs teach

short vowels early in their instructional plan.

Dealing with phonemic accessibility. To establish the link between a letter and a sound, the learner must first establish a clear image of each. We can print or point to individual letters, one by one. The phonemes, in contrast, are more elusive. In normal speech, their images are fleeting. As noted earlier, they do not correspond to discrete segments in spoken language. In speech, their features overlap with one another in time such that their sounds are entwined with one another. In view of this, it is not surprising that a number of the principles guiding initial phonics instruction are directed toward making the phonemic side of the letter-sound relationship as obvious as possible.

Perhaps the most widespread technique consists of using letters whose sounds can be pronounced in isolation with least distortion. Among the consonants, the most popular in this category are *f*, *m*, and *s*. The sounds of each of these letters can be exaggerated both in isolation (/*f-f-f*/, /*m-m-m*/, /*s-s-s-s*/) and in the words in which they occur (such as *s-s-s-snake*). Other consonants with these attributes are *l*, *n*, *r*, *v*, and *z*. These letters are among the first taught by many programs. (Note that in contrast to such "continuant" consonants, the "stop" consonants, such as *b*, *d*, *p*, *t*, cannot be elongated; indeed, they cannot even be spoken without the support of adjacent sounds.)

By the same logic, some programs suggest that vowels be presented first. All vowels can be pronounced in isolation. They are, moreover, the most frequent letters in our script. Several programs advocate presentation of the "long" vowels before the "short" ones. Long vowels have the special advantage of sounding like their names. For students who know their letter names, what better clue could be provided as to the relation between letter identities and speech sounds?

A major problem in teaching the "long" vowels first, of course, is that in most words, the "long" sound of a vowel is signaled by relatively complex but only semi-reliable spelling clues (such as adjacent vowels and word-final "silent" *e*'s). Thus, when teachers wish to apply the lesson in real word contexts, they quickly run up against spelling-pattern issues that might best be saved for later. A problem with teaching the "short" vowels first, however, is that, relative to the sounds of other letters, those of the short vowels seem to be especially difficult to learn.[6]

The problem with focusing on either the "long" or the "short" vowel category to the exclusion of the other, is that both occur in many high-frequency words. And so, whichever

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of these two categories teachers choose as the initial set of vowel correspondences to teach, they are setting students up to soon encounter exceptions.

The problem with postponing all vowels and teaching the consonants first is that no words at all can be spelled without vowels; therefore, teachers are faced with the dilemma of exposing students to words with untaught correspondences or of exposing them to no words at all.

In view of these difficulties, many programs introduce at least one (typically "short") vowel early in the letter-sound correspondence lessons. But whatever spelling-sound correspondences teachers choose to teach first, problems of how to deal with the exceptions as well as the as-yet-untaught correspondences will not go away.

Because so many of the letters cannot be pronounced in isolation, other programs avoid or limit the use of isolated phonemes in their instruction. This may cause serious confusion. ■

Avoiding confusing instruction. We try to make our instruction clear, avoiding confusion. But what types of confusion shall we worry about most?

On one hand, the sounds of phonemes are different from the names of letters. To avoid confusing letter names and phonemes, some programs choose to avoid or minimize the use of letter names in their instruction. These programs often warn teachers to take care to say, for example, just */b/* and not */buh/* or */bih/*. This is simply not possible (try it yourself). Moreover, teaching children the sounds of the letters *b*, *a*, and *t*, will not assure that they will be able to pro[illegible] */bat/*, rather than */buh/-/ah/-/tuh/* without additional instruction in blending.

On the other hand, because so many of the letters cannot be pronounced in isolation, other programs avoid or limit the use of isolated phonemes in their instruction. This may cause serious confusion.

Programs that seek to minimize use of isolated phonemes necessarily begin with words and almost have to use letter names. As an example, the teacher might write the word *get* on the board, read it aloud, underline the *e*, ask the children to listen for the same sound in several other words, and then explain that they are listening to the short sound of *e*.

In such "analytic" approaches, teachers often have need to refer to the sound of a particular letter as distinct from the sound of the whole word in which it occurs. The most frequent solution is to develop a terminology that permits such reference: "The short vowel sound of the letter *e*," and so on.

Such programs may provide teachers with rather detailed guidance on what to say. In one program:

> The teacher is instructed to write the word **girls** on the board. The teacher then says, "You can find out what this word is. With wh[illegible] conso-

nant does it begin? With what consonant does it end? You know the sounds that **g** and **r** and **l** and **s** stand for. I am going to say something and leave out this word at the end. When I stop, *think of a word that begins with a sound g stands for, ends with the sounds r and l and s stand for and makes sense with what I said."*[7](italics added)

This instruction may sound quite clear, even over-specified, to our adult minds. Yet its complexity is revealed by replacing the letter-sound correspondences with color-shape pairings. Thus translated, the italicized line of this instruction becomes:

Find the row that begins with the color that goes with rectangle, ends with the colors that go with triangle, diamond, and square, and that has a wavy line under it.[8]

These instructions, in fact, were presented to a group of young readers. In distinction from the true phonics task, the children were not asked to construct the appropriate response, but only to choose from several rows of colored shapes that were set before them. Surprise, surprise, they couldn't do it!

As yet one more path around such problems, programs may defer their solution to the teacher, as in the following instructions:

Help the children to understand that the underlined letter in the word *fish* is a symbol for the vowel sound heard in the word *fish*.

As a teacher, how might you go about doing this? Remember that you're working with a bunch of six year olds. Remember that the challenge of extracting the vowel from a syllable is among the most difficult of phonemic segmentation tasks. And remember that you're not supposed to voice the sound of the phoneme in isolation.[9]

Special terminology. Occasional programs try to limit use of both letter names and isolated phonemes. Although the motivation for doing so is clear, the difficulties that result are outstanding. Here, for example, is a quote from the instructions in one such program:

Refer to the CVC pattern and explain that . . . when the vowel letter *i* is between two consonant letters, the corresponding vowel sound is usually unglided.

In my opinion, the use of special terminology in instructional dialogues has two drawbacks. The first of these is probably obvious — special terminology is sometimes hard to understand. The second drawback is that the purpose of the terminology is easily misperceived. Students tend to perceive

the content of the lesson as an illustration of the special term instead of perceiving the special term as a label or direction for what they are to notice in the content. Thus they view "The Highway Man" as a vehicle for learning the definition of "alliteration," rather than perceiving the term "alliteration" as a lens for examining the poem.

In the same vein, I worry that use of special terminology may subvert the goal of beginning reading lessons. Instructions such as those above are not easy to understand. Furthermore, the goal is not to have students study words such as *fish* to learn the term "unglided vowel." Rather, it is to find a way through which we can successfully direct their attention to the spelling and sound structures of words such as *fish*.

Students tend to perceive the content of the lesson as an illustration of the special term instead of perceiving the special term as a label or direction for what they are to notice in the content. ■

Use of both letter names and isolated phonemes seems reasonable and, indeed, many programs do seem to use both. To use both while minimizing confusions between them, two principles should be observed. First, both should not be introduced to students at the same time. Either the letter names should be thoroughly overlearned before the sounds are introduced, or vice versa. Second, the goal of letter-sound instruction is to help students to acquire the relations between printed letters and speech sounds. The names of the letters are neither; they are labels, and care should be taken to avoid blurring their status as such.

As an example, if the goal is to establish linkages between printed letters and their phonemic correspondences, an exercise in which the teacher says *e* and asks students for its short sound does not represent the best use of instructional time. In contrast, exercises requiring students to generate the short */e/ sound* in response to the printed letter *e* (or vice versa), seem well directed.

Dealing with letters with multiple sounds. English contains at least forty phonemes, but only twenty-six letters. This means that each letter or combination may represent more than one phoneme (such as the soft and hard *c* and *g*). The question arises of how to teach these alternative sounds with the least amount of confusion. Arguments can be made both for teaching alternative sounds closely together, so that students' learning of the first would not interfere with their learning of the second, and for teaching them far apart, so that students are not confused.

Actually, the best solution seems to lie in between: Don't teach alternate correspondences too closely together, but don't wait too long between them either.[10] Exactly what is the right amount of time to wait between lessons? There isn't an exact answer. The first alternative should receive sufficient

practice to be clearly and comfortably established, but not so much that it is locked in.

The use of minor visual cues that do not distort the basic shapes of letters or spelling patterns of words may be quite helpful to students. Such cues may reduce the trial and error needed to master complex sound-symbol relations and may make the initial phases of learning to read easier. These are certainly worthy of further consideration by researchers and publishers.

Phonic Generalizations

Learning that some letters symbolize more than one sound and that many sounds are symbolized by more than one letter or group of letters is not enough. The sound a letter represents depends on the letters that surround it. For example, *c* has a different sound in *city* than in *candy*, *t* a different sound in *tin* than in *ambitious*.

What students need to acquire is not simply the knowledge that *g* can signal a hard or soft pronunciation, but knowledge of the conditions under which it is most likely to do one rather than the other. What they need to appreciate is not simply that /j/ can be spelled with *j*, *g*, or *dge*, but the conditions under which one of these spellings is more likely than another. Being able to use such phonic generalizations is necessary for proficient reading and writing. Phonic generalizations suggest conditions in which letters produce sounds different from those they typically produce, for example, "*lean*" versus "*create*." However, phonic generalizations are complex, they are numerous, and few are 100% reliable. Most reading educators use the term "generalizations" rather than "rules" to convey that they do not apply in all cases.

Not only can each letter represent more than one sound but each sound can be represented by more than one letter or combination of letters (such as *sh* or the various spellings of long *a*). The result of this is that phonic generalizations often don't hold very well. One survey found that only twenty-three of forty-five common phonic generalizations sampled from published reading series worked properly with as many as three quarters of the words to which they pertained.[11] To illustrate, the generalization that "when there are two vowels side by side, the long sound of the first one is heard and the second one is usually silent" is well known. Yet it was found to work only 45% of the time.[12] It works with *bead*, for example, but not with *chief*.

Two motives have been proposed for presenting some phonic generalizations to students. First, generalizations may

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serve to direct students toward the importance of common spelling patterns such as CVC or CVVC. For this, the generalizations need not be memorized. The purpose is instead to enhance students' memory for the patterns to which they apply.

Second, phonic generalizations can provide students with strategies for identifying unknown words. Such strategic application of generalizations must be done consciously and become an option only when automatic recognition fails. It also must be done flexibly, *because* the generalizations are individually unreliable. Although a generalization must be remembered (though not verbatim) to be used in this way, relatively few are consistent enough to be worth memorizing. Further, those that are, are useful only for a short time, that is, until the words for which they are used can be recognized automatically — without the strategic use of the generalizations.

In short, if the purpose of presenting a phonic generalization is to call attention to a particular pattern, the teacher might mention the generalization and provide practice with the pattern. If the purpose is to arm students with a strategy for unlocking unknown words, the teacher might put more stress on the generalization itself. Let us examine some of the types of generalizations that appear in reading curricula to see where each of these purposes is most appropriate.

Pronunciation of consonants. Nearly all of the generalizations dealing with consonants prove exceptionally reliable. Because they are so consistent, it should be effective simply to practice reading words containing the desired patterns. Rather than drilling children on "rules" about silent *w*, *gh*, and *k*, one might more productively give them practice with relevant words. On the other hand, the mention of some generalizations may be enough. For example, if children are accustomed to associating each letter with one sound, a reminder that, "When *c* and *h* are together, they make a special sound" is worthwhile.

Division of syllables. As discussed earlier, the capacity to break long words into syllables is critical for decoding them. Therefore, as a procedure for decoding words, generalizations such as "If the first vowel sound in a word is followed by two consonants, the first syllable usually ends with the first of the two consonants" or "If the first vowel sound is followed by a single consonant, that consonant usually begins the second syllable," seem useful in spirit. For the purposes of breaking a word down into syllables, students should at least appreciate that, when separated by one or more consonants, two vowels must belong to different syllables. Attempting to divide such

syllables between consonants seems a reasonably useful strategy. The use of these conventions depends, not on memorization of generalizations, but on sensitivity to the spelling patterns in writing.

It should additionally be noted that there is limited value in trying to teach the precise, dictionary-defined locations of the syllable boundaries in printed words. For the purposes of sounding out its identity, it matters little, for example, whether a student attempts *simple* as *simp-le* or *sim-ple*. What is more important is that each unit is pronounceable.

Pronunciation of vowels. The majority of phonic generalizations involve vowels, and these seem to be the least reliable. Only four of the twenty-three vowel generalizations on one list were found to work in as many as four out of five cases. Actually, it seems that the majority of these twenty-three rules represent ways of describing only six classes of spelling-sound patterns:

- single vowels surrounded by consonants usually take a short sound;
- "when two vowels go walking, the first does the talking";
- the "silent e rule";
- the behavior of *y* when it acts like a vowel;
- the behavior of *w* when it acts like a vowel; and
- the behavior of *r*-, *l*-, and *w*-controlled vowels.

The major problem with vowel generalizations is, basically, that they don't work. And if a set of vowel generalizations did work, their memorization would not result in effortless word recognition. Proficient word recognition depends on the learning of spelling patterns and the direct links between those patterns to the speech patterns and words to which they apply.

In short, children cannot become skillful decoders by memorizing generalizations or rules. For neither the expert nor the novice does rote knowledge of an abstract rule, in and of itself, make any difference. Rules are useful only as far as they pertain to experience. Rules are intended to capture the patterns of spelling. But productive use of those patterns depends on relevant experience, not on rote memorization.

What Is the Instructional Importance of Onsets and Rimes? As described earlier, there is a developing line of evidence that parts of syllables, *onsets* and *rimes*, are natural components of spoken language. The concept of onsets and rimes may be useful in teaching written language. For example, five- and six-year-old children can induce the pronunciation of one word by

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analogy to another with the same rime (for example, they could read *beak* given *peak*). These children could not, by contrast, make any use of matching spellings and sound that did not correspond to rimes (for example, they could not read *beak* given *bean*).[13]

Using onsets and rimes has several advantages over traditional phonics instruction. First, as we have seen, phonic generalizations about the pronunciations of individual vowels and vowel digraphs are frustratingly unstable.[14] As it turns out, however, vowel sounds are generally quite stable within particular rimes. Indeed, even the "irregular" behaviors of vowel spellings are relatively rime-specific. For example, the vowel digraph *ea* is quite consistently pronounced as long *e* except in the rimes *-ear* (*hear* versus *bear*), *-ead* (*bead* versus *head*), and *-eaf* (*sheaf* versus *deaf*).

Vowel sounds are generally quite stable within particular rimes. ■

Some researchers have found that children generally find it easy to learn to read words by use of "rhyming phonograms,"[15] which are nothing more or less than families of words that share the same rime. Indeed, in contrast to the difficulties and complexities of teaching vowel pronunciations through individual spelling-sound correspondences and phonic generalizations, the children seemed easily to learn phonograms, almost regardless of the nature of the vowels they contain. For example,

- phonograms containing long vowels were learned as easily as phonograms containing short vowels;
- long vowel phonograms spelled with "silent *e*" were not more difficult to learn than long vowel phonograms containing vowel digraphs;
- phonograms containing vowel variants, including *r*-, *l*-, and *w*-controlled vowels, vowel digraphs, and vowel diphthongs, were very nearly as easy to learn as those containing long and short vowel sounds; and
- phonograms containing one final consonant are easier to learn than phonograms ending in consonant blends.

In further support of the utility of phonograms and rimes is their generalizability. One study found that of 286 phonograms that appear in primary-grade texts, 95% were pronounced the same in every word in which they were found.[16] Moreover, these 272 stable rimes are contained in 1,437 of the words commonly found in the speaking vocabularies of primary-grade children.[17] Finally, nearly 500 primary-grade words can be derived from the following set of only thirty-seven rimes:[18]

-ack	-all	-ain	-ake	-ale	-ame	-an
-ank	-ap	-ash	-at	-ate	-aw	-ay
-eat	-ell	-est	-ice	-ick	-ide	-ight
-ill	-in	-inc	-ing	-ink	-ip	-ir
-ock	-oke	-op	-ore	-or	-uck	-ug
-ump	-unk					

Compared to the disappointing reliability of phonic generalizations discussed earlier, the phonic stability of rimes is very encouraging.

Other Instructional Considerations

The very mention of phonograms or word families will, for some, raise memories of the so-called "linguistic" programs for beginning reading and of such notorious text offerings as:

Dan can fan the man.
Can Dan fan Nat?
Dan can fan Nat.
Can Dan fan a rat?

The motivation for using such text in beginning reading curricula has been to reinforce, through repetition, the spelling patterns and contrasts that it contains. Although such motivation should be applauded, it must be recognized that the use of phonograms in connected text can be overdone. When minimal contrast and repetition is carried to such extremes, the effect seems not to strengthen the learning of patterns. Research has shown that texts composed of high proportions of similar words are difficult to process.[19] Even when read silently by proficient readers, such texts produce the disruptiveness of tongue twisters.

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Another problem with the "linguistic" programs is their insistence that spelling-sound correspondences are best acquired indirectly—that sufficient repetition of any particular spelling pattern is enough for a child to learn it.[20] To the contrary, for the child who is having trouble segmenting the sounds of words, some explicit guidance and instruction is invaluable. Word families or phonograms are best seen as useful vehicles for providing this guidance.

Onsets, rimes, and blending. Young readers' special difficulties with blending were underscored in the earlier reviews of children's phonological awareness and decoding difficulties.[21] In addition, a special value of direct instruction on blending was pointed up in the program comparison studies mentioned in the first chapter.

Our look at onsets and rimes suggests that blending difficulties can be divided into three different types:

- the difficulty of analyzing rimes into their component phonemes,
- the awareness that different onsets can be spliced onto the same rime to make different words, and
- the difficulty of breaking complex onsets (*scr-*, *tr-*, and so forth) into individual phonemes.

Phonograms offer a means of taking care of each of these problems.[22]

Teachers might begin with a rime consisting of a short vowel and a consonant, such as *an*. With *an* on display, they might explain that *a* says /*a*/ (short a) and that *n* says /*n*/. They would encourage children to produce these individual sounds and blend them.

Next, teachers would add a consonant, say *p*, to the beginning of the syllable. The children would learn, first to sound, then to blend, the new consonant with the rime of the phonogram, producing *pan*. Repeating the process, the children might eventually be led to read and write *an*, *pan*, *tan*, *can*, *man*, *ran*. Finally, direct instruction would be extended to the sounding and blending of initial consonant clusters. For example, *scat* might be taught from *cat*.

To a large extent, the instructional value of rimes has been implicitly recognized in many reading programs. In code-emphasis programs, words are usually presented with other words sharing the same rime, and this is true whether or not phonograms were methodically practiced or explicitly acknowledged in the instructional plan. Such introduction of words with similar spelling-sound correspondences allows for new words to be introduced more rapidly. To the extent that words in a story share spelling-sound patterns, each may be conquered more easily.[23]

In contrast, within meaning-emphasis programs, words are typically selected on the basis of frequency or need, and rarely on shared rimes. As a consequence, their stories provide less focused exercise of spelling patterns. In such programs words tend to be remembered on the basis of such cues as shape, length, and initial letter.[24]

Summary

In this chapter we have discussed a number of issues related to the teaching of phonics. On the basis of available research, some of these issues can be resolved, yet others remain as open questions. For example:

We can determine how many and which correspondences are suggested in any given published reading program, but whether or not that number reflects the right level of

content and pace depends both on how they are presented and used in the program and on the students using the program.

We can point to confusing instructions and confusable concepts, but beyond being sensitive to these difficulties, we cannot say how to prevent confusion entirely.

We know that it is of vital importance to establish the alphabetic principle early on. We also know that certain sounds and combinations of sounds are more accessible than others. Basing initial instruction on these sounds is surely wise. However, children cannot learn to read through phonic exercise alone. They must read text. Yet creating readable text with too small of a number of spelling-sound correspondences is unrealistic.

Most of the issues addressed in this chapter have no firm and fixed answers. Each issue raises several considerations. The considerations often translate into mutually incompatible instructional strategies. Because of this, effective responses to these issues must depend on finding an effective balance. In turn, finding this balance depends on understanding the trade-offs involved in light of the needs, progress, and interests of the students involved.

Decoding, Context, and Fluency

Implicit in some discussions of reading instruction is the assumption that the goal of early instruction on word recognition is to teach students to sound out words. As important as it is to sound out words, it is important only as an intermediate step. Sounding out words should not be the end goal, but a way of teaching children what they need to know to comprehend text. The only reason for learning to read words is to understand text.

There are many methods of teaching beginning reading. And within every method are countless variations. To focus instruction so that children use what they learn most effectively to comprehend text, it is important to understand how decoding influences comprehension and the relative values of decoding and context in reading connected text.

Perhaps the most widely respected value of letter-sound instruction is that it provides students with a means of deciphering written words that are visually unfamiliar. ■

The Value of Sounding Out Words

The ability to sound out words has two functions. First, it gives students a means of independently identifying words that are visually unfamiliar. Second, sounding out words forces children's attention to the order and identities of letters. The following discussion will look at each of these functions in turn.

Independence and "Self-Teaching"

Perhaps the most widely respected value of letter-sound instruction is that it provides students with a means of deciphering written words that are visually unfamiliar. By applying their knowledge of letter-to-sound correspondences, students can sound out an unfamiliar word, discovering or

confirming its identity all by themselves.

A further advantage of the ability to sound out words is that it serves as a self-teaching mechanism.[1] While it is possible for students to learn the complete spellings of individual words visually, that is, without sounding them out, they cannot learn enough words that way. Even in first- and second-grade texts, more than a third of the words occur only once; the majority occur five or fewer times.[2] Because of this, adequate growth in students' visual vocabulary is not likely to result from the learning of one whole word at a time.

Children who can neither recognize a word as a whole nor sound it out are left with only two options for word identification: They can rely on contextual cues, or they can ask someone else. Because the drawbacks of depending on someone else are obvious, I will review the drawbacks of relying on context.

Contextual cues. The major problem with using contextual cues for word identification is that they are unreliable.[3] This is all the more true because, as was mentioned earlier, it is the less frequent words that contribute most information to a passage. Here is the dilemma: Children depend on the meaning of the passage to infer the meaning of its less familiar words, yet the meaning of the passage depends disproportionately upon the meanings of its less frequent words.

Relying on context is also less than ideal for purposes of word learning. Where context is strong enough to allow quick and confident identification of the unfamiliar word, it leaves little incentive to pore over its spelling. Without studying a word's spelling, there is no opportunity for increasing its visual familiarity. Thus, even if a student uses context to guess right on one occasion, she or he may be no better prepared to identify the word on the next. On the other hand, where contextual cues are not strong enough to reveal the word's identity, there is little point for a student to study its spelling. Without a meaning or pronunciation to hold the word together, the student is not likely to remember it anyhow.

In contrast, combining contextual support with useful knowledge of letter-sound correspondences, students should be able to sound out and then identify any written word that is in their listening vocabulary. Because the very process of sounding the word out necessarily involves careful visual study of its spelling, the student in this case will have created a memory for the word's spelling that is integrally tied to and supported by knowledge of its pronunciation and meaning.

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Remembering the Order and Identities of Letters

Learning letter-sound correspondences also provides a means of remembering the identities and orderings of the letters within words.

English is fundamentally alphabetic. With obvious exceptions, the letter sequences of our written words mimic the phonemic sequences of our spoken words. True, there are irregularities, but the majority of these irregularities are owed to the vowels. However fuzzy our knowledge of spelling-sound correspondences might be, it is of invaluable assistance in memorizing the order and identities of the letters that distinguish written words.

The process of learning about the identities and orderings proceeds gradually.[4] At the first level, children acquire familiarity with the shapes and sounds of letters. In addition, they acquire basic phonemic awareness and, in particular, the ability to detect systematic relationships between the sound segments of spoken words and the letters in their spellings.

Working from these abilities, children begin to build orthographic images of the words they read by matching the letters each to its phonemic segments. At first, children may proceed by matching just a few of the individual letters of any word to its phonemic segments. Yet as they become more and more familiar with the words and with the letter-sound relationships, their orthographic images become more complete and cohesive—such that, eventually, they may evoke the full image of a word at a glance.

As children's repertoires of printed words grow in number and completeness, they also begin to learn about more complex spelling-sound patterns. As these complex patterns support more efficient translations of spellings to sounds, it thus becomes easier and easier for children to read and remember newly encountered words. Meanwhile, through their reading experience, information from the context also becomes "amalgamated" with the visual forms of the words.

Contributions of Spoken Language

In the course of reading instruction, spoken language contributes crucially to the development of associations both between letters to form spelling patterns and between those patterns and the rest of the system.

Examples? They are myriad. When a teacher says a letter's sound or calls it by name while asking students to look at it, that teacher creates linkages between the letter's visual form and its spoken translation or label. When the teacher says, "No, that's *hat*, not *hot*. Look at the *a*. It says *haaat*," the

linkages between a word's spelling and its sound are refined. Sounding out a word, emphasizing but blending its separate phonemes, creates linkages among the word's left-to-right sequence of letters and between them and its sequence of sounds. When teachers present students with rhymes or phonograms (such as, *bent, dent, sent, tent, went*), they reinforce the similar spelling patterns and connect them to the similar sounds. And, when teachers read books aloud, they arouse and thus impose the students' knowledge of spoken language on their interpretation of text.

Students, in short, understand spoken language, and teachers depend on that. It is *from* speech and *through* speech that students will come to understand written language as well, provided they have sufficient familiarity with the words and patterns that are to be linked.

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Spelling-Sound Versus Spelling-Meaning Relationships

Given the long-standing debate between advocates of phonics and whole word methods, it is ironic that the major documented advantage of phonics methods — of having students sound words out and so attend to spelling patterns — is that they tend to result in better visual word recognition. But indeed this seems to be the case.

The primary goal of beginning instruction on printed word identification is to teach students about spelling patterns and how these patterns map onto the sounds and meanings of words.

The Importance of Automatic Word Recognition

Human attention is limited. To understand connected text, our attention cannot be directed to the identities of individual words and letters. In reading as in listening, the process of individual word perception must proceed with relative automaticity, and such automaticity comes only though learning. We must have learned about the relations among visual features that signal individual letters and about the relations among individual letters that correspond to frequent words and spelling patterns. And we must have acquired the associations that link spellings to speech and to meanings. Only having perceived the individual words automatically can we direct our attention to the relationships between them. Only as their perception has become relatively automatic can we devote our active attention to the process of understanding them.

Like skillful readers, beginners are attuned to the relevant flow of their texts as they read.[5] However, to the

extent that necessary word and letter recognition skills are lacking, the role of information available from general context changes. Instead of complementing orthographic processing, information from general context may substitute for it. In particular, until the processes involved in visual word recognition are fairly well developed, many readers apparently find that they can often guess the identity of a word as accurately and more easily than they can actually decode it. Studies show that even among older, poorer decoders, contextually appropriate substitution errors are especially frequent,[6] and that word recognition performance is especially sensitive to the presence and compatibility of meaningful context.[7]

Good readers decode rapidly and automatically. Younger and poorer readers tend to rely on context, partly because they do not have efficient knowledge of spelling patterns to rely on instead. ■

Good readers decode rapidly and automatically. Younger and poorer readers tend to rely on context, partly because they do not have efficient knowledge of spelling patterns to rely on instead.

Although such young readers' sensitivity to context can only be a good sign, its dominance is not. In oral reading, contextual appropriateness of their substitutions can be taken as evidence of productive comprehension processes. However, too many substitutions suggest that their orthographic processing is proceeding neither quickly nor completely enough to do its job. The seriousness of this situation is underscored by the evidence that weaknesses in basic decoding skills may be the most common and can be the most serious source of reading difficulties.[8]

Avoiding overuse of context. In particular, teaching young children to use context to minimize orthographic processing does not seem to be a good strategy. Given that the text is at an appropriate level of difficulty, it is preferable that children be encouraged *not* to skip words that are difficult for them. When they encounter a word that is hard to read, they should, of their own volition, take the time to study it. In addition to reflecting upon its spelling, they should methodically consider its meaning, using the information available from context. After they have worked over a new word, they should return to the beginning of the phrase and then the sentence to which it belongs, rereading the whole thing.

Context plays an important role in determining the meaning, rather than the identity, of a word. Explicit training in the strategic use of context seems to be warranted, as does the teaching of word parts, such as prefixes, suffixes, and roots. The use of both types of cues is not automatic, but they are part of a sensitivity to words that seems important in the incidental learning of word meanings from context.

Repeated readings of sentences and passages are found

to produce marked improvement in children's word recognition, fluency, and comprehension.[9] Repeated readings strengthen, through repetition, the links between letters in the orthographic processor. Indeed, repeated readings over time of passages with large overlaps of words are more effective than repeated readings of passages containing mostly different words.[10] Repeated readings may also improve readers' appreciation of the syntax of the passage. When readers are asked to undertake repeated readings in unison with an expressive model (such as someone reading on tape), marked improvements in their own phrasing are found.[11]

In short, the tendency among young readers to pause and study an unfamiliar word is healthy. Children who pause occasionally should be helped, if necessary, to figure out the troublesome words. Then they should be encouraged to begin reading their sentences anew so as to recover comprehension and to establish the associations that make their struggle a worthwhile learning experience. Teachers should be aware that such efforts, even when successful, are likely to disrupt the flow of comprehension.

Children who pause on many words should be given an easier text.[12] As will be discussed later, children do not benefit from texts that are excessively difficult.

The goals of phonics instruction. Learning to translate spellings to speech sounds is important because it provides children with a means of independent word recognition to aid them when they encounter visually unfamiliar words. Of still greater importance, however, spelling-sound translations serve to create, confirm, and secure children's visual knowledge of spelling patterns. The primary goal of phonics instruction should be to direct a child's attention to those patterns so that they can be learned well enough that words can be identified rapidly and automatically. In contrast, a child who relies excessively on context to identify words may not lend adequate attention to these patterns to develop word recognition as rapidly.

Phonics instruction by itself is not enough, however. To support skillful reading, the information in *all* the processors must be richly interconnected. To learn to read skillfully, children need practice in seeing and understanding decodable words in real reading situations and with connected text. The purpose of word identification instruction is to establish paths from the print to spelling, speech, meaning, and context. This can best be done when phonics instruction is part of a reading program that provides ample practice reading and writing connected text. Encouraging children with connected text can

also show them the importance of what they are learning, and make the lessons in phonics relevant and sensible.

From Spelling and Writing to Reading

Across evaluations of beginning reading programs, emphasis on writing activities is repeatedly shown to result in special gains in early reading achievement.[1] Although the supportive relations between reading and writing surely run in both directions, this chapter concentrates on those that run *from* spelling and writing *to* reading.

Early Spelling and Phonemic Awareness

In an increasing number of American classrooms, children are encouraged to write even before they receive much instruction in reading. Although the idea of "write first, read later" was long promoted by Maria Montessori,[2] writing instruction, until recently, was generally postponed until after reading was well underway.

In a classic study of children who learned to read well before entering school, it was observed that, for many of these children, writing came first. Indeed, the "ability to read seemed almost like a by-product of [the] ability to print and spell."[3]

The spellings that young children produce are, of course, often incorrect by conventional standards. Using their knowledge of letter names and sounds, children spell the words as they sound to them. And, as shown by their spellings, the children quickly develop an impressive appreciation of the phonemic structure of the English language.

The educational interest in such children centers on the prospect that their phonemic awareness develops through their efforts to spell. Does such awareness grow through the process of having children figure out sound-to-spelling translations on

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their own? Research evidence is scant. However, examining the spellings that children produce suggests that it does. The invented spellings of different children have long been recognized to exhibit a number of common features.

These common features have been summarized as follows:[4]

- Often, children will incorporate whole letter names into their spellings: *YL* (while), *THAQ* (thank you), *NR* (nature), *PPL* (people).
- More generally, the consonants tend to contribute part of their names—though sometimes unconventionally: *KAN* (can), *JRIV* (drive).
- Long vowels generally speak for themselves: *BOT* (boat), STA (stay), *AGRE* (angry).
- Short vowels come as close as they can: *BAD* (bed), *COL* (call), *LUKS* (looks), or are omitted altogether: *TST* (test).
- Letters such as *l* and *r* tend to lose their vowels: *GRL* (girl), *KLR* (color), *PKN* (picking).
- And *n* and *m* before stop consonants often go unrepresented: *WOT* (won't), *PLAT* (plant).

Over time, children's writing gradually but clearly reflects increasing knowledge of the spellings of particular words and of general orthographic conventions. ■

Thus we have one explanation for the peculiarities of children's invented spellings. In deciding how to represent a word, they tend to exploit the names of the letters, rather than a direct image of the sounds they formally represent. Over time, children's writing gradually but clearly reflects increasing knowledge of the spellings of particular words and of general orthographic conventions. In addition, it reflects increasing sensitivity to the phonemic structures of words. Of particular interest, young writers have special difficulty in hearing the separate phonemes of consonant clusters, suggesting that the spellings of consonant blends warrant explicit instruction attention.

Instructional Issues

In the classroom, invented spelling is generally encouraged in simple ways. Students are given regular opportunities to express themselves on paper. Initially, at least, the centerpieces of their products are typically illustrations. With encouragement from their teachers and from watching their classmates, students begin, first to caption, then to write stories about the pictures they have drawn. In such classrooms, teachers report providing little explicit instruction on exactly how to go about invented spellings — "Just spell it the way it sounds. I'll be able to read it."

The major reservation to promoting invented spelling

in the classroom is the concern that students' invented spellings might interfere with their ability to recognize the correct spellings of words. A recent study focused precisely on this issue.[5]

All of the students in the study received reading instruction through a basal reading program along with supplementary phonics activities. In addition, all were regularly engaged in creative writing sessions each week. The students in two of the four classrooms were encouraged to invent their spellings while writing; the students in the other two classrooms were encouraged to spell correctly.

During writing sessions in the classrooms in which invented spellings were encouraged, teachers circulated, encouraging effort and discussing ideas that might be developed. The teachers discouraged erasing ("just cross it out"), and they did not spell words for students, telling them that, instead, they should sound out the words and print the letters thus heard. In addition, the teachers told students that their letter choices were not always going to be correct, and emphasized that that did not matter at the moment.

In contrast, when students in the classrooms emphasizing traditional spellings were ready to write, they got out their dictionaries or personal word lists, which they used when they wanted to write a word they were not sure how to spell. The students often consulted friends for help in finding a word in the dictionary or for confirmation on how a word should be spelled. Teachers printed words on the chalkboard or on the students' papers, and spelled words aloud while students printed the letters. Teachers also circulated to see that students having difficulty were able to write something. In the beginning months, this involved having some students dictate their stories and then copy the teacher's printing.

Examinations of writing samples collected between November and March indicated that the students using traditional spelling wrote with slightly more sophisticated vocabulary and more complex syntax and committed far fewer spelling errors (6%) than those using invented spellings (34%). But the students using traditional spelling tended to write much shorter stories.

Given the difference in the classroom emphases for these two groups, did the students' spelling accuracy reflect real differences in their knowledge? Both groups displayed considerable but comparable difficulty in spelling high-frequency but orthographically irregular words. However, in contrast to the evidence obtained from the writing samples, the children in the invented spelling group were significantly more

successful with both a list of lower frequency, regularly spelled words and with the words on a standardized spelling test.

While the performance of the two groups was quite comparable on a reading comprehension test, it differed significantly on several tests of word recognition skill. Children in the classrooms that relied on invented spelling significantly outperformed the others on reading regularly spelled nonsense words and on untimed reading of lists of high-frequency irregular and lower frequency regular words.[6]

On balance, the results seem to indicate a definite advantage for the invented over the traditional spelling groups. Yet one wonders why. True, the children in the invented spelling group wrote more, but their evident attentiveness to correct spelling during writing seemed so much less. For example, in the writing samples analyzed, spelling accuracy increased from 88% to 95% for the traditional spellers between November and March; for the inventive spellers it decreased from 66% to 58%.

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A closer look at the results of the study showed that though the performance of the traditional spellers was often lower than that of the inventive spellers, the range of scores was often greater. For the high-readiness students, the invented spelling and the traditional spelling groups performed similarly on spelling and word recognition posttests. *For the low-readiness students, however, those in the invented spelling group significantly outperformed their traditionally instructed peers on the majority of the measures.*

Could the difference between the performance of the low-readiness students come from the ways they were encouraged to confront holes in their knowledge? The traditional spellers dictated their earliest stories. The inventive spellers were on their own from the start. The traditional spellers were given correct "models" to follow. The inventive spellers had to figure the system out by themselves. The tempting conclusion is, in other words, that the advantage of the low-readiness inventive spellers reflected a better developed sense of the relations between spoken and written words, a sense that had grown from their own necessarily thoughtful and active efforts to spell.

Another study of the written products of children who had been encouraged to write and spell creatively in class showed that spelling development is often quite gradual.[7] The earliest "spellings" of many children often captured but a sampling of the phonemes of the word of interest, and not always correctly.

In overview, classroom encouragement of invented

spellings and independent writing from the start seems a very promising approach toward the development of phonemic awareness and orthographic skills. Beyond this, early writing seems an incomparable means of developing children's abilities to reflect on their own thoughts, to elaborate and organize their ideas, and to express themselves in print. Moreover, such challenges require children to think actively about print.[8]

Invented Spelling and Phonics

Restricting concern to the issue of learning to read words, note that the process of inventing spellings is essentially a process of phonics. Not surprisingly, then, how well sounds are represented in prereaders' invented spellings is found to be predicted by their level of phonemic awareness[9] and to predict their later success in learning to read words.[10] In addition, there is evidence that invented spelling activity simultaneously develops phonemic awareness and promotes understanding of the alphabetic principle. This is extremely promising, especially in view of the difficulty with which children are found to acquire these insights through other teaching methods.

But exercise in writing cannot take the place of instruction and practice in reading and word recognition. ■

Equally inspiring are the reports that early writing activities promote children's interest in learning about what words say and how they are spelled. Yet these are only starting points. Exercise in writing and invented spelling may significantly enhance children's attitudes toward and their linguistic readiness for reading. As such, it may invaluably complement instruction in reading.

But exercise in writing cannot take the place of instruction and practice in reading and word recognition. Note that all of the children discussed above were receiving instruction in reading and word recognition alongside their exercises in writing, and that their effects cannot be separated. Further, for children's interest in how words actually are spelled to be functional, they must be exposed to properly written text. For children to learn how words actually are spelled, they must also learn to read. But this raises one of the sticky points among advocates of invented spelling.

Learning How to Spell Correctly

When or how should children be taught about correct spellings? Some advocates suggest that parents and teachers should take care to provide correct spellings whenever a child asks.[11] In contrast, the invented spelling teachers in the study just reviewed not only refused to answer when students asked for correct spellings, but actively discouraged such questions.[12] Going one more step, it might be argued that in the coming

world of word processors, letter perfect spelling will be as obsolete a skill as using logarithmic tables to multiply. But let's not be hasty.

Prior to this century — in fact, for thousands of years prior to this century — spelling drill was the principal means of teaching children to read. The reasons for this emphasis on spelling surely included many that are of little interest to us now—the relative availability of chalk tablets versus books, the appropriateness within other eras of drill and rote recitation, the classroom structure of the one room school . . . or, try this: Noah Webster is said to have held that spelling was the proper way to teach reading because at the earliest instructional levels, the child's mind was not ready to deal with word meanings.[13] However remote these reasons may be from today's widely held educational philosophies and processes, there must also have been one more: For the method to have prevailed for thousands of years, people must have felt that it worked.

Good spelling cannot be a direct derivative of phonological knowledge. First, people with different dialects still can and do learn standard spellings. Second, and more persuasively, spelling-to-sound rules just plain do not work in reverse. ■

The Relation Between Reading and Spelling Skills

Good spelling cannot be a direct derivative of phonological knowledge. First, people with different dialects still can and do learn standard spellings. Second, and more persuasively, spelling-to-sound rules just plain do not work in reverse. In one study, 166 spelling-to-sound correspondences were found successfully to generate pronunciations for 90% of the one- and two-syllable words known by six to nine year olds.[14] Applying those rules in reverse, however, resulted in correct sound-to-spelling translations for fewer than half of these words.[15] In another study, 300 spelling rules correctly predicted the spelling of fewer than 50% of the 17,000 words studied.[16]

Even if they worked better, 300 is probably more rules than one could expect the average fourth grader to have usefully learned. Yet, in a spelling bee between fourth graders and a computer that had been programmed with these rules, the fourth graders won handily.[17]

The problem, more specifically, seems to be that there is considerably more uncertainty in sound-to-spelling than in spelling-to-sound translations. For example, the letter *f* quite reliably symbolizes the phoneme /f/. In contrast, the phoneme /f/ can be spelled as *f*, *ff*, *ph*, or *gh*.

Some spellings may help the reader to perceive the relations between word cousins, as in *sign/signature*, *bomb/bombard*, and *muscle/muscular*.[18] But they are not terribly helpful for the speller. Further, spelling skills appear not to be associated with receptive and productive language capacities, nor with reading ability. Still more provocative, however, are the

contrasting patterns of behaviors found among normal children who are good spellers as opposed to poor ones.

Just as in good reading, good spelling seems to depend on sensitivity to patterns of letters, rather than individual letter-sound correspondences.[19] Good spellers tend to use their knowledge of patterns in their spelling of pseudowords, spelling *jation* in analogy to *nation* — instead of *jashun*, as would be produced by a letter-by-letter translation.[20] Poor spellers, in contrast, do tend to produce such letter-by-letter translations, relying more on simpler spelling-to-sound rules.

Good spellers also seem more sensitive to whether a spelling "looks right."[21] Yet researchers have shown this to reflect their greater knowledge of which letters typically go together, the orthographic knowledge discussed earlier, rather than any superiority in visual imagery.

Good spellers tend to use their knowledge of patterns in their spelling of pseudowords, spelling jation *in analogy to* nation — *instead of* jashun, *as would be produced by a letter-by-letter translation.* ■

Think about what you have to do to spell a never-seen word independently. First you must analyze the sounds in the spoken word and then produce the spelling patterns associated with those sounds. Difficulty in either phonemic analysis or knowledge of spelling patterns, or both, will interfere with good spelling.

The reading behavior of good and poor spellers similarly reflects differences in knowledge of spelling patterns. During reading, poor spellers tend to rely on the initial letters of words and to make substitution errors that make sense but do not contain the same sounds as the text word.[22]

Remember that efficient reading of a word proceeds through the complete recognition of individual letters. To the extent that the spelling patterns of the word are familiar, recognition of the pattern will be accompanied by phonological translation. To the extent that the word is also familiar, the meaning also will be stimulated.

If students have not learned a complete representation of a spelling pattern, they cannot process the word rapidly without glossing over the unfamiliar parts of its spelling. On the other hand, when students gloss over the complete spelling of a word as they read, they miss the opportunity to learn its spelling more thoroughly. To release them from this dilemma, their spelling knowledge must be improved.

Directing Students' Attention to Spellings

Successful spelling improvement depends on getting children to attend to unfamiliar patterns. One may figure out the correct spelling of a word either by having somebody else spell it aloud or by looking at it in print. Research indicates that the experience of seeing a word in print is not only superior to

hearing it spelled but, further, is an extremely powerful and effective means of acquiring its spelling.[23] In addition, the experience of seeing or imagining a word's spelling, as contrasted with repeatedly hearing the word or even rehearsing it aloud, has been shown to be a superior means toward remembering its pronunciation, even among first graders.[24] One obvious instructional implication of this evidence is that teachers should habitually encourage students to look at the spellings of words. Teachers should write the words of interest on the board or point to them on the page. Merely spelling words aloud, relatively speaking, is a waste of time.

Reading, because it requires children to look at words in print, should be a superlative means of learning the spellings of words. But as quickly as we recognize this point, we realize its limitations.

The process of copying new words strengthens students' memory for those words and does so rather enduringly. ■

Where the purpose of reading is to comprehend, the process of word recognition is under considerable time pressure. Readers can invest extra time in identifying or sounding out letter sequences only at the expense of losing the meaning of the surrounding text. Yet unless the word is already familiar, readers can fully process its letter sequences only through the time-consuming application of conscious effort and attention.

The only way to process a troublesome word fully and comprehend the sentence to which it belongs is by working out the word and then rereading the sentence. Although, for purposes of learning, this is an excellent strategy,[25] an easier alternative exists. Specifically, readers can finesse their difficulties with the word. Relying on whatever fragments of its spelling pattern they have perceived, along with contextual cues, they can just gloss over the fuzzier visual details. To a greater or lesser extent, this option is probably used by all readers. The result is that virtually all readers can read more words than they can spell.

In contrast, if students are given isolated words to spell, there is no comprehension pressure to divert their attention. Moreover, research demonstrates that the process of copying new words strengthens students' memory for those words and does so rather enduringly.[26] Perhaps this should not be surprising — the writing of a word forces attention to its full sequence of letters. For students, the thought that somebody else might evaluate their products may encourage such attention all the more.

In summary, the arguments for including spelling instruction as a major component of the reading program are strong. Learning about spelling reinforces children's knowledge about common letter sequences. It also reinforces their

knowledge about spelling-sound relationships and may help children become aware of word parts. Because of this, spelling practice enhances reading proficiency.

The Influence of Spelling on the Perception of Sounds and Meaning

The connections between sound and spelling are so strong that even adults, when they hear a nonsense word that violates common spelling patterns (such as */sbal/*) tend to think they heard a familiar pattern (such as */spal/*).[27] Even when encouraged to listen harder and to try something different, many adults have trouble — indeed, cannot — hear the actual sounds as they are spoken. They know how such syllables should be spelled, and that knowledge prevails. In contrast to the adults, kindergarten and first-grade listeners tend to hear and spell the sounds as spoken.[28]

Clearly, the connections between sound patterns and spelling patterns must enhance our ability to remember or figure out how a new word is spelled. They must enhance our ability to recognize a printed rendition of a word once having heard it. And they must enhance our ability to recognize a spoken rendition of a word once having seen it in print.

Clearly, the connections between sound patterns and spelling patterns must enhance our ability to remember or figure out how a new word is spelled. ■

Beyond Spelling: Writing

Even among older students, the strongest measurable links between reading and writing abilities tend to cluster at the level of spelling and word recognition skills. But just as there is more to reading than word recognition, there is more to writing than spelling. And there is much more to the reading-writing connection than just reading and spelling individual words.

Indeed, children's writing is strongly influenced by their reading. One review of the literature on the reading-writing relationship makes the point that better writers tend to read more than poorer writers.[29] Moreover, the reading experiences in which children are engaged are more beneficial to their writing abilities than either grammar study or extra writing practice.[30] Finally, children tend to incorporate into their writing not only the content of material they have just previously read, but also its syntactic patterns and themes.

Nevertheless, for young or uncertain readers, the potential contribution of writing to reading runs much deeper than any concern of form or style. In particular, as children become authors, as they struggle to express, refine, and reach audiences through their own writing, they actively come to grips with the most important reading insights of all.

Through writing, children learn that text is not preor-

dained or immutable truth. It is human voice. It is produced by people — people with their own personal and sometimes inappropriate sets of information and points of view; people with their own prior assumptions about who their readers will be and what those readers will already know and think; people who themselves struggled, and not always more fruitfully, to find clear ways of expressing the ideas and information in their texts. Through writing, children learn that the purpose of text is not to be read, but to be understood.

They learn that text does not contain meaning, but is meaningful only to the extent that it is understood by the reader. They learn that different readers respond differently to the same text. They also learn that sometimes understanding comes only through hard work even for the best of readers. They learn that cogent writing may depend on consulting other sources, inviting the insight that cogent reading may do this too. They learn that text is written about an underlying organization, inviting the insight that it may be read that way too.

They learn, in short, that reading is about thinking, and that lesson is essential. For the beginner, as we have seen, learning to read depends critically on thinking and understanding. Yet more. The ultimate power of text is not from its understanding but from its broader interpretation, its critique, its extension through the reader's own knowledge and thought and to the reader's own needs and interests. It is this power, most of all, that we want to give all of our children.

Words and Meanings: Toward a Resolution

Finding the Balance

The goal of teaching phonics is to develop students' ability to read connected text independently. However, the reverse connection between phonics and connected reading is equally important. Reading connected text may serve to motivate and reinforce students' learning of phonics. It is only the nature of reading that can make the content of phonics lessons sensible. It is only the prospect of reading that can make that content seem worthwhile.

Because of this, we are faced with yet another dilemma, and this dilemma may be the most serious of all for effective phonics instruction. Should we withhold connected text from students until after they have mastered all relevant letter-sound correspondences? Or should we instead expose students to and challenge them with meaningful, interesting text from the start, regardless of the extent to which the demands of its vocabulary go beyond their word attack skills? This chapter looks closer at this dilemma.

A Dilemma

In their extremes, both of the proposals just stated are preposterous. But the concerns are the same, if easier to overlook, for any position in between.

Let's begin with the option of withholding connected text until phonics instruction has been completed. Assuming the teaching of two or three correspondences per week and even assuming perfect learning, it would take many years to cover all possible spelling-sound translations. Without the rewards of reading, what student would sit still for such

Assuming the teaching of two or three correspondences per week and even assuming perfect learning, it would take many years to cover all possible spelling-sound translations. Without the rewards of reading, what student would sit still for such instruction? ■

instruction? Without the imminent challenge of reading what could make it worthwhile? How would students practice and extend that which they had already been taught?

One seemingly reasonable compromise would be to wait until some critical mass of sound-symbol correspondences and phonic generalizations has been taught. But again, this strategy leaves us in a quandary about the right moment. Obviously, we do not want to wait until students have been taught about the *oo* in *oogenesis* and *oology* or the *oe* in *synaloepha* and *onomatopoeia*. Rather, the best moment would seem to be as soon as the variety of explicitly taught correspondences and generalizations is sufficient to permit the generation of meaningful text.

However, out of the 150 most frequent words in English,[1] only 14 follow sound-symbol generalizations that might be taught during first grade. Imagine writing an interesting story without words such as *look, could, right, little, one, through,* and so forth.

For children who enter school with solid literacy preparation and with the desire to read, the drawbacks of postponing reading too long in favor of drill are clear. For children who enter school without such readiness, the drawbacks are potentially even greater. ■

For children who enter school with solid literacy preparation and with the desire to read, the drawbacks of postponing reading too long in favor of drill are clear. For children who enter school without such readiness, the drawbacks are potentially even greater.

These low-readiness children may be lacking in basic print awareness. They may not know that reading has its rewards of entertainment and information. They may not know that all writing is comprised of letters. They may not be aware of the format of books. They may not know that print reads left to right, and that those clusters of print that are separated by spaces are words. In all probability, these children have very little in the way of phonemic awareness, but to gain phonemic awareness through phonics instruction, they must appreciate that the sounds being taught are the sounds of meaningful, spoken words. Yet they may not have had the insight that words are independently speakable and meaningful units. As these children practice *fin, tin,* and *bin* in isolation, they may not notice that these syllables are meaningful words at all. They may not, in short, know why their phonics lessons are useful or important to them. These children need to be exposed to meaningful, written text as soon as possible so that they will begin to notice and have an interest in reading all of the things around them that there are to be read. They need to sense the utility of their phonics lessons as soon as possible.

In view of such considerations, nearly all reading programs engage students in connected reading from the start. All but universally, the solution for those words that contain

untaught correspondences is to use them in the students' texts anyway. This compromise is wholly understandable. Whether or not it is reasonable depends on the restraint with which it is done.

Text and Phonics Lessons

A number of studies have found the relation of student texts to phonics lessons to be very important. One of these is an in-depth investigation of the effects of texts on children's reading processes.[2] The researchers compared the effects of two commercially developed programs. The first program emphasized phonics, and the core vocabulary of its three initial "preprimer" texts stressed words with regular, decodable patterns. The second program was not phonics-oriented, and the word selection in its preprimers stressed frequent words instead. In addition, teachers devoted twenty to thirty minutes per day to whole-class synthetic phonics instruction.

The different percentages of decodable words in the two programs had strong effects on children's reading. By very early in the year, children in the phonics-oriented program had developed a greater appreciation of—and more general reliance on— spelling-sound relations than had their peers in the other program.

Children in the non-phonics-oriented program tended to use distinctive letter patterns, or patterns that appeared in only a few words, as cues for recognition. For these children, it seemed that visual cues were gaining precedence over spelling-sound strategies.

As for achievement, children in the phonics-oriented program were able to read more words from unfamiliar books than were children in the non-phonics-oriented program. They also were better able to read pseudowords in a list than were the other children. The researchers concluded that

> the selection of text used very early in first grade may, at least in part, determine the strategies and cues children learn to use and persist in using in subsequent word identification . . . . In particular, emphasis on a phonics method seems to make little sense if children are given initial texts to read where the words do not follow regular letter-sound correspondence generalizations. . . . [T]he types of words which appear in beginning reading texts may well exert a more powerful influence in shaping word identification strategies than the method of reading instruction.[3]

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Other studies suggest that beginning reading books in basal reading programs vary greatly in the percentage of decodable words, from nearly all words that children are exposed to in the first year to almost none.[4] Consonant with the results of such studies, *Becoming a Nation of Readers* encouraged publishers to bring the structure and wording of their earlier books into coordination with their phonics instruction.[5] To do so with interestingly readable text is a challenge, but one that is well worth the effort.

But it is not only the percentage of decodable words that affects children's reading. In addition, it seems that children learn letter sequences best if they appear in many different words, rather than the repetition of the same word in a passage. Thus students may learn to read words with the *th* pattern better if their reading contains a number of words such as *this, that, path,* and *thank,* than through as many repetitions of *the.*

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The Downplaying of Phonics

On scrutiny, the notion of "phonics-first" begs the larger question of how best to communicate with students about the function and use of phonics. In addition to the difficulties associated with using letter names, letter sounds, and special terminology that have already been discussed, there are other difficulties. How, for example, can a teacher explain to a student that letters should be sounded out from left to right? How can a teacher explain what is meant by segmenting or blending to a student who has little phonemic awareness?

It is not for lack of thought, care, or effort that such disarray exists. As also mentioned earlier, there are scores of beginning reading programs whose primary purpose is to teach the spelling-sound correspondences of the English writing system. We know that experts have invested enormous effort in finding the most coherent and teachable way to do so. Yet chaos prevails.

Given this chaos, how do teachers manage to teach phonics at all? The answer from research is: with difficulty. Because they know that reading connected text itself is the goal of reading instruction, there is even some tendency for teachers to downplay or finesse phonics lessons drastically. Teachers allocate considerable supervised instruction time to basal reader activities. Somewhat less time is spent on phonics each day, and much less of that time is supervised.[6] One study of first-grade classrooms in six schools revealed that most phonics instruction occurs as seatwork.

Similarly, a study of reading in special education

classrooms found that teachers spent only sixteen minutes a day in direct instruction. Of that time, teachers used fourteen minutes to give general reading instructions. They spent one minute waiting while a student completed reading tasks. They used only one minute a day to explain or model correct elements in reading.[7]

The downplaying of phonics instruction reflects a compromise. The amount of time teachers spend on each activity is more than a matter of limited classroom time, it is a choice between two activities that differ in manageability, apparent pertinence, and evident progress.

Why Is Phonics Downplayed?

When word attack skills are taught in the context of connected reading, their application is immediately pertinent to the story being read. The instruction's relevance to the greater goal of reading meaningful text is evident, both to teachers and students.

In contrast, the importance of phonics instruction may be more difficult to convey to students when it is not reflected in the words students encounter in basal readers. The pace of phonics instruction may seem excruciatingly slow — especially when it lags behind the word identification challenges of the readers. And, given the complex nature of English spelling-sound translations, there is no obvious path through the phonics correspondences and generalizations. Along that path, there are no obvious landmarks to let teachers or students know which way the instruction will turn next or how much headway has been made toward its end.

In contrast, the importance of phonics instruction may be more difficult to convey to students when it is not reflected in the words students encounter in basal readers. ■

Because the phonics instruction in basal reading programs is so often mismatched with the rest of the program, thinking teachers may well downplay it. They may find that the other pages and the stories of the basal program provide a greater sense of purpose, direction, and achievement. The structure of the basal program may appear clearer than that defined by the schedule and progression of phonics lessons.

The downplaying of phonics instruction may also be traced to management considerations. The amount of class time that can be spent on reading is limited. Listening to students' oral reading requires teacher time, but most phonics activities in workbooks do not. Thus, from the viewpoint of the teacher, one way to maximize the time available is to relegate phonics exercises to seatwork.

For students who already know considerable phonics, this practice may not be the best solution. For students less well prepared, it may be a big mistake. Investigators have

found repeatedly that the degree of engagement or attention that students invest in their schoolwork is directly related to the how much they learn.[8] Seatwork is associated with lower levels of engagement and achievement. High levels of student engagement and classroom achievement are associated with teacher-led activities.[9] In the early grades, the amount of time students are engaged in teacher-led instruction on phonics is a strong predictor of their reading achievement.[10]

The dilemma is tragic. Teachers give students phonics practice to enable them to recognize words independently and with sufficient ease so that their attention and interest can be focused on the meaning of what they read. At the same time, teachers provide students with connected text to enable them to understand the purpose and value of the phonics lessons through applying what they have learned. In practice, however, it seems that teachers often lose sight of the goals behind their plans. The initial activities in connected reading tend to compete with or even to displace the word recognition skills that they were intended, in part, to develop.

Seatwork is associated with lower levels of engagement and achievement. High levels of student engagement and classroom achievement are associated with teacher-led activities. ■

Why Poor Readers Get Less Reading Instruction

The very structure of a typical basal reading program may lead us to give less word identification instruction to those students most in need of such instruction.

Observers in first-grade classrooms found that the primary determinant of lesson level and pace was the students' ability to read their basal reader stories aloud.[11] That is, students who read more slowly and laboriously progressed through the story sequence more slowly.

By itself, this practice makes perfect sense. However, bear in mind that the basal programs and their accompanying teachers' guides and worksheets are intended to provide teachers with a core program of reading instruction. If the teacher relies on the basal program to prescribe instructional content and activities to accompany each story — then progress in all aspects of reading instruction is tied to the students' progress through the stories. As such, a slow pace through the basal stories means an equally slow pace through phonics instruction.

The upshot of this is that the more poorly prepared students are on school entry, the less they will be taught about letter-sound correspondences and spelling patterns. Yet the less students know about letter-sound correspondences and spelling patterns, the less fluent and able they will be in deciphering connected text.

Importantly, this situation is counterproductive

however it is viewed. The amount students learn through connected reading is tightly bound to the amount of difficulty they experience in reading it. High error rates are negatively correlated with achievement; low error rates are positively correlated with achievement. There is evidence that achievement in reading is improved by placement in materials that a student can read orally with a low error rate (2% to 5%), and that students placed in materials that they read with greater than 5% errors tend to be off-task during instruction.[12]

Teachers of low-readiness readers thus are caught in a bind. They can only speed progress through the stories by accepting higher error rates or by skipping stories. Across the lessons of the basal readers, however, sight vocabulary and readability are built up, story by story. Teachers cannot, therefore, skip stories without accepting an accelerated increase in difficulty in those stories that are read. Teachers could move students more quickly through the phonics than through the reading components of the basal, but this results in management problems.

In many ways, the compromise of moving through the lesson sequence more slowly seems understandable. By spending more time on each story, the teacher can bring students to a higher level of correct responding. The only cost is that of diluting the lesson's supporting activities. But even this has its advantages. It leaves more instructional time per day for working on the connected reading—and remember that basal reader coverage is itself a good predictor of first-grade reading achievement.

Indeed, the only major disadvantage of moving through the lessons more slowly seems to be that students will receive less explicit instruction and practice in phonics and word analysis skills across the school year. But again, this is a very serious disadvantage. We have seen repeatedly that the single best differentiator between good and poor readers is their knowledge of spelling patterns and their proficiency in translating spelling to sound. Phonics mastery is not only highly correlated with the amount of phonics taught, but for low-readiness children — that is, for those who lack it most — it is very strongly and directly dependent upon it. One analysis found that among low-readiness students:

> Phonics learning is not related to basal learning .... Among these children, who are the least ready to read, the acquisition of phonics skills does not occur derivatively from basal reading or in conjunction with it, but more narrowly reflects the pace of phonics instruction. In short,

We have seen repeatedly that the single best differentiator between good and poor readers is their knowledge of spelling patterns and their proficiency in translating spelling to sound. Phonics mastery is not only highly correlated with the amount of phonics taught, but for low-readiness children — that is, for those who lack it most — it is very strongly and directly dependent upon it. ■

the low aptitude children learn the phonics they are taught and do not pick it up as a by-product of more general reading.[13]

A Partial Solution

If only the basal stories and basal phonics instruction were consistently and carefully designed in support of one another, these conflicts might disappear, and the situation would be significantly improved.

However, even this would not provide a total cure. There is a deeper problem here: As material to be taught or learned, individual letter-sound correspondences and phonic generalizations are, when divorced from the rest of the reading situation, inherently difficult. Moreover, to be useful, individual letter-sound correspondences or phonic generalizations must not merely be learned, they must be overlearned such that they are instantly and effortlessly available to readers. But overlearning requires lots of practice and review and, therefore, lots of time.

On the other hand, it does not seem necessary for students to master all sound-symbol relationships prior to reading connected text. Students can and should read simple texts containing both taught and untaught correspondences, providing they can do so with a low error rate. ■

On one hand, the touted importance of spelling-sound relationships seems not to be an illusion. As we have examined each of a number of areas—program comparisons, research on prereader skills, the knowledge and performance of skillful readers, theory on the nature of learning—each has pointed toward the conclusion that skillful word reading depends critically upon a deep and thorough acquisition of sound-symbol relationships.

On the other hand, it does not seem necessary for students to master all sound-symbol relationships prior to reading connected text. Students can and should read simple texts containing both taught and untaught correspondences, providing they can do so with a low error rate.

Our problem remains: Children who are not well prepared get further and further behind. Indeed, in reading achievement, the gap between good and poor readers grows wider each year. In the extreme, these children will come to know only what we have helped them to learn and only as we have helped them to learn it.

If low-readiness students learn only the phonic generalizations they are taught, how are teachers ever to teach them enough, quickly enough, and thoroughly enough to make reading a rewarding activity? And, if we could find more effective ways of instructing low-readiness students, wouldn't these ways also be more effective with those students who come better prepared?

Concerns and Conclusions

Skillful reading depends uncompromisingly upon thorough familiarity with individual letters, words, and frequent spelling patterns. Only to the extent that we have developed such familiarity can the written word flow effortlessly from print to meaning. Moreover, insufficient familiarity with the spellings and spelling-to-sound correspondences of frequent words and syllables may be the single most common source of reading difficulties.

What are the prerequisites to acquiring such knowledge? Children should embark on reading instruction with solid visual knowledge of the letters of the alphabet. They must also have a broad, general appreciation of the nature of print — how it is formatted; that its basic meaningful units are specific, speakable words; and that its words are comprised of letters. And they should have a sense of its various functions and its potential personal use. We know that familiarity with individual letters and familiarity with the nature of written text are strong predictors of the ease with which young children will learn to read.

While appreciation of the alphabetic principle is of primary importance for beginning readers, it must be realized that its appreciation depends on phonemic awareness. Specifically, appreciation of the alphabetic principle depends upon students' understanding that the sounds that are paired with each letter are parts of spoken words. Though many children enter first grade with little or no appreciation of the nature and existence of phonemes, such awareness can be developed through preschool games and activities to the significant benefit of the children's subsequent reading achievement.

Developing Pathways from Print to Meaning

Although the ultimate goal of word recognition instruction is to develop pathways from print to meaning, the growth of young readers' visual vocabularies depends on their knowledge of spelling-sound relations. As its most obvious benefit, such knowledge allows for independent word learning: Printed words that are also in a child's speaking vocabulary can be discovered by sounding them out.

Yet there is a side effect that is of still more value to the reader. The reader's visual knowledge of frequent words and spelling patterns consists of knowledge of the order and identities of their component letters. The process of sounding words out helps to establish this visual knowledge in two ways. First, to sound a word out, a child must attend closely to its left-to-right sequence of letters. Second, as the child proceeds, the sound sequence of the spoken word locks into the visual sequence of its printed letters. In this way, the process of sounding out both constrains and reinforces the child's memory for the word's spelling. Without such phonological support, acquisition of an adequate visual vocabulary would be difficult if not impossible.

The process of sounding out both constrains and reinforces the child's memory for the word's spelling. ■

These relations between spellings and sounds become so well built into the system that, with experience, skillful readers tend to sound words out quite automatically. As a result, even the occasional, never-before-seen word may be read with little outward sign of difficulty. Just try it: *pentamerous, hypermetropical, hackmatack.* Of far greater importance, however, the automaticity of skillful readers' spelling-sound translations ensures that those many, many words of known meaning but marginal visual familiarity will be recognized with the ease and speed required for fluent reading comprehension. Further, as the phonological translations serve to link knowledge of the word's meaning with knowledge of its spelling, each such encounter also results in a strengthening of the word's direct spelling-to-meaning connections.

Comprehension can be successful only to the extent that the reader's attention is devoted to it. Thus it is necessarily disrupted when a reader's attention is instead focused on the identification of any particular word, syllable, or letter of the text in which the disruption occurs. For comprehension to be recovered, the phrase in which the disruption occurred must be reread with fluency. Because of the ease with which skillful readers sound words out, the disruptiveness of unfamiliar words is minimized. In view of this, the capacity for sounding words out is at least as important when children are reading complex texts with less familiar vocabulary as it was when they

were in the early stages of mastering word recognition skills. Moreover, its importance extends beyond the support it lends to the processes involved in recognizing individual printed words.

For example, as it is perceived, each word of the text automatically stimulates the entire complex of meanings and experiences with which it has been associated. Clearly, were that the end-point of reading, the end-product would be mental chaos. But perception is only the first stage involved in comprehension. To select the intended use and meaning of each word, readers must work with whole phrases or sentences of words at once. Here, too, the process of sounding words out is invaluable. By speaking the words in their minds, skillful readers expand the number of words that they can remember — and hence, think about — at once. Indeed, preventing skillful readers from subvocalizing severely disrupts their ability to comprehend long or complex sentences.

Having perceived and remembered the words of a sentence, the reader's task is one of searching among their collective meanings to find the most useful interpretation of the sentence. This process requires the critical and inferential processes essential for putting such information together. It is this level of interpretation that we think of as true understanding.

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But interpretation at this level requires active attention and thought. It is not automatic or effortless. It will only be as fruitful as the discipline and effort the reader invests in it Yet the discipline and effort that readers can invest in it depend, in turn, on the ease and completeness with which they can perceive the words in the text.

In summary, deep and thorough knowledge of letters, spelling patterns, and words, as well as the phonological translations of all three, are of inescapable importance to both skillful reading and its acquisition. By extension, instruction designed to develop students' sensitivity to spellings and their relations to pronunciations should be of paramount importance in the development of skillful reading. This is, of course, precisely the goal of good phonics instruction.

Why Is Phonics Instruction So Often Protested?

And so we are left with the question: Why is phonics instruction so often and so loudly protested? The answer seems to lie in the typical realities of its application.

First let us consider the situation for those children who enter first grade with thousands of hours of literacy preparation behind them. Many of these children will be on

the brink of independent reading and writing, if they are not there already, and the basic phonics curriculum will generally consist less of new concepts and information than of review and clarification of things they already know. Many teachers sense that curricula that emphasize basic phonics are inappropriate for these children. However, systematic phonics instruction is no less important for these children. To be most productive, it may best be conceived as a support activity, carefully covered but largely subordinated to the reading and writing of connected text.

But what about children who enter school with little literacy preparation? Even among teachers of these students, resistance to phonics is not uncommon. And, again, such negative attitudes can be traced to the realities of instructional delivery. To illustrate, let us consider the instructional treatment of at-risk students.

Low achievers generally are given less classroom time to read text than their higher achieving peers. When low achievers are asked to read, the reading tends to be oral, round-robin style, with the consequence that they read far fewer words, stories, and books. ■

As it happens, schools with high proportions of at-risk students tend to spend not more, but less classroom time on reading instruction.[1] Indeed, data from the most recent national evaluation of Chapter 1 programs indicate that schools with large numbers of students from low-income homes schedule nearly twenty minutes less reading instruction per day than comparison schools.[2]

Perhaps this disparity should not be surprising. Where many students are receiving individual reading instruction through Chapter 1 programs, it is reasonable to conclude that less classroom time for reading is appropriate — there are, after all, topics besides reading to be covered in a day. But not all of the students in a classroom receive supplemental instruction. Furthermore, most of those who do receive such instruction miss at least some of the time scheduled for reading in their classrooms.[3] In the end, not even these students gain any increase in the total amount of instructional time they receive.

Still, it is not only the time allocated for reading that is important. How that time is spent is also important. Low achievers generally are given less classroom time to read text than their higher achieving peers. When low achievers are asked to read, the reading tends to be oral, round-robin style, with the consequence that they read far fewer words, stories, and books.[4]

Furthermore, the emphasis during the round-robin sessions of low achievers tends to be squarely on reading accuracy. While this emphasis no doubt reflects concern for students' phonics development, it results in a large number of interruptions during reading. This serves to reduce still further the number of words, stories, and books they will cover.[5] It

also means that low-achieving readers are found to be given little encouragement or opportunity to examine the structure of their text, to reflect on aspects of its meaning, or to discuss its message.[6] The focus of supervised reading is, instead, on words and on relatively few of them.

Seatwork

But, while one group is reading with the teacher, the other groups must also be busy. How do students spend time at their desks? Again, a disparity is found between high and low achievers. The completion of skillsheets, workbooks, and dittos accounts for the majority of all student seatwork. In addition, however, better readers are often engaged in silent reading and comprehension tasks other than seatwork. Low achievers seldom are.

Even within Chapter 1 programs, most of the low achievers' time is spent on worksheets, and especially on worksheets that emphasize letter-sound relations and word analysis skills.[7] The motivation is clear. The worksheets are meant to develop the spelling and spelling-sound knowledge these students lack.

There is nothing inherently wrong with giving students well-devised worksheets. In addition to exercising valuable skills, many students enjoy the sense of getting something done. Moreover, independent seatwork affords an opportunity for each student to practice the knowledge and skills she or he needs most.

But opportunities aside, such seatwork activities are rarely selected with an eye toward the student's own, individual needs.[8] In both classrooms and pull-out sessions, all students are typically held accountable for the same seatwork. When pull-out students return to their classrooms, they are often required to complete seatwork despite having missed the relevant instruction. And, in both classrooms and pull-out sessions, the seatwork of the low-achieving students is often completed with a very high number of errors.

Seatwork should never be assigned unless students understand its purpose and method and are expected to profit from its execution. Of equal concern, however, is that time spent on worksheets is time that cannot be spent reading. And these students need desperately to read.

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Reading Instruction

Because the materials used in pull-out reading programs are usually different from those of the classroom — with different vocabulary words and often different instruction — low-

achieving students are typically confronted with twice as many vocabulary words and decoding skills as their higher achieving peers, but are given less time for mastering either set. They are given less time for connected reading and independent writing. And during the time they do read text, they cover less material and are less often challenged to think about its meaning or structure.[9]

In reaction to this situation, some may see phonics instruction as the problem with such programs for low-achievers. Yet the problem is not phonics instruction — all students, whether their preschool reading preparation is high, low, or in-between, need to learn about spellings, sounds, and their relationships. The problem with so many programs is that the phonics instruction they present is both poor and imbalanced. But this does not have to be. Effective programs have been designed to provide students with a balanced range of reading instruction. For the sake of concreteness, I will discuss one such program in detail.

The problem with so many programs is that the phonics instruction they present is both poor and imbalanced. But this does not have to be. ■

The Reading Recovery program for low-achieving students. Exemplary among these is Marie Clay's Reading Recovery program.[10] Reading Recovery is initiated with a diagnostic survey designed to assess each student's letter recognition abilities, knowledge of the structure and functions of print, word recognition abilities, passage comprehension ability, and writing skills.

During the first two weeks of one-to-one tutoring, the teacher introduces nothing new for the student to learn. Instead, based on the results of the diagnostic survey, the student and the teacher engage in "roaming around the known." So that the teacher can more fully observe and understand the knowledge, skills, and behaviors of the student, these introductory activities consist of finding different ways to exercise established skills fluently. So that the student will understand the purpose of the tutoring, these activities are exclusively conducted with real texts and real writing. In this way, the introductory sessions allow both the teacher and the student to develop their ideas of what they will be doing together.

The first story is carefully chosen so that the student can read at least 90% of the words. The stories that are most often used with the Reading Recovery program are bound as separate little books. The illustrations in these books are enchanting, the stories are delightful, and the language is full of rhyme and repetition, as beginning books should be. A new book is introduced each day, but the lesson always includes rereading of at least one familiar one. Such rereading has been

shown to be an excellent way of refining and reinforcing both word recognition and comprehension skills. In addition, it provides a means of enhancing the student's sense of confidence and accomplishment.

The student is also engaged in a variety of other activities. Secure learning of letter identities is supported through key words, exercises with magnetic letters, verbal description, directed attention to similarities and differences, finger-tracing, and printing. Letters may be labeled with their names, their sounds, or as the first sounds of a word, depending on what the student finds most comfortable.

The importance of awareness of sounds and words is also explicitly recognized. The student is asked to clap out syllables and to segment words into phonemes with bingo markers. In support of word awareness, the student is encouraged to point to each separate word while reading.

Writing is the principal means for developing word analysis skills. As in the language experience approach, writing may at first consist of dictation by the student to the teacher. However, independent writing is encouraged as soon as possible. The teacher may give the student model words to copy, and may ask that a word be written again and again. The stories that the student writes may be typed, but not edited, by the teacher. They provide a major source of information about the student's growing mastery of the spelling patterns of English.

The goals of Reading Recovery are to establish and secure that complex of lower order skills upon which reading depends; to help students learn to monitor their own reading; to develop the habit of rereading a word, phrase, or passage when unclear; to know that they not only can discover new words and meanings but also cross-check and confirm or correct their discoveries on their own; and to develop a strong sense of how to search deliberately and methodically for information in letter sequences, word sequences, or meaning. The program, in short, is meant to help students understand the nature of text and reading.

Other effective programs. Along lines similar to Reading Recovery, a number of other successful programs for low-achieving students have been developed across the country. These programs are designed to develop a thorough appreciation of phonics. However, none of them treats phonics in a vacuum. Nor should phonics skills be treated that way. Their proper acquisition depends upon coordination with all kinds of knowledge about language and text.

Phonological awareness, letter recognition facility,

familiarity with spelling patterns, spelling-sound relations, and individual words must be developed in concert with real reading and real writing and with deliberate reflection on the forms, functions, and meanings of texts.

In fact, if we consider, not what reading experts say, but what they do, we quite commonly find this sort of pattern of activities. For example, one model approach to "whole language" instruction is packed with activities for developing phonological awareness, orthographic knowledge, and spelling-sound relations.[11] And some programs that are bitterly anti-phonics acknowledge the importance of teaching such skills "as needed."[12]

On the other side, even Rudolph Flesch, while loudly touting basic, bottom-up phonics, explained that before such instruction is begun, students must acquire awareness of the phonological structure of words and ready familiarity with the visual forms of letters.[13] He assumed, moreover, that parents regularly will have read and enjoyed nursery rhymes, fairy tales, and other stimulating texts with their children from the earliest moment possible. He insisted that reading should always be coupled with writing. And he asserted that it is through the reading and appreciation of classic literature and informative text — not of individual words or texts controlled to vapidity — that a child's literacy competence grows.

It is not just the presence of a variety of activities that makes a program of reading instruction effective or ineffective. It is the way in which its pieces are fitted together to complement and support one another, always with full consideration of the needs and progress of the young readers with whom it will be used. ■

So Why the Dispute?

With so much underlying agreement, why is there so much outward dispute? My guess is that people tend to conceive of some instructional activities as "key" and others as "support." But the process of reading cannot be divided into "key" and "support" activities. All of its component knowledge and skills must work together within a single integrated and interdependent system. And it is in that way that they must be acquired as well.

It is not just the presence of a variety of activities that makes a program of reading instruction effective or ineffective. It is the way in which its pieces are fitted together to complement and support one another, always with full consideration of the needs and progress of the young readers with whom it will be used.

Good curriculum implementation depends on solid understanding of the principles and goals upon which it is built. To make the most of a set of materials, teachers need to understand *why* each activity is included. They must understand the purpose of each activity so that its importance can be assessed with respect to the particular needs of their own

students. Teachers must understand how the activities fit together. They must be able to separate necessary from recommended activities.

My objective in this book has not been to outline any particular "universal, best method" for teaching reading. I do not believe that a "best method" can be defined in outline: The effectiveness of a method depends too much on the details of how it is implemented — its materials, its teachers, its students, and the compatibility of each with the other. I have tried, instead, to clarify principles and goals that might be used in the rational development of any method, and issues that should be considered along the way.

The research reviewed in this book gives ample evidence that we do, indeed, know a great deal about beginning reading. Yet the divisiveness over code-emphasis versus meaning-emphasis in reading instruction rages on. Isn't it time for us to stop bickering about which is more important? Isn't it time we recognized that written text has both form and function? To read, children must learn to deal with both, and we must help them.

Conclusions

Effective reading instruction depends not only on what one does, but also on the depth and quality of the understandings by which it is guided. An analogous statement can be made for the following conclusions. They are valuable only with an understanding of the processes and considerations on which they are based.

Predictors of Reading Acquisition

- Performance on perceptual tests that do not involve linguistic skills or facility with print does not appear to relate to reading success.

- Letter recognition skills are strong predictors of reading success. It is not simply the accuracy with which children can name letters that gives them an advantage in learning toread, it is their basic familiarity with the letters — though this is typically reflected in the ease with which they can name them.

- Awareness that spoken language is composed of phonemes is an extremely important predictor of success in learning to read.

- Children's general awareness of the nature and func-

tions of print is a strong index of their readiness to learn to read.

Before Formal Instruction Begins

- The single most important activity for building the knowledge and skills eventually required for reading appears to be reading aloud to children regularly and interactively.

- Children learn a great deal about both the nature and function of print through thoughtful interactions with adults.

- Language experience activities and the use of big books are excellent means of establishing print awareness (although they are less useful as primary vehicles for reading instruction itself).

- Children recognize a variety of environmental print that they encounter day to day, but environmental print does not seem to contribute to reading success unless a child has first begun to learn about the individual letters.

- Learning to recognize and discriminate the shapes of letters is a difficult process requiring support and encouragement. Ideally, letter knowledge should be well established before children reach first grade.

- Among preschool children in the United States who learn about letters at home, it is typically the names of the letters that are learned first, often through the alphabet song. Learning about their shapes comes later, and their sounds, later still.

- Some children have difficulty conceiving of spoken language as consisting of individual words. The concept of "word" can be developed easily, though, through exposure to written text or through direct instruction. Children should also be helped to appreciate the relationship between the lengths of spoken and written words.

- Activities designed to develop young children's awareness of words, syllables, and phonemes signifi-

cantly increase their later success in learning to read and write. The impact of phonemic training on reading acquisition is especially strong when phonemes are taught together with the letters by which they are represented.

- Early encouragement of printing is both a way of developing letter recognition skills and of enabling children to write independently.

Beginning to Read

- Approaches in which systematic code instruction is included along with the reading of meaningful connected text result in superior reading achievement overall, for both low-readiness and better prepared students.

- Programs for all children, good and poor readers alike, should strive to maintain an appropriate balance between phonics activities and the reading and appreciation of informative and engaging texts.

- Matching children to different instructional programs based on dominant perceptual modality or styles does not appear to improve the efficacy of instruction.

- Writing and spelling activities, in general, are a means of developing and reinforcing knowledge of spelling and spelling-sound patterns.

- Independent writing activities are a means of developing children's deeper appreciation of the nature of text and its comprehension.

- The texts that children read influence the reading abilities they develop. Texts that contain a higher proportion of decodable words promote independent word recognition growth. As reflected by their writing, children also absorb the syntax, vocabulary, and conceptual structures of the texts they read.

Phonics Instruction

- Phonics instruction is not only a means of teaching children to sound words out, but also of directing their attention to the spellings of words.

- To maximize word recognition growth, the wording of

children's early texts should be carefully coordinated with the content and schedule of phonics lessons.

- The ability to recognize letters is extremely important to the development of word recognition.

- For children with little letter knowledge on entry to school, current learning theory suggests it is unwise to try to teach both upper case and lower case forms of all twenty-six letters at once. For children who do not know letter names on school entry, special care should be taken to avoid confusion of names and sounds.

- Classroom encouragement of invented spellings is a promising approach toward the development of phonemic awareness and knowledge of spelling patterns.

- The learning of regular spelling patterns and their phonic significance may be hastened through methodical use of onsets and rimes.

- Because most phonemes cannot be pronounced without a vowel, many programs avoid or limit the use of isolated phonemes in their instruction. This practice often leads to potentially confusing instruction. The advantages of asking students to articulate phonemes in isolation outweigh the disadvantages.

- Because children have special difficulty analyzing the phonemic structure of words, reading programs should include explicit instruction in blending.

- Reliance on special terminology may subvert the purpose of the lessons in which it occurs.

- Although rules and generalizations cannot substitute for direct practice with the words to which they pertain, they may be useful for either directing students' attention to a particular spelling pattern, or providing strategies for coping with difficult decoding patterns.

- Phonic rules and generalizations are, at best, of temporary value. Once a child has learned to read the spellings to which they pertain, they are superfluous.

Beyond the Basics

- Children should be given as much opportunity and encouragement as possible to practice their reading. Beyond the basics, children's reading facility, as well as their vocabulary and conceptual growth, depends strongly on the amount of text they read.

- Reading comprehension depends on the ability to perceive words relatively quickly and effortlessly.

- Reading comprehension also depends on the conviction that text is meant to be understood and thought about.

- To maximize achievement, children should be given texts that they can read orally with 90% to 95% accuracy.

- Given that a text is at an appropriate level of difficulty, it is preferable that children be encouraged *not* to skip words that are difficult for them. Instead, they should be encouraged to take the time to study a word, and then reread the entire sentence or phrase in which is appears.

- Repeated readings of text are found to produce marked improvement in children's word recognition, fluency, and comprehension.

- Encouraging children to learn to spell words correctly is important because spelling knowledge directly affects their reading ability.

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Beginning to Read: Thinking and Learning about Print

by Marilyn Jager Adams

6 x 9 480 pages ISBN 0-262-01112-3

Comments on *Beginning to Read:*

Beginning to Read is a worthy sequel to Chall's book, *Learning to Read: The Great Debate.* It brings together a prodigious amount of research in support of a coherent and forceful statement about how children acquire reading skills and how these skills should be taught, with clear recommendations concerning educational practice. — Mark Seidenberg, McGill University

Adams' considerable talents as a writer emerge in her abilities to effectively use analogies and examples to get crucial points across, to find just the right turn of phrase to summarize an argument or highlight a problem. The tone of the book is engaging and familiar, the subject matter is challenging, but so clearly presented. Moreover, teachers and teachers-in-training will appreciate that Adams does not lose sight of the complexity and reality of the classroom when she works out the implications for teaching reading. — Deborah G. Kemler Nelson, Professor of Psychology, Swarthmore College

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