Reading Assessment

READING ASSESSMENT
Linking Language, Literacy, and Cognition

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This book is dedicated to the men in my life:
To my husband, Bob
To my sons, Nolan and Lucas
And to my friend and mentor, John O. Willis

Contents

Acknowledgments

This book has been the result of over three years of work, and during that time I have had the help and support of several individuals. (All mistakes, of course, are mine.) My assistant, Debby Mullan, has been invaluable for her fastidiousness, attention to detail, and never-failing encouragement; I am often struck by her expertise on teaching reading and her comments on the importance of explicit instruction. Susan E. Morbey, an astute evaluator who writes and teaches with great intelligence, critiqued each and every chapter. I smile when I think of moments stolen from conversations with our spouses so that we could talk of testing and cognition.

Caryl Patten, special education advocate, read with a critical eye offering expertise in the history of dyslexia. ''Tell them,'' she said, ''that Samuel Orton was right.'' My husband, Bob Barrie, has read every single page of this text. He knows more about assessment than most software professionals would ever think possible or imagine. To his surprise and my delight, he thinks differently now about language and reading.

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I have been fortunate in my life to have had a series of mentors who were kind enough to take me under their wing. David Maxwell, now president of Drake University, opened my eyes to the beauty of the Russian language and 19th-century Russian literature, a period of literary genius that has no equal in history. Robert Mathiesen, Professor Emeritus of Brown University, trained me to analyze scribal errors in Old Russian manuscripts for what they could tell us about the Slavs prior to the time of the printing press. Little did I know that I would use those skills in my work in the field of learning disabilities.

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I was lucky. My childhood was filled with trips to the library and books from murder mysteries to high-energy physics. Mom and Dad, look what I did.

Introduction

Chapter 1

Joseph Brodsky (1940–1996), winner of the 1987 Nobel Prize for Literature and the 1986 National Book Award, became poet laureate of the Library of Congress in 1991. Brodsky, a former Soviet citizen, had been sentenced to hard labor in Siberia in 1964 for ''social parasitism'' and ''decadent poetry.'' Upon his exile from the Soviet Union in 1972, he emigrated to the United States where he became a citizen.

Brodsky never could understand the apathy of Americans toward poetry. His quote, ''I don't know what's worse, burning books or not reading them'' (Ohnemus, 1991, p. 9) expressed his sheer puzzlement over American reading habits. Brodsky believed that literature, in particular poetry, was essential to a culture and that the downfall of the Soviet Union was a result of its efforts to censor its writers and poets. According to Brodsky, empires did not stand by virtue of their legions, they were united by their language (Billington, 1996). The Soviet Union was destined to fall because it denied its linguistic and literary heritage.

As poet laureate in the United States, Brodsky recommended that inexpensive anthologies be made available to the public in places such as hotels, airports, and even supermarkets in the hope that they would become a source of inspiration for those who were lonely, in fear, or spiritually in need. Brodsky made this recommendation with a sense of urgency. In what was an amazingly prescient statement, Brodsky said that ''there is now an opportunity to turn the nation into an enlightened democracy . . . before literacy gets replaced with videocy'' (Ohnemus, 1991, p. 9).

Brodsky would have been sorely pained to read the National Endowment for the Arts report, *To Read or Not to Read: A Question of National Consequence*, published in 2007. This study presented a somber picture of American literary habits; from 1985 to 2005, American spending on books dropped 14%. Americans in almost every demographic group were reading less than their predecessors 10 and 20 years ago, and as they aged they read less and less. According to this study, almost half of Americans between the ages of 18 to 24 did not read for pleasure; only 67% of college graduates read voluntarily, a decline of 15 percentage points over the past 20 years.

The statistics from 2007 are grim: Most individuals ages 15 to 24 are spending only 7 to 10 minutes per day reading voluntarily. This does not mean, however, that these readers are focused and engaged in what they are doing. Fifty-eight percent of middle and high school students are multitasking with electronic media at the same time that they read.

Educators in the United States are now faced with the immense task of working with a population that is increasingly diverse and that has other forms of stimulation competing for its attention and time. In addition to reading less, Americans are reading less well. Although the National Assessment for Educational Progress scores for 2009 represented a slight increase from 2005, the average reading scores for 17-year-olds were less than the scores earned in 1992 (National Center for Education Statistics, 2010). As interest and skill in reading decline, we have access to more information in print than ever before. We must ask whether we can realize our potential as a nation if we do not read and think deeply about what ails us.

As educators, we are faced with building a workforce from a population that is increasingly diverse in terms of ethnicity, culture, socioeconomic status, and preparedness for learning. While our task may seem to be awe inspiring (and there is not an educator who goes home at night unexhausted), we have a growing body of research on what it takes to turn children into readers. This research, however, does not always make it into training programs for educators where research-based methodologies are often presented as an instructional alternative: ''You can do this or you can do that.''

It is not unusual for teacher training programs to produce a variety of specialists who are each expert within their own domain. We have regular education teachers, special educators, speech and language pathologists, and psychologists (just to name a few) who each claim (or relinquish) responsibility for their own piece of a child's education. It is not possible, however, to separate out language from reading, and we do our children a disservice when we attempt to offer piecemeal solutions that, as J. O. Willis, head of the Specialist in the Assessment of Intellectual Functioning Program at Rivier College, has said, are then integrated with a staple (personal communication, January 14, 2005). Findings must be integrated thoughtfully with comprehensive conclusions and recommendations. Although on the surface children with poor reading comprehension may all look the same, they have different strengths and weaknesses. Each child requires instruction that is designed to meet his or her unique needs as a learner and that is delivered in a timely fashion. This is where evaluators come in.

A Field Under Assault

The field of assessment is currently under assault. Evaluations are considered costly in terms of time and resources. Some say that evaluations are irrelevant and that the dissection of strengths and weaknesses does little to inform instruction (D. Fuchs, Fuchs, Mathes, Lipsey, & Roberts, 2001). Much of the criticism may be well deserved. In some cases, evaluations are not comprehensive; in other cases, evaluations may stop short of being helpful. Excessive use of jargon, seemingly contradictory results, recommendations for the same old same old . . . No wonder teachers have been known to complain ''I would rather have a tooth extracted than attend another evaluation team meeting.''

When I first became a learning disabilities specialist with a resource room of my own, I had tested all of two children. I knew little about tests as products, and I had no experience in linking recommendations to research-based practices. In fact, I was encouraged during my training to focus more on modifications and accommodations than on reading remediation. To this day I see evaluations that conclude with recommendations for additional time without considering the root cause of the problem—that is, the inability to read. As a trainer who works with teachers at the graduate level, I see many educators who have not been taught about the role of language in reading or about the instruments that they use to test children.

Integrated Approach

This text is presented as an integrated approach to reading assessment; it is intended as a graduate-level text in a reading assessment or general assessment course. Evaluators who wish to assess reading skill require expertise not only in statistics, test development, test administration, and the precepts of good report writing; they also require expertise in how reading develops and in the complexities of reading comprehension. In particular, evaluators require a knowledge of the structure of language, for language is the stuff from which print is made.

In the past, component approaches to reading assessment have been criticized. By dissecting reading and language skills into discrete units, some believe that we lose sight of the big picture—the interaction that occurs between the reader and the text. Language, however, is remarkable for its connectivity. Vocabulary development is related to phonemic awareness and to syntax. Spelling is related to vocabulary. Expressive language skills are related to written expression, and receptive language is related to reading comprehension. While we may seek to measure discrete abilities, we need to think about language as a system and peel the onion one layer at a time.

The Text

Each chapter begins with a review of the theory and then moves into a discussion of issues related to assessment and the tools of the trade. Inclusion of specific test instruments is not necessarily a recommendation for use; sometimes tests are discussed because they have much to offer the field of assessment. In other cases, tests are discussed to illustrate weaknesses and potential problems in interpretation. Many chapters include case studies; all chapters include review questions that are designed to provide opportunities for basic skill development, critical thinking, and what it all means for a living, breathing child.

Chapter 2 begins with a review of reading theory and the stages of reading acquisition. How we define ourselves as educators and the controversies associated with reading reflect, at the most basic level, the difficulty associated with trying to understand how humans think and what the mind does in its efforts to process print and make meaning.

Chapter 3 focuses on theories of how children acquire language, the stages of language development, and a brief discussion of communication disorders. A knowledge of the structure of language permits us to understand both typical and atypical language development as a foundation for success in the classroom and for understanding print—written language that has been stripped of its prosody and potential for clarification.

Chapter 4 examines the issues associated with the assessment and instruction of children who are linguistically and culturally diverse. The process by which students with limited English proficiency and culturally diverse backgrounds are identified for special education is fraught by confusion over second language acquisition and actual language disorders. What does it mean to assess phonemic awareness in an English-language learner (ELL)? Are delays in decoding a function of ELL status, or are they indicative of a more serious problem with print? Why is it that children who appear to be proficient conversationally struggle with reading comprehension? How can we be proactive in our assessment and, at the same time, respect the linguistic and cultural differences that make us rich as a nation?

Chapter 5 on statistics and test development moves us into the realm of criterion-referenced and norm-referenced tests. Experienced evaluators may find some of this content familiar; novices in the field will find discussions of mastery, norm-referenced tests, and scoring systems as well as reliability and validity. This chapter also addresses concerns regarding measuring progress, floor and ceiling effects, and age and grade equivalents. In the assessment marketplace, it is consumer beware.

Chapter 6 focuses on test administration and report writing. A top-down approach to testing helps ensure that we use our time as evaluators well and that we do not subject children to more tests than are required. A template provides a skeleton for report writing that permits us to work efficiently, reduce the potential for errors, and at the same time produce a report that is highly individualized. Of course, the communication of test results in a manner that can be understood by parents and other educators is paramount to this discussion.

Chapter 7 brings us to progress monitoring and its potential for responding to children's need with greater efficiency. As a profession, we like the practicality of counting whatever is deemed countable. It is easy to do and easy to score, and there are many benefits to monitoring children's response to instruction. Unfortunately, not everything that is important is countable, and progress monitoring may not answer all questions regarding a child's need for instruction. Perhaps we should be thinking of what progress monitoring and comprehensive evaluations together have to offer.

Chapter 8 focuses on intellectual assessment and the relationship between intellectual ability and academic achievement. It would be a shame to assess reading without understanding what the field of cognition can tell us about how children learn. While we may not be partial to the discrepancy method for identifying learning disabilities, cognitive assessment can tell us much about verbal knowledge, spatial thinking, memory, and processing speed. In some cases intellectual assessment helps us understand why children do the things they do.

Chapter 9 examines oral language assessment with the goal of satisfying the hidden language specialist that resides deep within those of us in the field of reading. In particular, we look at the relationship between listening comprehension and reading comprehension, and the different ways in which they can be assessed. We also study the respective roles of vocabulary, syntax, abstract and figurative language, and inferential thinking, and how each skill relates to reading. I continue to be amazed by the all-important role that vocabulary plays not just in comprehension but also in decoding.

Chapter 10 delves into the underlying processes (and their associated controversies) that support the development of decoding and spelling: phonemic awareness, phonological memory, rapid naming, and orthographic processing. The chapter begins with a discussion of dyslexia and what it is about phonological processing that makes it hard for some children to perceive speech sounds and learn to read. We look how phonemic awareness develops and what to do with the myriad of tests that each purport to measure these all important skills. This chapter examines rapid automatized naming, an underlying process that is often overlooked in reading assessments, together with new tests that are forging into the less understood (and less researched) area of orthographic processing.

Chapter 11, the longest chapter in this text, reviews what current research and technology have to say about the dual route model, word recognition, and word attack, culminating in a discussion of reading fluency. As part of our exploration of print-based skills, we examine the usefulness of print awareness and alphabet skills as predictors of reading as well as issues (and yes, the debate) related to the assessment of noncontextual word reading. Terminology and concepts related to phonics are explained as vehicles for error analysis and communication with parents and other educators. The chapter concludes with a discussion of eye movements, reading automaticity and fluency, and the different ways in which they are assessed.

Chapter 12 discusses the Kintsch Model of Reading Comprehension, inferential thinking, working memory, background knowledge, and vocabulary. In this chapter we review different types of comprehension tests and issues related to how reading comprehension is conceptualized. Are we measuring a child's ability to learn new content from a passage, or are we measuring the sum total of passage content and a child's background knowledge? Is it possible to tell the difference? Given that different tests of reading comprehension may provide dramatically different results for the same child, this chapter provides a critical look at what tests actually measure and what they do not.

Chapter 13 strays from the arena of formal assessment to informal reading inventories (IRIs), and it discusses whether IRIs are really standardized tests in disguise. We examine the history and debate associated with reading levels, what the research has to say about miscue analysis and errors, and the use of running records. In the end, this chapter closes with a discussion of readability and of the many factors that make texts easy or hard to understand.

Chapter 14 shifts away from reading per se to a discussion of written expression and spelling, skills that are often overlooked in the field of reading. While you might be tempted to say ''rightly so,'' most children with reading challenges struggle with writing, and most children with decoding challenges struggle with spelling. Given the importance of written expression and spelling as tools for enhancing reading and decoding, we would be remiss to ignore them. The assessment of written expression, however, is complicated by a fundamental lack of agreement as to what written expression is and how it should be measured. Each time we test writing skill, we have to be aware of the limitations and the strengths of the instruments that we are using.

This textbook concludes with a discussion of illiteracy in Chapter 15. As educators, we have to understand the burden that reading failure places on society, on the family, and on the individual.

Before we begin, you might wish to take the pretest presented next.

Survey of Knowledge: Assessment and Reading

1. What is the primary purpose of a norm-referenced, standardized test?
2. What does the term standard deviation describe?
3. When is a test considered to be reliable?
4. Johnny earned a standard score of 98 on the reading comprehension test when it was read to him. Explain why this score is not valid.
5. Johnny earned a standard score of 90 on the Anybody-Can-Do-It Reading Test in 2009; he earned a standard score of 85 on the same test in 2010. Explain to all concerned whether Johnny has made progress or whether his skills have declined. Presume a standard error of measure of ± 5.
6. What does it mean to have an insufficient floor?
7. What is the structure of language?
8. List the components of a comprehensive reading evaluation.
9. Why is it important to test reading fluency?
10. Identify the six syllable patterns.
11. List four different ways of testing reading comprehension.
12. What is dyslexia?
13. What is a double deficit?

Reading Theory and Stages of Reading Acquisition

2 Chapter

Introduction

For centuries humans have sought to explain the mystery of language and thought. What started as a discussion among theologians, philosophers, and poets has now moved into the domain of science, and for the past 100 years psychologists, educators, biologists, and neurologists have attempted to lift the veil from the brain and reveal what happens when the mind encounters print.

The long-standing debate over the nature of cognition in general and reading in particular has at its core the practical challenges associated with trying to measure an internal, unobservable mental activity (Johnston, 1983). Recent advances in the field of medical science notwithstanding, researchers and educators have been forced to rely on their powers of observation and a variety of tools (sometimes crude and imperfect) in order to define the nature of reading. How does one describe the interaction between author and reader? How do we ascertain the process by which children become readers and thinkers? Just what does it mean to read?

The word *read* has a variety of meanings. We read over a text to get a general impression or read through a text from beginning to end. We can read aloud or silently, we can read for the gist or deeply. Actors read for parts in plays; parents read their children to sleep. We can read off measurements from a data logging device, or we can read up on a subject and become more informed. We can read someone's mind or read between the lines. When we read into something, all does not bode well. When we read someone the riot act, we chastise them for their bad behavior.

The *Shorter Oxford English Dictionary* (Stevenson, 2007) lists 21 definitions for the verb *to read*. All definitions of the transitive verb involve the notion of interpreting, reasoning, and ''taking in the sense of'' (p. 2477). The word is thought to have come to Old English (rædαn) from Old Norse (rαðα) and Old High German (rαten), originally meaning ''to advise, plan, [or] contrive'' (p. 2477). The word *riddle* also derives from the Old English root, extending the usage to include guessing.

The link between reasoning and print is attributed to Old English and Old Norse. According to the *Shorter Oxford English Dictionary* (Stevenson, 2007), *read* means ''believe, think [or] suppose.'' The secondary definition is

> *inspect and silently interpret or say aloud (letters, words, sentences, etc.) by passing the eyes or fingers over written, printed, engraved, or embossed characters; render (written or printed matter) in speech esp.* aloud *or to another person (also with pers. indirect obj.), take in the sense of (a book*

or magazine), or habitually peruse (an author's writing, a newspaper, etc.) by inspecting and interpreting letters, words, sentences, etc. (p. 2477)

The dictionary definition, however, does not take into account that reading means different things to different people in different contexts at different stages of their lives. The English language does not provide us with multiple words for reading; the word describes a broad spectrum of behaviors ranging from the child who proudly recites what he has scribbled on the wall to the attorney who examines legal contracts. It does not distinguish between the child who is learning to sound out words and the student who reads with confidence, automaticity, and fluency.

Given that English has few terms with which to describe reading, we might think that English speakers have little interest in reading. In fact, the converse is true. The debate over reading has incited passion, fierce arguments, and deep-rooted concerns for how we nurture and teach our children.

In order to appreciate the present-day controversy over reading, it is helpful to understand the philosophical and psychological underpinnings that have contributed to our views of how children learn and how they become readers. This chapter reviews some of the major theories on cognition and language as they have contributed to current models of reading theory and the stages of reading development.

Philosophical Underpinnings: Nature Versus Nurture

The discussion over language and cognition encompasses a wide range of theories that span the spectrum from those who believe that we learn by virtue of our biology to those who believe that learning is shaped by experience. The nature versus nurture controversy, as it is frequently called, has its roots in the philosophical discussions of the late 17th century that attempted to reconcile the differences between the behaviors of children and those of adults.

John Locke

The English philosopher John Locke (1632–1704) was the first to suggest that children were not born with adult reasoning capabilities and that they were not miniature versions of their parents. In 1690 (1997), Locke published his *Essay Concerning Human Understanding* in which he described children's minds as blank slates (*tabula rasa*) to be imprinted and transformed through sensory experience. Three years later Locke published a treatise called *Some Thoughts Concerning Education* (1693, 2010). This work had a tremendous impact on 18th-century educational theory. It sought to deemphasize self-indulgent educational practices of the Renaissance and its spotlight on the arts and focus instead on the development of critical thinking skills, the sciences, and vocational training. Locke's call for educational reform reflected a comprehensive approach that addressed parental and pedagogical responsibilities in three main areas: health, virtue, and academics.

While we may be pleased to see this early concern for health and character as part of a child's education, Locke's view of childrearing practices would be regarded by many today as harsh and unforgiving. Locke believed that children would develop healthy bodies through rigorous exposure to the cold and harsh elements, an idea somewhat akin to environmental inoculation. Virtue, Locke believed, in contrast to early views of original sin, would come with self-denial and rational thinking. Physical rewards and punishment were discouraged; they would promote sensuality. Locke cautioned parents to limit their children's exposure to inappropriate or foolish ideas; such exposure would taint the blank slate, leading to malformation of character. Children would embark on a path to virtue and rationality in an environment where parents and teachers would model proper behaviors and thoughts. Childhood was not about children; it was about forming adult character.

Despite his strong feelings on what constituted a proper education, Locke never provided much detail regarding specifics of instruction. His views, however, transformed the way in which adults considered children, and his stance became the foundation for the environmentalist position on learning and for the school of empiricism.

Jean-Jacques Rousseau

While many philosophers acknowledged the differences between adult and child thought, not everyone accepted the notion that learning was the sole product of experience. Jean-Jacques Rousseau (1712–1778), born in Geneva, was long considered the leading voice of the nature school of thought. He accepted Locke's view that children were not like adults. In contrast, however, Rousseau proposed that children were born with innate qualities that would develop and unfold according to a biological time table, culminating in a unique, virtuous adult. In his work *Emile: or, On Education* (1966, 1979), Rousseau proposed that children be encouraged to follow their natural curiosity and learn under the guidance of a tutor who would facilitate experiences, preferably in the country, free from the artifices of society.

Rousseau's view of education was child-centered. He was the first to argue for a developmentally appropriate education. Rousseau proposed that children advance through three stages to adulthood. The first stage was one of emotion and natural inclinations. Rousseau believed that children who were permitted to pursue these inclinations without the influence of potentially corrupting societal influences would enter into a stage of reasoning when they reached 12 years of age. During this second stage, adolescents would be provided with opportunities to problem-solve. Rousseau did not advocate instruction in the arts and sciences; he valued reasoning more than world knowledge. His work *Discourse on the Sciences and Arts* (1750, 1993), in fact, argued that these avocations were the product of vanity and self-interest and that they distracted young men from moral pursuits of friendship and love of country. The third and last stage (adulthood) would come at age 16; having internalized the tools of reason, adults would live a life of character and value.

Rousseau's views were not limited to child-rearing practices and education. His views of the innate morality of natural man, societal corruption, inequality, religion, and free will were both celebrated and reviled for their contribution to the French Revolution and early American political thought.

Empiricism and B. F. Skinner

The first half of the 20th century was influenced by the disciples of John Locke, who argued that science needed to be based on phenomenon that could be observed and measured. B. F. Skinner (1905–1990), recognized as the major proponent of empiricism in the United States, rejected the study of internal mental states in favor of an objective science based on behavioral principles. Skinner had no interest in psychological machinations; he equated the inner workings of the mind to an impenetrable black box that had little to offer the field of science. Instead, Skinner developed a theory of psychology that was based on observable behaviors and how those behaviors changed through reinforcement. In 1948 Skinner published *Walden Two*, a fictional account of a utopian community, in which individuals were supported to achieve their potential through environmental and social engineering. Although noble in its vision, *Walden Two* was met with suspicion and derision by a public fearing that individual freedom would be replaced by programmed robotic behavior.

In 1957 Skinner published *Verbal Behavior*, in which he reduced language, once thought to be divine in nature, to a behavior, like any other, that was shaped by the environment. According to Skinner, nature did not provide children with tools to learn language. Children acquired language because their early attempts at speech were modeled and reinforced. They learned how to sequence words into phrases and phrases into clauses through a process known in behavioral circles as chaining.

Skinner's effort to define all of the conditions under which speech was acquired was built on a foundation destined to crumble. His theory suggested that children could only produce language that was part of their experience; they could not state what they had not previously heard and learned. In his analysis, however, Skinner was forced to acknowledge that verbal behaviors could occur without environmental stimuli and that speakers could reinforce their own behaviors through thinking. Skinner was skirting the surface of what was thought to be an impenetrable black box.

Skinner's legacy to teachers was not in the field of language; his major contribution to the field of teaching was in the area of operant conditioning and the idea that behaviors could be modified through positive and negative reinforcement. Much of Skinner's work was misunderstood by the public that was uneasy with the prospect of using research on rats and pigeons in special cages called Skinner boxes to learn about human behavior. Contrary to what circulated widely in the press, however, Skinner did not advocate an end to freedom, and he did not raise his daughter in a Skinner box. Deborah Skinner Buzan, Skinner's daughter, reported in 2004 that she was alive, that she loved her father, and that she was doing well.

Inside the Black Box

Although behaviorism reigned supreme in the field of experimental psychology in the United States, several distinguished psychologists were exploring the mind inside the black box (G. Miller, 2003). In the 1930s A. R. Luria (1902–1977), a Soviet developmental psychologist who worked under the direction of Lev Vygotsky, Soviet psychologist, researched the relationships among culture, language, and the development of higher-level thinking skills. In particular, Luria examined the effect of cultural development on populations lacking knowledge of writing or print, a large concern for the Stalinist government. He was also credited with the invention of the first lie detector and for his work in aphasia.

In France during the same period, Jean Piaget (1896–1980) was researching the qualitative differences in children's thought based on patterns of their responses on IQ tests that were designed for adults. It was Piaget who first understood that children's responses were not errors and that they reflected their perceptions of the world. In the 1940s Jerome Bruner, American psychologist, researched the ways in which internal ''mental sets'' affected perception and how experience and cultural forces affected an individual's world view. Bruner would eventually publish a seminal work, *The Process of Education* (1977), in which he spoke to the need for structure, motivation, and active involvement in learning. In contrast to Piaget, Bruner believed that cognitive development could be enhanced, and he decried the practice of delaying instruction until children were deemed ready.

Cognitive Revolution

Prior to the 1950s, structuralism reigned in the field of linguistics. Language was dissected and reassembled into a hierarchical structure: Phonemes were combined into morphemes, morphemes into sentences, and sentences into discourse. Researchers, however, were becoming frustrated; Structuralism did not provide insight into how children mastered the many complexities of language, and linguists were at a loss to describe just what constituted a sentence. At the time, there was no model that encompassed the infinite variation in sentences produced by humans.

Noam Chomsky

And then there was Noam Chomsky (1928–), a young professor at the Massachusetts Institute of Technology. With the publication of *Syntactic Structures* in 1957, Chomsky moved the study of language from nurture to nature and laid the foundation for whole language educators who decided that learning to read was as natural as learning to speak. He was also instrumental in redefining the science of cognition as a multifaceted discipline that would unite psychology, linguistics, and anthropology together with the new fields of computer science and neuroscience.

Chomsky's *Syntactic Structures* stood in stark contrast to the basic tenets of empiricism. According to George Miller (2003), American psychologist, Chomsky believed that ''defining psychology as the science of behavior was like defining physics as the science of meter reading'' (p. 142). The same observation applied to language. Behaviorism could not do justice to the complexity of language and the sophistication of children's language skill. The coup de grace for the empiricist view of language acquisition occurred when N. Chomsky reviewed Skinner's *Verbal Behavior* in 1957. Chomsky, in contrast to Skinner's position that language was acquired through experience, proposed that children were born with a uniquely human predisposition for language and that their innate grasp of language structures exceeded the expertise of most teachers and caregivers. Because medical science was not sufficiently developed to identify the part or parts of the brain that were responsible for language, Chomsky developed a metaphor for innate language ability that became known as the Language Acquisition Device (LAD). Children did not learn language from adults; language was a product of biology.

Almost overnight, Chomsky's theories and the field of linguistics became the rage among scholars who sought to verify whether language indeed was uniquely human and whether language was a reflection of the neurostructures of the brain. In 1968 *Time* magazine reported in an article entitled ''Academic Disciplines; The Scholarly Dispute Over the Meaning of Linguistics'' that the field of linguistics had grown from an esoteric rarity to an option for undergraduates at over 30 universities. Linguists were in short supply; their task was immense. Their work would take them to the four corners of the earth as well as the animal kingdom in an effort to prove that all languages had fundamental features in common, that language was developmental, and that language was uniquely human.

Chomsky's views on language acquisition also extend to the classroom. Chomsky is a constructionist; he believes that the teacher's job is to arouse natural curiosity and provide students with opportunities to discover new content. In an interview in 1991, Chomsky stated, ''[T]hat's good teaching. It doesn't matter what you cover; it matters how much you develop the capacity to discover.'' When asked, however, about standard literary knowledge, Chomsky acknowledged the importance of ''sensible prescriptivism,'' stating:

> *I would certainly think that students ought to know the standard literary language with all its conventions, its absurdities, its artificial conventions, and so on because that's a real cultural system, and an important cultural system. They should certainly know it and be inside it and be able to use it freely .... Much of it is a violation of natural law. In fact, a good deal of what's taught is taught because it's wrong. You don't have to teach people their natural language because it grows in their minds, but if you want people to say, 'He and I were here' and not 'Him and me were here,' then you have to teach them. (G. Olson & Faigley, 1991, p. 30).*

Chomsky did not specifically address issues related to how children learn to read; this area he left to the expertise of his wife, Carol Chomsky, a respected researcher in language and psycholinguistics at Harvard University.

Jean Piaget

There is not a teacher in a classroom who does not, to some degree, view children and learning through Piaget's window. Piaget's views, in fact, are at the heart of the debate on how we teach and assess reading skill.

Jean Piaget (1896–1980) transformed Rousseau's stages of development and the notion of child-centered education into the leading theory of cognitive development of the 20th century. Piaget's theory became the foundation for the constructivist movement in education. Piaget did not believe that children learned directly from lessons taught by their teachers; he believed that children learned most effectively when provided with a stimulating environment that offered appropriate opportunities for problem solving (1974a, 1974b).

Piaget, however, was not a pure innatist; he did not believe that development was the sole product of internal biological forces or genetics (Ginsburg & Opper, 1988). He took children out of Rousseau's natural environs in the country and placed them in homes and classrooms that would offer them rich opportunities to teach themselves. According to Piaget, children would grow from infancy to adulthood by advancing through a series of qualitatively different stages—from limited self-awareness and sensorimotor activity to the appreciation of subtle differences in opinion and abstract modes of thought.

Piaget stated (1936/1974b) that children would not develop according to a specific time table, and he cautioned that the rate of development could not be altered or accelerated by overenthusiastic parents and educators. Children would move through the stages at their own pace, adjusting and reorganizing their cognitive structures based upon the quality of their experience. Learning would occur through two primary channels: assimilation and accommodation. *Assimilation* refers to a process by which children incorporate new learning into their existing cognitive structures (i.e., their prior knowledge). *Accommodation* occurs when prior knowledge is insufficient or incorrect and existing neural structures have to be corrected or built from scratch. Assimilation was regarded as the easier, or preferred, vehicle of learning. Teachers of culturally and linguistically diverse classrooms well know how hard it is to learn through accommodation; much of what is taught in schools presumes a common experience or prior knowledge.

Lev Vygotsky

Although Vygotsky's research preceded much of Piaget's work, his theories on cognitive development were not available in English until the 1970s and 1980s, a time when Piaget's views were already enjoying great popularity in the classroom.

In the 1920s the Soviet Union was stricken by economic devastation, disease, and political strife. During this period, Vladimir Ilyich Lenin, leader of the revolution, charged artists, writers, and scientists with the responsibility of creating a new proletarian society; their artistic inclinations and their research, however, had to be singularly focused on creating the new Soviet citizen, and no one would be permitted to deviate from this purpose. Not only could there be no study of human weaknesses and foibles; Lenin banned research that did not celebrate the superiority of Soviet citizens. According to Lenin, there could be no ''impartial social science'' (or any other science, for that matter) in a society that aspired to build socialism (1913/1977). Those who were not able to accept the strictly utilitarian focus of the new regime and those who dared to focus on individualistic issues of personality would be condemned to exile or death with a single knock at the door.

Lev Semyonivich Vygotsky (1896–1934), a psychologist at the Moscow Institute of Psychology, was faced with a dilemma: how to pursue research in psychology during the post–civil war years in the Soviet Union. Given the harsh political realities, Vygotsky sought to develop a theory of cognition that would bridge the gap between those who believed that learning was a product of sensory experience, and those who avowed that mental activities were beyond the pale of human observation. He sought to establish a theory of mind that would move away from empiricist limitations and describe how sociohistorical influences molded the human capacity for language and thought. Vygotsky grounded his theory in the thinking of Karl Marx and Friedrich Engels, coauthors of the Communist Manifesto, and proposed that humans use ''psychological tools,'' or signs, in order to develop their intellectual skills (1930, 1978). According to Vygotsky, there were three primary sign systems: writing, numbering, and speech. He considered speech to be the most important.

Vygotsky believed that speech permitted children to internalize social forms of behavior, to use oral language (self-talk) as a vehicle for problem solving, and to enhance the development of linguistically based thought (1934/1986). He proposed that speech worked together with thought in a symbiotic fashion to foster higher-level cognitive skills. While Vygotsky did not disavow other forms of intelligence, his work was primarily in the area of linguistic intelligence. Language could be viewed within its sociohistorical context.

In contrast to Piaget, Vygotsky did not believe that children developed in distinct stages but rather through a gradual process of molecular change. According to Vygotsky, learning was based not only on a child's spontaneous efforts but also, and more importantly, on the influence of the sociohistoric environment. Children could be brought to higher levels of cognitive functioning by virtue of assistance and guidance from their peers and caretakers. The *zone of proximal development*, a concept well known to western educators, was the difference between a child's level of actual development, as measured by his or her independent functioning, and what the child could achieve with support (i.e., *scaffolding*).

Initially, Vygotsky's views were met with interest in the Soviet Union; his theory, after all, was compatible with Soviet ideology and the utopian vision of the world, in which its citizenry would reflect the perfection of their system. However, two years after publication, Vygotsky's works were banned by the Central Committee of the Communist Party. Had he not died in 1934, likely he would not have survived the 1930s, during which time Stalin consolidated his power base through unprecedented political repression and persecution of individuals and populations who were suspected of dissention. Vygotsky's work was not published again officially until the thaw of 1956 under Nikita Khrushchev.

David Elkind: *The Hurried Child*

In 1981 David Elkind (1931–), professor of child development at Tufts University, published *The Hurried Child: Growing Up Too Fast Too Soon*, in which he cautioned that changes in the media, in home life, and in school were denying children the opportunity to be children. Elkind's book, now in its third edition, has sold over half a million copies (Cloud, 2007). Elkind built his reputation as the protector of childhood in a society that, in his opinion, treated children more and more like ''miniature adults.''

Elkind condemned the ''factory model'' of education that values test performance over individual differences. According to Elkind, expectations for literacy and numeracy in first grade have created a crisis of increasing numbers of children who are not developmentally ready for academic work. His article *Much Too Early* (2001) stated that formal instruction in reading and math should not be introduced until children are developmentally ready and they have reached the concrete operations stage as defined by Piaget (1936/1974b). Elkind, in fact, decried the Head Start program for spreading ''the pernicious belief that education is a race—and that the earlier you start, the earlier you finish'' (p. 9).

Elkind's views of childhood were adopted by many educators who easily moved from the concept of child-centered education to the notion that teaching skills to children prematurely could be stressful and have long-term consequences for children's well-being.

Legacy to Education

American educational practices reflect the heritage of some of the best thinkers of the past four hundred years; this legacy is shown in Table 2.1.

Whole Language Movement

John Dewey

The whole language movement of the 1970s has its roots in the work of the American philosopher, John Dewey (1859–1952), one of the leading educational theorists of the 20th century. Dewey (1897) believed that schools were social institutions that would prepare children to participate in society through meaningful experiences and opportunities for social interaction. He criticized schools for neglecting the importance of community life and social functioning and for focusing instead on science, literature, history, and geography.

Dewey (1898) believed that children should not be exposed to written language prior to the age of 8 and that reading was no longer the only key to culture as it had been in the past. Dewey implored teachers to consider young children's mental needs; he recommended that reading instruction be postponed until children developed their oral language skills, an early precursor to Piaget's concept of a developmentally approach to education. He believed that school primers, which taught children to read for reading's sake, starved children intellectually and forced them to develop

Table 2.1 **Legacy to Education**

Theorist	View of Learning	View of Language	Contribution to Current Educational Practices
John Locke (1632–1704)	Nurture	Language is divine.	*Tabula rasa*. Proponent of comprehensive, functionally oriented curriculum, including health, character education, and vocational instruction.
Jean-Jacques Rousseau (1712–1778)	Nature	Was language the product of love? Surprisingly, Rousseau was an early social interactionist.	Instruction should be ''child centered.'' Developmentally appropriate education.
John Dewey (1859–1952)	Nature/ Nurture	Language is essential for communication within a community.	Hands-on learning and experiential education.
Lev Vygotsky (1896–1934)	Nature/ Nurture	Language is both the medium and the message. It is a tool that facilitates cognitive development.	Zone of proximal development and scaffolding are both part of standard teaching practices today.
Jean Piaget (1896–1980)	Nature/ Nurture	Children's language is egocentric. It is a reflection of cognitive development.	Foundation for the constructivist movement in education. Children learn when provided with a stimulating environment offering appropriate opportunities for problem solving.
B. F. Skinner (1905–1990)	Nurture	Language is a behavior like any other that is learned through stimulus and response.	Concept of ''programmed instruction'' based on data.
Jerome Bruner (1915–)	Nature/ Nurture	Language is learned through motherese.	Importance of motivation, engagement, and rich educational opportunities for learning. Learning can be accelerated.
Noam Chomsky (1928–)	Nature	Language is biological.	Teachers should excite natural curiosity of young learners. Oral language is acquired naturally without need for direct instruction. Written language (syntax) must be taught if we want children to write according to rules for standard literary language.
David Elkind (1931–)	Nature		Condemnation of an educational system that introduces academic skills prematurely. Reading instruction should not be introduced until children have reached the concrete operations stage of development as defined by Piaget.

bad habits as thinkers. In *The Primary Education Fetich* (1898), Dewey stated, ''The pleas for the predominance of learning to read in early school life because of the great importance attached to literature seems to me a perversion'' (p. 323).

Edmund Burke Huey

In 1908 Edmund Burke Huey (1870–1913) of the United States published the *Psychology and Pedagogy of Reading*, the first definitive text on reading. Huey described reading as a wondrous silent visual process, and he wondered whether unnatural oral methods of reading instruction would lead to ''disastrous effects,'' including ''myopia, nerve exhaustion . . . [and] race degeneration'' (p. 8). Huey agreed with Dewey's recommendations that reading and writing skills should not be taught for their own sake and that teachers should promote a natural desire to read. Providing children with time to develop their own language skills would decrease ''the likelihood of producing mechanical habits of expression, and [would result in] less danger to speech-habits from the self-dissection of phonics'' (p. 311).

Huey felt that schools were ''over-bookish'' and that, in the future, books would not be used with children prior to their eighth or ninth year (According to Piaget's stages of cognitive development, children would likely be in the concrete operations stage [1974b]). ''Real reading'' would begin at the sentence level with a focus not on word recognition but on meaning. Huey did not feel that knowledge of letter names or sounds was necessary for reading. He advocated that children learn through drawing pictures, much in the same way that early civilizations used pictographs.

Developmental Approach

The whole language movement of the 1970s embraced the natural approach to reading, Piaget's theory of cognitive development, and the need for a developmental approach to education. Whole language teachers stepped away from the front of the classroom in order to design and support stimulating environments that would arouse children's natural curiosity and send them on a quest for knowledge. While there is no formal definition of the term *whole language*, it is generally acknowledged that whole language teachers work hard to motivate children to construct their own meaning by immersing them in rich language and literary traditions. According to Bette S. Bergeron, Professor of Education and Head of the Faculty at Arizona State University East, in her article *What Does the Term Whole Language Mean: Constructing a Definition from the Literature* (1990), whole language teachers emphasize the role of comprehension in reading, the writing process, cooperative groupings, as well as motivation and engagement.

Frank Smith

Whole language instruction, however, is also defined by what it is not, and for most whole language proponents, it does not include direct instruction in phonics. In 1971 Frank Smith published *Understanding Reading*, a book that became the rallying cry for the whole language movement. Riding on the coattails of the cognitive revolution, Smith attempted to secure a place for written language in the LAD that had been hypothesized by Chomsky. According to Smith, the same genetic programming that supported oral language development would also provide children with the skills needed for working with print. À la Chomsky, children would not be taught how to read by their teachers; they would become readers through meaningful opportunities to engage with text. The teacher's job was to respond to children's inquiries and to be supportive of their efforts in ways that would enhance self-esteem and risk taking.

Phonics instruction, Smith asserted, diverted children from the task at hand; it reduced reading to a rote exercise in word recognition, forcing children to process individual letters while compromising their attempts to construct meaning. He said that skilled reading could not be explained by sequential models in which readers attended to and analyzed individual letters and words. This process, he felt, would be confounded by limitations of memory and by the irregularities of the English language. Instead, Smith believed that reading was a visual process that was directly linked to meaning.

In 1973 Smith released *Psycholinguistics and Reading*, a collection of articles in which he further condemned the practice of teaching phonics, the use of prepackaged instructional materials, and formal assessment. He decried many well-established practices in teaching, including but not limited to early mastery of the rules of reading, insistence on reading carefully and with accuracy, prompt feedback, special attention to children with poor reading skills, and the use of alternative methods when the current method was not effective.

According to Smith, teachers came to the profession with an innate understanding of how to impart academic skills. The word *eclectic* entered the profession of education as a descriptor for a teacher who was not a ''brainless purveyor of predigested instruction'' but rather one who used his or her intuition to guide instruction. Good teachers, Smith (1973) stated, did not rely on data to make their decisions. ''In terms of reading instruction, intuition is a sensitivity for the unspoken intellectual demands of a child, encouraging and responding to his hypothesis testing'' (p. 196).

More recently, in his book titled *Unspeakable Acts/Unnatural Practices: Flaws and Fallacies in ''Scientific'' Reading Instruction* (2003), Smith assailed the notion that children are not biologically equipped to learn to read, and he rejected the concept that teachers require training to teach reading. According to Smith, children have difficulty learning to read when reading is introduced prematurely or when they have been confused by misguided efforts of teachers. He stated:

> *References to mythical brain disabilities (diagnosed circularly in relation to perceived reading difficulty) explain nothing. Such phantasms are conjured up in the absence of understanding or coherent theory. And even if there were rare brain malfunctions that make it difficult for a few children and adults to read, that doesn't mean that such individuals should be subjected to regimes of unnatural treatment . . . . Calling them disabled is hardly likely to help. (p. 13)*

Three-Cueing System

Smith's views on reading inspired the development of the three-cueing system. (See Figure 2.1.) The progenitorship of this term is not clear, but according to Marilyn Jager Adams (1998), internationally known researcher in the fields of cognition and education, its first appearance may have occurred in 1976 in an article by David Pearson. Adams credits Kenneth S. Goodman, Professor Emeritus, Department of Language, Reading and Culture at the University of Arizona, for his work in the early 1970s with the proliferation of this approach within the whole language model.

The three-cueing system, widely taught in many teacher-education programs, is based on the premise that readers create meaning by integrating syntactic, semantic, and graphophonemic information in text. Although the diagram used to represent this process depicts three component skills, they are not given equal weight or importance, and they are not to be considered in isolation. The process by which meaning is constructed is not sequential but simultaneous; readers actively confirm and modify their understanding through a complex and multifaceted process, culminating in a product that is greater than the sum of its parts.

Teachers model the three-cueing system for beginning readers and for children with poor word-recognition skill. In order for comprehension to occur, readers actively use the cueing systems to verify their understanding. Children who use *semantic cues* rely on context and pictures to determine whether a given word makes sense.

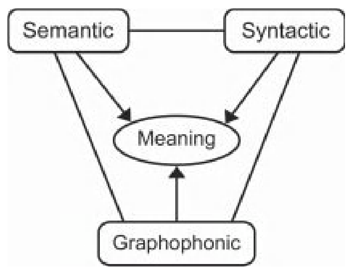


Figure 2.1

Three-Cueing System

They are encouraged to think about what has happened and predict what might logically be expected to happen next. *Syntactic cues* permit children to ascertain whether a word sounds right in a given context. Children are supported to rely on their grasp of sentence structure and produce a grammatically feasible guess for an unknown word. The *graphophonic system* is the system of last resort. According to Weaver (1988), undue focus on the graphophonic system detracts from the search for meaning. Smith argued in 1999 that ''[t]he first alternative and preference is—to skip over the puzzling word. The second alternative is to guess what the unknown words might be. And the final and least preferred alternative is to sound the word out. Phonics, in other words, comes last'' (p. 153). Goodman (1976) summed it up when he equated reading to a ''psycholinguistic guessing game'' (p. 126).

The reading research conducted over the last 40 years has not changed Smith's opinions. In language reminiscent of Dewey, Smith (2003) described recommendations in support of phonics in federally commissioned studies, such as the National Reading Panel, as a ''fetish . . . an object of irrational reverence and obsessive devotion'' (p. 45), and he did not accept studies of children with reading disabilities as evidence that children require direct instruction in reading.

Rebuttal

Many in the research community disagree with Smith. Kerry Hempenstall, professor at the Royal Melbourne Institute of Technology in Victoria, Australia, refers to the three-cueing system as a belief system that was based on a flawed understanding of the role of context in word recognition (2002, 2003). According to Adams in her article ''Why Not Phonics and Whole Language?'' (1991), the concept of an oral and written language acquisition device has not withstood the test of time. The more current understanding of reading is based on research from the fields of language and cognition. Adams expressed concern that teachers have come to interpret the three-cueing system as validation of the minimal role that word-recognition skills play in reading and that somehow, in a twist of convoluted logic, the understanding of the text has become the primary vehicle by which children come to decipher the words.

Adams and Hempenstall are not alone in their views. In July 1995 the Massachusetts commissioner of education, Dr. Robert Antonucci, received a letter signed by 40 experts in linguistics and reading who protested the ''scientifically unfounded views of language'' that downplayed the role of phonics and supported instead the use of contextual guessing (Eagle Forum, 1996).

The Code Perspective

Simple View of Reading

In the 1980s there were two competing views of reading instruction: those who believed that phonics-based instruction would divert children from the task of creating meaning (Goodman, 1976; Smith, 1973) and those who felt that decoding instruction was critical for children to access text content (Chall, 1967; Fries, 1963). The Simple View of Reading was developed to clarify some of the issues that were at the heart of the debate (Gough & Tunmer, 1986; Hoover & Gough, 1990).

According to the authors, reading comprehension (R) is the product of decoding (D) and linguistic comprehension (C). (Some researchers refer to C as language comprehension; others refer to it as listening comprehension.). In the spirit of Chomsky, who used mathematical models to represent the infinite variety of possible sentence structures, the relationship between these three variables was represented as $R = D \times C$ (D and C could range in value from 0 (poor skill) to 1 (perfect skill)). This equation captured the essence of what were, in the proponents' opinion, the three main types of reading disabilities; dyslexia, hyperlexia, and what is commonly referred to as the ''garden-variety reading disability.''

The Simple View, as shown in Figure 2.2, defines skilled reading as the product of decoding expertise and good linguistic comprehension. Weaknesses in either decoding or linguistic comprehension lead to poor reading comprehension.

Figure 2.2

Simple View of Reading

Dyslexia:

$$\text{If } R = D \times C, \text{ and } D = 0, \text{ then } R = 0.$$

Children with good receptive language ability (linguistic comprehension) and poor decoding skills will have poor reading comprehension.

Hyperlexia:

$$\text{If } R = D \times C, \text{ and } C = 0, \text{ then } R = 0.$$

Children with good decoding skills and poor receptive language ability will also have poor reading comprehension.

Garden-Variety Reading Disability:

$$\text{If } R = D \times C, \text{ and } D = 0 \text{ and } C = 0, \text{ then } R = 0.$$

Children with poor decoding skills and poor receptive language ability will also be poor comprehenders.

The Simple View of Reading has been widely cited in the literature. Hoover and Gough (1990) revisited this model in a longitudinal study of bilingual children in first through fourth grade. Researchers have attempted to fine-tune the model to explain the variance in reading comprehension (Chen & Vellutino, 1997). Joshi and Aaron (2000) proposed a more complex version of the Simple View in which naming speed of letters increased its predictive value. Nagy, Berninger, and Abbott (2006) found that morphological awareness also contributed to the variance in reading comprehension. Catts, Hogan, Adlof, and Barth (2003) examined the varying contributions of decoding ability and listening comprehension over time; they found that decoding skills accounted for a greater variance in the reading skills in young children and that listening comprehension played a larger role in the reading comprehension of eighth graders.

The increased role of listening comprehension over time reflects the importance of the world knowledge that we accumulate over time. Although we may think of listening comprehension as a purely linguistic entity, it is not possible to separate listening comprehension from issues related to vocabulary and background knowledge.

In 2006 Catts, Adlof, and Weismer reaffirmed the Simple View of Reading, noting its potential for helping teachers classify poor readers based on two parameters: word recognition and language. Although the model has been criticized for being overly simplistic, the Simple View of Reading reminds teachers and evaluators of the need to address both decoding ability and language skill. According to researchers, classification of young children based on language comprehension and word-recognition ability provides a platform for early intervention that targets the reading profiles of the majority of children.

Hollis S. Scarborough's Rope Model

Hollis Scarborough, senior scientist of Haskins Laboratories, a nonprofit institute in New Haven, CT, that conducts research on spoken and written language, has focused much of her research on longitudinal studies of children at risk for reading disabilities. Her "rope model" of reading

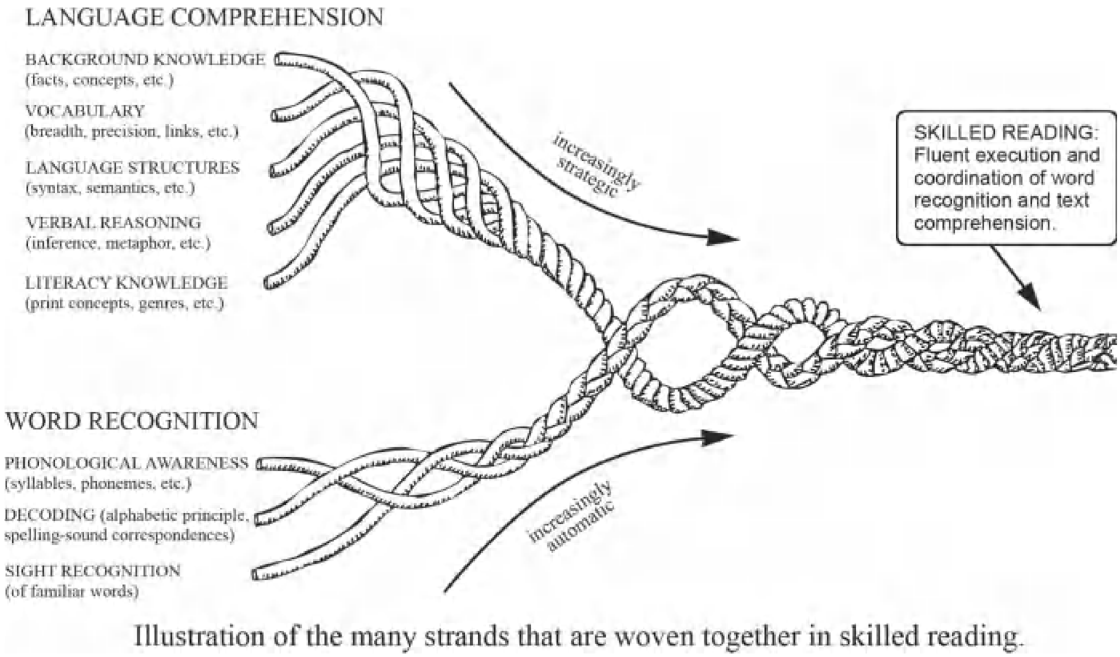


Figure 2.3

Strands of Early Literacy Development
Reprinted with permission from ''Connecting Early Language and Literacy to Later Reading Disabilities: Evidence, Theory, and Practice,'' by H. Scarborough, in S. Neuman and D. Dickinson (Eds.), 2001, *Handbook of Early Literacy Research*, pp. 97–110. New York, NY: Guilford Press, p. 98.

development (see Figure 2.3) depicts the strands of early literacy development that contribute to skilled reading (2001).

Scarborough's model focused on two domains: language comprehension and word recognition. Each domain consists of several subskills, or strands, that are fine-tuned, executed with increasing automaticity, and interwoven into reading comprehension skill. Scarborough acknowledged that most reading disabilities are consequences of poor phonemic awareness and poor decoding skills. She, however, noted that language comprehension deficits also play a significant role in the reading challenges of older children and that early language impairments are highly predictive of future reading impairment. Scarborough seeks to understand the factors that contribute to reading disabilities so that they can be addressed before children have difficulty in school.

McKenna and Stahl's Modified Cognitive Model

McKenna and Stahl's Modified Cognitive Model portrays reading comprehension as the integration of three strands: automatic word recognition, language comprehension, and strategic knowledge (2009). It is based on the model that the authors proposed in the first edition of their text, *Assessment for Reading Instruction* (2003). (See Figure 2.4.)

The strength of the McKenna and Stahl model lies in the addition of strategic knowledge as a third distinct contributor to reading comprehension. Strategic knowledge develops in young children with an initial understanding that reading can be entertaining or informative. Other students think strategically when they use their knowledge of genres and content to be selective in their reading and when they extend their comprehension

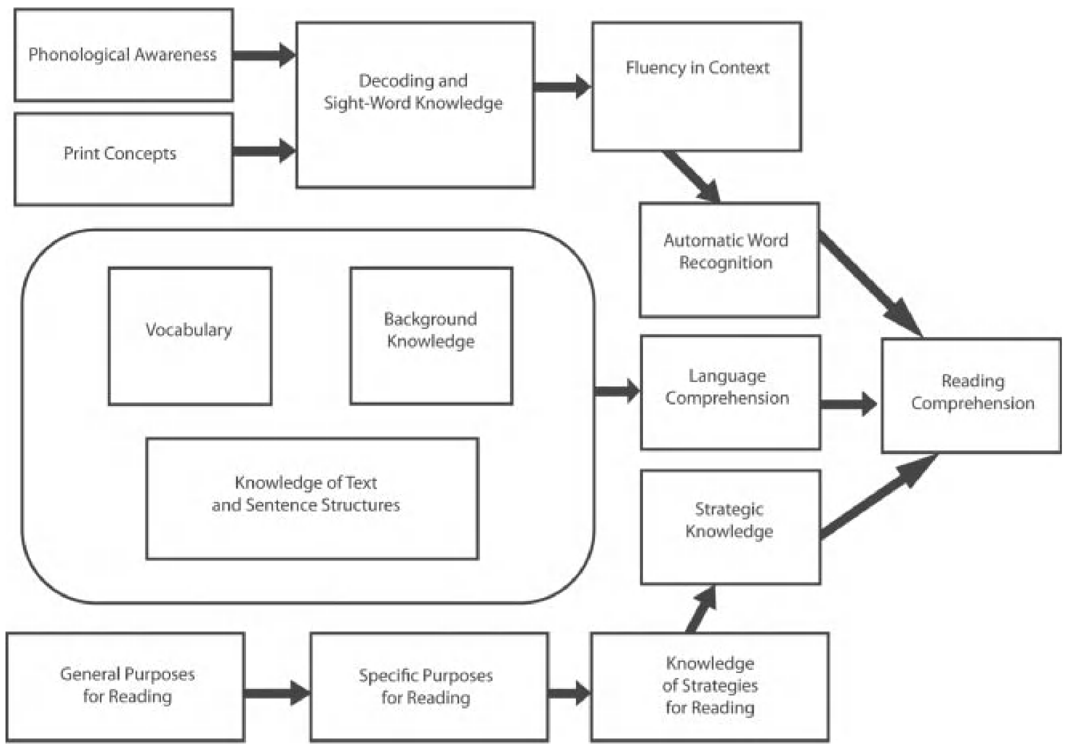


Figure 2.4

Modified Cognitive Model
Reprinted with permission from M. McKenna and K. Stahl (2009), *Assessment for reading instruction*. New York, NY: Guilford Press, p. 23.

through the judicious use of strategies. This area is not well captured by standardized testing and is better assessed through interviews and observation.

Models of Reading Acquisition

Knowledge of different models of reading acquisition permits evaluators to understand the development of reading in typical learners as a basis for discerning strengths and weaknesses in young readers.

Jeanne Chall and the Stages of Reading Development

In 1955 Rudolf Flesch published *Why Johnny Can't Read*, a book that shook the American public's confidence in teaching and in the textbook industry. The book proclaimed that the American educational system ignored research and minimized the role of phonics instruction, resulting in an alarming decline in literacy. The book provided instructions for parents who wanted to teach their own children at home; Flesch suggested that this process would take about 6 weeks. The book spent over 30 weeks on the best-seller list, and it was endorsed by *Reader's Digest*.

Educators and researchers were horrified at the popular appeal of the book, and they found themselves at a loss for a response. Jeanne Chall, professor at the Harvard Graduate School of Education, took on the task to investigate Flesch's claims. Her book *Learning to Read: The Great Debate* (1967) and her recommendations for code-emphasis instruction for young children propelled her to the front lines of the reading wars. Critics believed that her focus on accurate decoding would be harmful to young children who needed to be encouraged to take risks. (See Chall, 1976.) Chall was reportedly subjected to intense professional and personal criticism; at the same time her text became required reading in many graduate-level teaching programs. Her work also became the foundation for the beginning reading skills taught on *Sesame Street* and *The Electric Company*, children's televisions series that were known for their efforts to educate young minds.

Chall's book *Stages of Reading Development* (1983) presented a developmental sequence beginning with oral language development and phonological awareness and culminating in the ability to synthesize a unique point of view based upon a variety of different materials read. Chall cloaked her stages under the umbrella of Piaget's developmental stages. She was not commenting on whether Piaget's stages were appropriate for reading but rather felt that his approach offered a context that would be helpful in learning about reading.

Chall's six stages (stage 0 through stage 5) (1983) were hierarchical in their structure; each stage was qualitatively different, requiring that children do "'different things' in relation to printed matter at each successive stage" (p. 12). Chall proposed that children advanced through the stages by interacting with and adapting to their environment (accommodation and assimilation). Advancing to a higher reading stage would require the ability to handle increasingly complex language and cope with the demands for more technical, more abstract, and more specialized background knowledge. Children would move through the stages at different rates; insufficient mastery of skills at a particular stage would inhibit progress to a higher stage. Not all individuals would become stage 5 readers. (See Table 2.2.)

Stage 0: Prereading: From birth to age 6, children develop the ability to express their needs, wants, and feelings through oral language. By the time children enter the classroom, it is hoped that they have a sufficient vocabulary with which to language-label their experiences, as well as a basic command of sentence structure. During this period, children develop an interest in language play (i.e., the rhythm and the sound patterns of words). They can recognize and name letters of the alphabet, write their own names, and demonstrate knowledge of concepts related to reading, such as directionality, turning pages, and pretend reading.

Stage 1: Initial Reading, or Decoding: In first and second grade, children acquire knowledge of the sounds that letters make, and they abandon pseudo or pretend reading in order to become "glued to the print" and decode each word letter by letter (1983, p. 17). Chall noted that practice with lower-level decoding skills and a small sight vocabulary would lead to higher-level, more skilled performance that would, in time, support reading comprehension.

Stage 2: Confirmation, Fluency, Ungluing From Print: Children in second- and third-grade work on consolidating the skills acquired in stage 1 and on reading multisyllable words with greater accuracy and fluency. Stage 2 readers typically are provided with familiar text. In this way, they can self-confirm the accuracy of their decoding skills, and they can find comfort in their knowledge of how stories unfold.

Stage 3: Reading for Learning the New: A First Step: In grades 3 and 4, stage 3 readers are ready to use reading as a tool for learning. They learn best when provided with materials that are written from one point of view or perspective and that are not overly technical or demanding in terms of background knowledge. This is the time when students typically are introduced to their first content-area textbooks because they now have sufficient expertise in decoding to attend to new facts and concepts. Vocabulary becomes increasingly important. Most materials with Grade 4 readability introduce words that are not typically encountered in conversation or on television. Chall divided this stage into two phases, the first

Table 2.2 **Chall's Stages Reading**

	Instructional Emphasis	Skills Taught	Materials Used
Stage 0: Birth to age 6	Meaning	Experience with nursery rhymes, fairy tales, and stories popularized by the media. Instruction in oral language, letter names, and sounds, phonological awareness.	Picture books, alphabet books, opportunities to engage in pretend/pseudo-reading, writing, and language play
Stage 1: Grade 1	Decoding: Children's oral language abilities exceed their knowledge of written language.	Focus on decoding: Anglo-Saxon layer of English: basic phonics skills, the six-syllable patterns, and commonly used irregular words. Meaning: Further development of oral language skills (vocabulary, sentence structure, and narrative skills).	Children's storybooks, basal readers, and trade books
Stage 2: Grades 2–3	Decoding: Children's oral language skill continues to exceed their knowledge of written language. Familiar content permits children to confirm word recognition skill and find pleasure in recognizing what they know.	Focus on decoding and fluency: Introduction to Latin and Greek layers of English; affixes and roots. Application of structural analysis skills to multisyllable words. Meaning: Oral language skills (vocabulary, sentence structure, narrative skills, and story grammar). Development of background knowledge.	Children's storybooks, workbooks, basal readers and trade books, familiar fiction and nonfiction
Stage 3: Grades 4–8	Meaning: Children now read with sufficient automaticity and fluency to focus on learning new content. The language of text is more sophisticated than oral language in the home or in the classroom. Children will continue to benefit from work with advanced structural analysis skills and morphemes to build vocabulary and increase reading speed.	Focus on reading for meaning: Story grammar, introduction to expository text and structures, and strategies to extend comprehension. Development of background knowledge.	Children's literature, basal readers, workbooks, content-area textbooks, beginning reference materials, and Internet sources

Table 2.2 (*continued*)

	Instructional Emphasis	Skills Taught	Materials Used
Stage 4: Grades 9–12	Meaning: Students actively use strategies for reading texts written from different perspectives.	Focus on reading for meaning in depth: Increased expertise with higher-level language, inferential thinking, genres, narrative and expository text structures, perspective, background knowledge, specialized vocabulary, and technical concepts.	Fiction and nonfiction, reference materials, newspapers, magazines, and Internet sources
Stage 5: College	Meaning: Students create their own world view based on materials that they have read and analyzed.	Focus on verbal reasoning and inferential thinking skills: Analysis of genres, text structures, style, and author's perspective as a foundation for drawing individual conclusions.	Fiction and nonfiction, periodicals, journals, and Internet sources

Source: Adapted from J. Chall (1983), *Stages of Reading Development,* New York, NY: McGraw-Hill.

for grades 4–6 and the second for grades 7–8, which are marked by an increase in analytical and critical thinking ability.

Stage 4: Multiple Viewpoints: Students at the high school level are required to compare and contrast texts that present a variety of points of view. This skill level is acquired through formal education and exposure to textbooks and reference works in the sciences.

Stage 5: Construction and Reconstruction—A Worldview: According to Chall, stage 5 reading is ''constructive.'' Stage 5 readers read with purpose and with selectivity; they make conscious decisions regarding how much to read and with what level of detail. Stage 5 readers not only take in new learning, they understand the content on a higher level of abstraction, and they actively formulate their own opinions, draw unique conclusions, and create new points of view.

Chall believed that her reading stage theory had potential for optimizing instruction for children of different ages and for the development of diagnostic-prescriptive tests. In particular, she felt that a stage scheme would provide a clearer picture of children with reading difficulty and of how to match instruction to individual need.

Chall's stages of reading are summarized in Table 2.2.

Chall's last book (2000), *The Academic Achievement Challenge: What Really Works in the Classroom*, was published posthumously. To the end Chall was concerned with how to raise student achievement for all children, particularly those of low socioeconomic status. Her first recommendation was that teachers used a more teacher-centered approach in the classroom; teacher-centered approaches are explicit in their presentation of new learning, how it is to be learned, and what is to be mastered. Chall's second recommendation regarded the importance of closing the gap between the research community and teachers in their classrooms.

Linnea Ehri: Spelling Development and Reading Acquisition

Linnea Ehri, professor at the Graduate Center of the City University of New York, proposed a different model by which children become readers (1995, 1999). She suggested that children's skill in word recognition develops in four phases that culminate in the ability to read words instantaneously without conscious effort, what is called reading by sight.

Ehri noted that the concept of sight word reading is often confused with sight word instruction. According to Ehri, *sight word reading* refers to words that readers have read several times and that have been successfully stored in memory with links to spelling, pronunciation, and meaning. These words may be regular or irregular, and they may have been acquired through the application of word attack strategies, reading by analogy, or possibly through prediction. Gough and Walsh (1991) demonstrated that most content words cannot be guessed with any degree of accuracy. Sight word reading is not related to the practice of using flashcards or solely visual methods for teaching reading.

Ehri's phases of sight word development represent the skills that all readers must acquire in order to build a sight word vocabulary. Although similar to Chall's stages, Ehri (2004) opted to speak of phases. Phases, she felt, were not qualitatively different from one another; children gradually moved from one phase to the next. Each phase, however, ''highlights the type of alphabetic knowledge that predominates in reading words'' (p. 439).

Prealphabetic Phase: This phase is a partial representation of Chall's Stage 0. It generally refers to children in preschool and kindergarten who have not yet had formal instruction. These children do not yet have an understanding of sound–symbol correspondence, and they attempt to recognize words through paired associations and visual features. According to Ehri, prealphabetic students engage in ''visual cue reading,'' in which they focus more on nonalphabetic cues, such as the environment, than on the letters themselves. In this phase, McDonald's golden arches are more important than the letter *m*. Students in this phase are not yet able to read connected text independently.

Partial-Alphabetic Phase: In this phase children learn some of the alphabet and attempt to recognize words by using both context and partial-letter cues. For example, a child looking at a picture of a house might guess ''house'' when seeing a word beginning with the letter *h*. Students at this phase may not have developed a strong sense of left-right directionality. When writing, partial-alphabetic children will represent the sounds in words that they perceive (typically sounds in the word-initial and word-final positions). They will find it easier to learn letter sounds when the sounds are reflected in the letter name.

Full-Alphabetic Phase: The full-alphabetic phase is equivalent to Chall's Stage 1. When children reach this phase, they are able to use their knowledge of sounds and letters to decode unfamiliar words. This phase is initially marked by slow and deliberate efforts to sound out words. As they receive more practice, however, children are able to read a corpus of words by sight as well as by analogy. According to Ehri, this phase requires systematic instruction in phonemic awareness and phonics. Progress through this phase is enhanced when students are provided with text that is well matched to their decoding skills and that does not cause undue frustration. Text reading practice is important to ensure that students have sufficient exposure to new words in order to retain them in memory. According to Reitsma's study in 1983, most readers are able to retain new sight words in memory with four practice trials (Ehri, 1995).

Consolidated-Alphabetic Phase: This phase, which is also referred to as the orthographic phrase, reflects a period in which students consolidate their knowledge of letter sequences into units, such as ''affixes, word roots, onsets, rimes, and syllables'' (Ehri, 1995, p. 433). It is consistent with Chall's Stage 2. Chunking of letter sequences permits students to read with greater accuracy and fluency and add multisyllable words to their repertoire of sight words. According to Ehri, multisyllable words are stored as sight words once readers have analyzed their graphosyllabic units (sup-port-ing).

Ehri and Snowling (2004) offered her phases as an aid to educators who are seeking to determine appropriate instruction for typical and atypical readers. She noted that, while atypical readers might appear to require the same instructional activities as their typical peers, they do not present with the same strengths and weaknesses. Children with poor reading skills will need ''concrete instruction and multisensory learning to circumvent weaknesses, without extensive reliance on auditory processing'' (p. 454). Ehri cautioned educators to avoid approaches that focus on training phonemic awareness in isolation, stating that ''the research consensus is that, for poor readers, training phonemes in isolation is much less effective than phoneme training linked to letters in print.''

In fact, Ehri's research (1989) suggested that many children with dyslexia have phonological deficits because they have not learned to read and spell. In contrast to other researchers who believe that phonological deficits are a significant cause of reading disabilities (Stanovich, 1986), Ehri believed that phonological deficits are experiential in nature and that phonemic awareness does not develop fully until students have learned to map letter symbols to sounds in words. This process causes students to fine-tune their knowledge of sounds, which in turn supports the development of more advanced phonics and spelling skills. According to Ehri, as illustrated in Figure 2.5, phonemic awareness promotes spelling, and spelling promotes higher degrees of phonemic awareness.

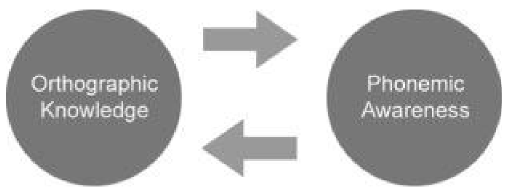


Figure 2.5

Orthographic and Phonemic Awareness

Spear-Swerling and Sternberg: Readers Off Track

Spear-Swerling and Sternberg wrote *Off Track: When Poor Readers Become ''Learning Disabled''* (1996), which presented a model of reading development specifically to help teachers analyze reading difficulties. The authors expressed concern regarding the large number of children who were identified as having reading disabilities. They advocated a view of reading difficulty based not on a discrepancy between intelligence and achievement but on a model in which children with reading disabilities ''[stray] from the path of typical reading development'' (p. xiii). Their hope was that educators would use this model, a small portion of which is illustrated in Figure 2.6, to think more proactively and more knowledgeably to address children's needs before their difficulties require placement in a special education program.

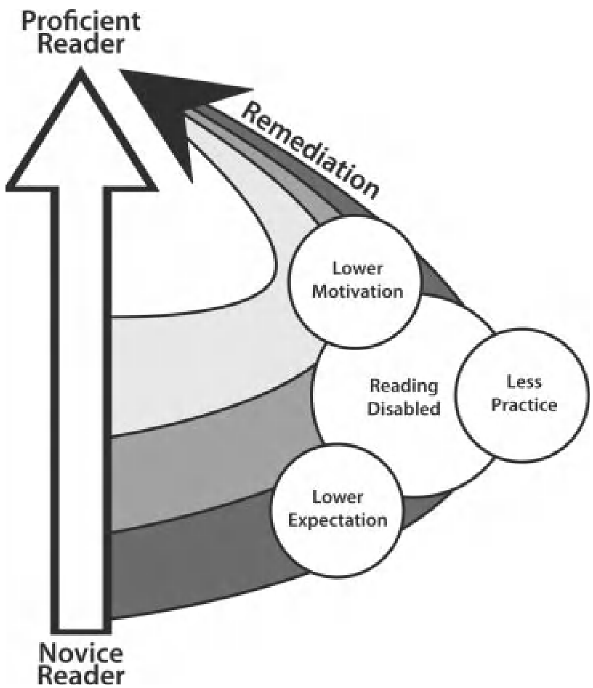


Figure 2.6

Adaptation of Spear-Swerling and Sternberg Model

Spear-Swerling and Sternberg (1996) acknowledged that a variety of intrinsic and extrinsic factors contribute to reading difficulty. Children with traumatic experiences and/or emotional and behavioral challenges have difficulty learning. Children from linguistically and culturally diverse backgrounds, as well as those with lower socioeconomic status, may also struggle with print. All these factors present real challenges in the classroom, and each contributes in its own way to learning difficulty. An overreliance on external factors without consideration of children's profiles as learners will not be sufficient for children to become readers.

Spear-Swerling and Sternberg's (1996) road map presented the path that typical students follow in their acquisition of reading skill. The authors based their model on Ehri's phases of word recognition, culminating in highly proficient reading (equivalent to Chall's Stages 4 and 5). The Spear-Swerling and Sternberg model focused more on word recognition than on challenges related to comprehension, most likely due to the fact that most children with reading difficulty struggle with word recognition and not with challenges related to receptive language skill.

In contrast to other models, the Spear-Swerling and Sternberg (1996) model attempted to convey the importance of prompt appropriate intervention and the costs associated with profound reading difficulty. Children who fail to make progress in reading do not simply remain comfortably at a particular stage or phase; over time they experience increasing challenges with motivation, insufficient practice, and lowered expectations. Spear-Swerling and Sternberg did not rule out different subtypes of reading disabilities, and they certainly did not recognize a single distinct cause of reading failure. They considered each child within the context of who they were as learners and their instructional environment.

Conclusion

Models provide a framework for understanding how reading skills typically develop and for understanding the different components that contribute to reading comprehension. There is no perfect model that captures the intricacies of a child's reading skill at a given moment, and certainly no model integrates individual strengths, weaknesses, and subtleties of character and what they mean for risk taking in learning.

When we assess children, it is our responsibility to craft evaluations that are founded in best practices and that consider the whole child in terms of his or her community, family, and instructional experience as well as specific strengths and challenges. As students of assessment, reading, language, and cognition, we should not feel the need to embrace one philosophy of education to the complete exclusion of another. We need, however, to make our decisions based on careful reading of research, our knowledge of children as learners, and our knowledge of the tools of assessment.

Review Questions

1. The whole language movement has its roots in Noam Chomsky's belief that humans were uniquely predisposed to acquire language. Explain the connection.
2. You are at a team meeting, and one of the team members analyzes the student's errors in terms of the three-cueing system. Describe the cueing system and how phonics fits into this approach to reading.
3. The Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) was developed in order to provide a framework for understanding reading comprehension. What is the Simple View, and how would it help you to make decisions about what to test in a comprehensive reading evaluation?
4. Compare the Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) with Scarborough's rope model (2001).
5. Outline Chall's stages of reading development (1983). Why is it important to teach to the stage of reading development and not to the grade?
6. According to Ehri, what is more effective: training phonemic awareness in isolation or training phonemic awareness in conjunction with phonics?

Oral Language

3 Chapter

Introduction

The clash between the titans and the gods of Olympus was no less intense than the battle that consumed linguists across the United States during the 1960s. According to Bruner (1983), ''George Miller said it well. We now had two theories of language acquisition; one of them, empiricist associationism, was impossible; the other nativism, was miraculous'' (p. 34).

The empiricists saw language as a behavior like any other, a function of stimulus and response. According to the empiricists, knowledge was acquired through experience. In contrast, Chomsky presented a view of language that celebrated the human capacity for rule generation and the infinite possibilities that language could bring to thought. Was it possible that Chomsky was correct? Do humans acquire language by virtue of their genetics? What is the role of parents and teachers, and how do they promote language development in children?

This chapter examines the oral language foundation that supports the development of reading and writing skill. It briefly reviews the structure of oral language, current theories and research related to language acquisition, and the stages of speech and language development.

The Language of Language

Language is the communication of thoughts and feelings by means of a formalized system of abstract symbols and rule-governed structures (Farrall, 1994). These symbols may take on the form of gestures, signs, speech sounds, or letters of the alphabet. Because language is a reflection of our biology, all languages have much in common. Languages provide us with an inexhaustible means of expression. Not only can we discuss the here and now, we can speak of events in the past and those yet to come. Languages also provide speakers with the tools for the creation of new words; they provide us with the means to interpret word combinations never before heard or experienced.

We cannot discuss the miracle of human communication without devoting a large part of the discussion to speech itself. *Speech* is defined as oral language; in many languages, the word for *speech* is the same word as for *tongue*. In English, we talk of speaking in tongues. This association is highly appropriate, given the tongue's important role in making speech sounds.

Although speech is often touted as what separates us from the animal kingdom, many learned authorities state that speech is not always a reflection of people at their best. The fact that we may find ourselves speaking without thought may be the best argument there is for the separate provenance of language and cognition. W. Somerset Maugham (1874–1965), the novelist and short story writer, cautioned, ''If nobody spoke unless he had something to say, the human race would very soon lose the use of speech'' (p. 38).

Linguistics is the study of language. Within the field of linguistics, there are different specialties. Historical linguists analyze how languages change over time, a field that was inspired by the work of the Brothers Grimm. The field of comparative linguistics seeks to organize languages into branches or families in an effort to reconstruct the mother tongue. Chomsky's work from the 1950s inspired the search for what languages have in common and what those commonalities tell us about what it means to be human.

Psycholinguists explore the relationship between cognition and language, with a growing focus on the neurobiology of language. The first conference on the neurobiology of language was held in Chicago in 2009. Structural linguists seek to discern the rules governing the different components of language. It was Terry Allen Winograd (1983) who compared the study of structural linguistics to the field of chemistry. Electrons and protons are combined into atoms; atoms are combined into molecules. In the field of structural linguistics, individual speech sounds are combined into words, words are combined into phrases, and phrases are combined into sentences. Sentences become the building blocks for oral and written discourse.

The structure of language is divided into five components or layers: phonology, morphology, syntax, semantics, and pragmatics. As shown in Figure 3.1, we might think about language in the form of a pyramid, culminating with the effective use of language at its pinnacle.

We begin with an overview of the building blocks of the pyramid and work our way up layer by layer. The layers are not necessarily distinct from one another; there are areas in which they overlap. Each area, however, will aid you in your efforts to analyze how children decode, how they comprehend, and how they write.

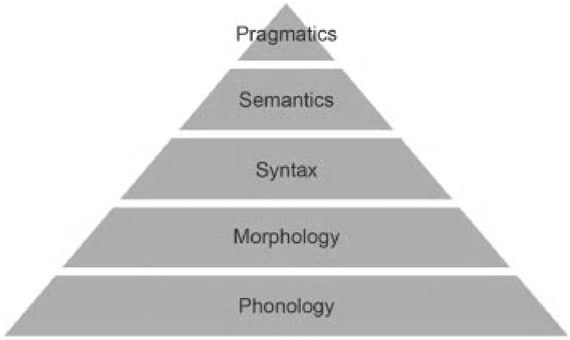


Figure 3.1

Language Pyramid

- *Phonology* is the study of the sound system of a language and the rules by which sounds are combined. The study of phonology is divided into two main disciplines: phonetics and phonemics. Specialists in *phonetics* focus on actual physical speech sounds, called phones, in the context of their production, transmission, and reception. Specialists in *phonemics* study sounds in the abstraction (phonemes) and how we conceptualize the sounds of a given language. Knowledge of phonetics and phonemics permits us to analyze children's decoding and spelling errors so that we can make explicit recommendations for instruction and remediation. We discuss more about phonology in Chapter 10.
- *Morphology* is the study of word structure, more specifically prefixes, roots, and suffixes. A grasp of morphology helps us analyze spelling, grammar, and vocabulary usage. We examine morphology in greater detail in Chapter 9.
- *Syntax* focuses on how words are combined into grammatical units. An understanding of sentence structure permits us to identify challenges in written expression as well as difficulties that students encounter in reading passages. We discuss the development of syntax in this chapter as well as in Chapter 14.
- *Semantics* involves the study of how words are combined to create meaning. Expertise in semantics help us to understand the barriers that some children encounter when they attempt to read text with abstract and figurative

expressions, words with multiple meanings, and subtle differences in phrasing and word order. Issues related to semantics are addressed in Chapter 9 as part of the discussion of oral language assessment.

- *Pragmatics* is the art of using language effectively to achieve needs, wants, and desires. An understanding of pragmatics is important for grasping the implications of language style and the indirect ways people have of conveying their intent. More on pragmatics is found in the section on language acquisition in this chapter and in Chapter 9.

Knowledge of each layer of the language pyramid from phonology to pragmatics permits us to craft evaluations with meaningful, focused recommendations. Now that we have a basic understanding of the different skills involved in oral language processing, we look at how language is acquired.

Language Acquisition

George Stewart, in his book *Man, An Autobiography* (1946), mused about the origin of language. He suggested that early woman's urgent need to bring help to her companion in distress may have been the genesis for the first multiword utterance. Stewart wrote, ''In desperation, naturally enough and yet with a stroke of genius, she cried, 'Coo-ouch!' Then they knew that he who was called Coo had been taken with a sudden pain'' (pp. 32–33). Stewart went on to say:

> *I like to think that the mothers may first have made and practiced language, and that for some generations the fathers still sat around merely grunting while the others chattered happily. At least I notice that girl-babies are still quicker than boy-babies, and that they grow up in general to be more fluent talkers. Besides, there has always been in language a great deal of an illogical and emotional quality. I might say, ''Women invented language, but men invented grammar.'' (p. 33)*

Whether gender actually played a role in the development of language will always be the source of playful speculation in the battle between the sexes. The more serious question of how young children acquire language continues to pique the curiosity of linguists, researchers, teachers, and parents.

LAD and LASS

N. Chomsky's *Review of B. F. Skinner's Verbal Behavior*, published in 1959, was the linguistic equivalent of the face that launched a thousand ships. Chomsky's Language Acquisition Device (LAD) was a direct assault on Skinner's black box. It moved the discussion of language from the observable world to the internal workings of the mind, where it gave language a unique status apart from that of general cognition. Language was not a behavior like any other, and it was not taught. Humans acquired language by virtue of their genetics. The acquisition of language was a process akin to physical maturation.

Not everyone, however, agreed with Chomsky. Jerome Bruner (1983), an American cognitive psychologist, found Chomsky's LAD to be lacking. According to Bruner, language could not possibly develop in a vacuum without the support of environmental influences. As an alternative, Bruner proposed the Language Acquisition Support System (LASS). Although the LASS acknowledged the genetic contribution to language, it stressed the role of the community and family in language development. In this model, the adult community (i.e., the LASS) modifies language to meet children's needs and in doing so helps children move from babbling to linguistic expression. Bruner's views were not unlike those of Lev Vygotsky, who stressed the importance of the zone of proximal development. According to Vygotsky (1930/1978), adults support skill development in children through modeling and interaction.

Social Interactionism

The union of the LAD and the LASS would come to be known as social interactionism, which is often touted as the compromise that permits nature and nurture enthusiasts to coexist under the psycholinguistic umbrella. Social interactionism is considered, however, to be more than the sum total of nature and nurture. Proponents of social interactionism focus on the unique quality of the bond between parent and child. The infant's innate desire to bond coupled with the parent's innate need to nurture ensures the development of language, problem solving, motor skills, social interaction, and emotional regulation in each successive generation (James, 1990).

Catherine Snow (1986) examined the parents' role (particularly the mother) in facilitating language development. According to Snow, mothers engage in a special form of communication with infants and toddlers called motherese. *Motherese*, or child-directed speech, as it is frequently called by gender-sensitive individuals, describes a form of communication that is designed to capture and sustain attention, convey affection, and enhance understanding. Despite its name, motherese is not unique to women or to adults. Both male and female caregivers, as well as older siblings modify their speech when communicating with young children.

Research suggests that young children prefer motherese to standard speech (Fernald, 1985). Kuhl, Tsao, and Liu's research (2003) suggested that children do not learn from television or audiotapes; they require a ''social tutor'' to learn language. Fueled by an intense desire to bond, infants go to great lengths to engage adult attention. Just a little eye contact and the hint of a smile cause even the most proper and formal of adults to abandon the formal trappings of adulthood. Formerly articulate speakers adopt a simplified vocabulary and syntax. Speech is delivered in a high register with exaggerated intonation and stress. Eloquence is sacrificed for clarity. Language becomes child centered. Topics of discussion focus on what is perceived to be of paramount interest to the child. Potentially ambiguous word use is eliminated; pronouns are replaced with their referents to ensure that the reference is understood. Mothers refer to themselves in the third person: ''Mommy likes apples.'' Repetition becomes the strategy de jour; what parents view as important is reinforced repeatedly. Infants are invited and prompted to engage in these conversations through questions and commands.

As children's speech develops, parents adjust their language to incorporate greater complexity and sophistication. As burps and grunts yield to babbled sequences of sounds that approximate recognizable words, caregivers selectively reinforce and model the higher, new standard for communication. In this way, adults work to pave the way for language development, beginning with the naming of persons, places, and things and culminating in well-formed sentences that describe events in the past, present, and future.

Even though motherese as a form of interaction has been well documented in our culture, William O'Grady (2005) questioned whether motherese is actually necessary for language development. As O'Grady put it, ''Being exposed to highly comprehensible speech in the early stages of language acquisition can't hurt'' (p. 177). Contrary to what we might want to believe in our role as caregivers, O'Grady described motherese as one of the myths of our culture. Most children, he stated, do not require special help to acquire language. Evidence suggests that children acquire language even when parents do not provide feedback regarding what is considered grammatically correct and what is not (R. Brown & Hanlon, 1970). What children do require is opportunities to hear sentences that they can understand in the context of rich and varied experience. Children need to be immersed in a language-rich environment.

While O'Grady has contributed much to our understanding of language acquisition, we need to remind ourselves that not all children learn in the same way and that different children require varying degrees of support. Although many children acquire language easily, there are those who need extensive modeling, direct instruction, and practice in order to develop their language skills.

Language Development Beyond Experience

Research conducted by Goldin-Meadow and Mylander (1994) took O'Grady's conclusion one step further. According to Goldin-Meadow and

Mylander, children routinely used their innate capacity for language to fashion utterances that are beyond their direct experience. This research focused on the language development of deaf children who were not exposed to conventional sign language.

The majority of the children in Goldin-Meadow and Mylander's study were being taught via an oral method, which involved instruction in sound sensitivity, lip-reading, and speech production. They were not taught formal language, and they had only incidental exposure to conversational gestures. Because lip-reading presumes knowledge of speech sounds, these children were at a disadvantage. Speech sounds are not well discerned by mouth position, and none of the children in the study was making significant progress in acquiring spoken English. Despite the lack of oral language and conventional sign language input, the children in the study organized their limited repertoire of gestures into a relatively cohesive language system with a simple syntax and morphology. Their ability to produce language exceeded their language experience.

The development of language without modeling and teaching suggests that children are indeed biologically equipped to develop certain aspects of language. If this is the case, we would then expect research on genetic factors in language to provide evidence of the inheritability of language skill and disorders. Karin Stromswold's research (2001) drew two main conclusions regarding the role of genetics and language. The first was that identical twins are more alike in their language skill than nonidentical twins. The second was that adopted children with language disorders in their birth family are more likely to have language disorders than those children with no familial language impairment. Both cases speak to the idea that genetics govern at least part of the language system.

The search for a specific language gene (or genes, as is more likely the case), however, is highly complex. Research associated with the KE family in England was initially touted as evidence of a specific gene that governed the acquisition of language. About half of the KE family was diagnosed with severe verbal apraxia, an oral-motor disorder that impairs the ability to sequence speech sounds. Affected family members had difficulty with the production and processing of syllables, the generation of well-formed sentences, the use suffixes -ed and -s, fine-motor facial movements, and a lower IQ.

In 2001 Lai, Fisher, Hurst, Vargha-Khadem, and Monaco identified a mutation of the FOXP2 gene as the core of the language deficit in the KE family. Based on extensive language and cognitive testing, K. Watkins, Dronkers, and Vargha-Khadem (2002) suggested that the genetic abnormalities in the KE family were not language specific and that they caused a ''developmental delay affecting both verbal and nonverbal abilities'' (p. 462). Later research conducted on mice and finches (Groszer et al., 2008; White, Fisher, Geschwind, Scharff, & Holy, 2006) that dealt with the same type of mutation resulted in mice that could not run on their wheels and baby birds that could not learn songs from their parents. Perhaps the FOXP2 gene involved more than language; it involved motor skills.

The research on the KE family illustrates the many questions that confront researchers in their quest to understand language and language acquisition. For some, language is an organized system by which spoken sounds convey information and enable society to conduct its affairs (W. E. Francis, 1958). For others, Steven Pinker, a renown researcher in language and cognition at Harvard University among them, language should not be conceptualized as a ''cultural artifact'' but rather as ''an instinct'' (1994, p. 18). According to Pinker, we speak because we are programmed to speak much in the same way that spiders are programmed to spin webs.

There are also those, of course, who prefer the comparison of human speech to the ancient parable of the scorpion and the frog. In this story a scorpion begs a frog to take him across the river. The frog worries that he will be fatally stung. The scorpion argues that if he stings the frog while crossing, they would both die. Convinced, the frog agrees to ferry the scorpion across the river. Halfway across, the scorpion stings the frog. With his dying breath, the frog asks, ''Why would you do that? Now we will both die.'' The scorpion shrugs and replies, ''It's my nature!'' (personal communication, R. P. Barrie, September 13, 2009).

Critical Periods in Language Acquisition

In reality, Skinner's theory of language acquisition suffered from a major flaw. When young children speak, they do not sound like little adults. Their language can hardly be called imitative; it differs in terms of its vocabulary, grammar, syntax, and pragmatics. Putting words together, step by step, in a chain, in and of itself, would not account for the growth in language skill. The disparity between child language and adult language is, in fact, the humor behind the E*Trade commercials, in which a toddler in diapers is buying and selling stocks while using jargon to poke at his friends who are less adept at trading than he.

In 1967 Eric H. Lenneberg (1921–1975), who studied the biological foundation of language, proposed an organ of the mind that he called a ''language-responsible cognitive structure'' (LCRS). The LCRS, he believed, governed the development of language in the same way that the brain controls physical maturation. Lenneberg believed that there was a ''critical period'' for language acquisition. The plasticity of the young brain permitted children to learn language as if it were child's play.

According to Lenneberg (1967), the onset of adolescence with all of its hormonal changes was also accompanied by a reduced capacity for language acquisition. Lenneberg acknowledged that language learning was still possible during and after adolescence; second-language acquisition in older individuals, however, would be the product of conscious effort and hard work. Even with extraordinary effort, most adults would never successfully master the sound patterns of a second language, leaving them to speak it with a foreign accent.

The concept of critical periods of language acquisition has always been controversial. Researchers (thankfully) are not provided with many cases of children with brain damage, and their progress, or lack thereof, in the area of language is not always well documented. There are a few historical cases in which children were reportedly deprived of language in order to provide evidence of the origin of language (Crystal, 1987). A Greek historian, Herodotus, reported that a seventh-century Egyptian king, Psamtik I, commanded that two newborn babies be raised without language as part of an effort to determine the most ancient language in the world. After about two years in a solitary environment, the children reportedly uttered the word *becos*, the Phrygian word for bread. (Phrygian is a now-extinct language that was once spoken in part of Turkey.) A similar experiment conducted by a Holy Roman Emperor, Frederick II of Hohenstaufen (1194–1250), was not quite so successful. According to the chronicle of a Franciscan friar, ''the children could not live without clappings of the hands, and gestures, and gladness of countenance, and blandishments'' (Crystal, 1987, p. 288).

One of the best-known contemporary cases of language deprivation is Genie, a child who was discovered in 1970 when she was 13 years old (Rymer, 1993). Genie had been the victim of neglect; she had been raised in isolation. In fact, her only vocabulary consisted of the words ''stop it'' and ''no more.'' The age at which Genie was discovered made her, in some ways, uniquely suited to provide researchers with information about critical periods in language acquisition, and she ended up residing in two different homes with the very researchers who were attempting to teach her language. Genie's nonverbal abilities were reported to be age appropriate. In contrast, her language skills were marked by a slow rate of learning, difficulty with syntax, and weak expressive language skill. Although Genie was able to increase her vocabulary, she never developed the capacity to generate well-formed sentences. She was eventually returned to her mother, who gave her up to social services. After living in several homes, Genie was placed in a home for adults with mental retardation.

Although it was hoped that Genie would provide evidence related to language acquisition, her case needs to be considered with caution.

Because Genie represents a sample of only one child, she cannot stand as evidence for what happens when children are deprived of language. It is difficult to make generalizations about language development in children who are neglected and abused, as language and affection are tightly intertwined.

Stages of Language Development

Although most children do not actually speak words until they are almost 1 year of age, they are already working on language in the womb. According to John L. Locke, biolinguist (1993), the womb not only provides safe haven, it is the setting for children's first exposure to language. At about 26 weeks, hearing develops in the fetus. Through the din of blood flow and digestion, the fetus becomes attuned to the mother's voice. By the time they are born, infants show a distinct preference for the sounds of what will soon be their native tongue (Mehler et al., 1988).

But that is not all. Nature equips children with the capacity to distinguish all of the phonetic contrasts in all languages (Kuhl, 2004). During their first year, infants begin to specialize in the sounds in their native language. According to Kuhl (2000), native language neural commitment ensures that neural networks will become increasingly adept at processing the specific sounds that they will need to support higher-order language processing. Infants, in fact, who do not demonstrate increased specialization in their own native tongue are slower to develop language skill (Kuhl et al. 2008).

From their first moment of life, infants actively seek out stimulation that they regard as pleasurable, and they solicit opportunities to bond with their caregivers (J.L. Locke, 1993). In particular, they are drawn to smiling faces and melodious voices. As parents, we oblige them by speaking in higher registers with exaggerated intonations and animated expressions. There is much more to this interaction than mere child's play. In the grand scheme of nature, infant survival depends on it. Infants actively monitor their mothers' behaviors for the verbal and nonverbal cues that signal how they are feeling. A little charm at the right moment results in affection, words of praise, and nourishment.

The back-and-forth between parent and child lays the foundation for turn taking, a process that ensures efficient and effective communication between two individuals. The ability to attend to nonverbal signals and focus on language input is a prerequisite skill for higher-level language processing and for successful social interactions with peers and teachers.

Infants and Speech

Infants' first sounds are reflexive in nature: cries, sneezes, burps, and coughs, and they are often called vegetative. The term *vegetative* refers to what was once thought to be the passive state of the child, a relic from Piagetian days. As mothers have always suspected, however, infants are more sentient than the term suggests, and they quickly fine-tune their cries to express hunger, pain, and anger.

At about 2 months of age, infants engage in their first efforts at speech production. They coordinate their tongues, lips, and vocal folds to produce vowel-like utterances signaling pleasure. John L. Locke (1993) referred to this stage of speech development as the ''goo stage.'' With additional practice and increased control of their speech organs, babies add consonant-like sounds to their repertoire. They enjoy a greater range of vowel sounds, together with nasals, fricatives, squeals, and, to everyone's delight, raspberries. Stark (1979) called this stage of sound production marginal babbling.

At 6 months of age, infants move on to a more sophisticated form of speech known as variegated babbling. During this stage, infants work to form consonant-vowel sequences much like syllables, using consonants that are articulated in the front of the mouth (/b/, /p/, /t/, /d/, /m/, and /n/). Some think that the inclusion of these particular sounds at this stage of speech development suggests that production is driven by imitation. (These sounds are more visible; they are made with the lips or in the front of the mouth.) It is also possible, however, that these sounds are simply next in the developmental sequence of oral-motor control.

John L. Locke (1993) thought that all children babble the same set of sounds, regardless of their native tongue. The sounds produced during the babbling stage are not in response to what infants hear and see but are a reflection of anatomical and aerodynamic factors that are unique to us as humans. In other words, children make these sounds because they have the physical capacity to do so. Locke further supported his argument by noting that babbling does not differ in children with cognitive impairments or neonatal brain damage. He did acknowledge, however, that babbling is delayed in children with severe hearing impairments.

From 9 to 18 months, children develop increased precision and refinement in their articulation, and they engage in nonreduplicated babbling, during which they combine different vowels and consonants into syllables (Stark, 1979). Children at this stage take on the intonational patterns, stress, rhythm, and phrasing of adult language, often giving the mistaken impression that they are engaging in meaningful communication. Likewise, deaf children begin to babble with their hands, producing sequences of syllables in sign language that are similar, if not identical, to the syllables found in oral babbling (Petitto & Marentette, 1991). Petitto and Marentette (1991) suggested that the human predisposition for language is not specifically for speech but rather for any abstract linguistic symbol system. In other words, the brain is not particular about what kind of language it develops as long as it develops in some form.

One-Word Stage

The leap from babbling to speech with communicative intent requires a realization about the purpose of language. Speech is not just an oral-motor activity; it is purposeful, and it conveys meaning. The realization that words have meaning typically occurs prior to the first birthday, a time when children begin to use phonetically consistent forms to refer to a particular thing, want, or dislike. Von Raffler-Engel (1973) described her son's use of phonetically consistent forms to express his inclinations: /i/ was reserved for things desired and /u/ expressed disapproval and discontent.

At this point in their development, children understand much more than they can express. Their mastery of speech sounds is still quite limited, and their first attempts to convey meaning through words may be understood only by parents, who become quite adept at translating infant code into recognizable words. The order in which children expand their vocal repertoire differs from child to child. Most children, however, acquire vowels before consonants and stops before continuants (O'Grady, Archibald, Aronoff, & Rees-Miller, 2005).

With the production of the first recognizable word, children enter the holophrastic stage of language development, a stage in which one word represents an entire thought. Children now use individual words to reference familiar people, animals, and objects as well as actions or states (Bloom, 1973). Their vocabulary consists predominantly of what we, as adults, would consider to be nouns and verbs. Function words such as pronouns, auxiliary verbs, articles, and prepositions occur with much less frequency if at all (Nelson, 1973).

Given that children are expressing themselves in one-word utterances, we can only guess at their true intent. A child who says "truck" may want the truck; she may, however, be commenting on its position, color, or size. We have no way of truly knowing what verbal and nonverbal thoughts stand behind their speech.

How children come to understand what a word means has been the subject of much speculation and learned discussion. Vygotsky (1934/1986) believed that children acquire breadth and depth of word meaning through experience. Novice word users typically *overextend* and *underextend* word meaning. Overextention is used to describe how young children overgeneralize word usage; "dog" may refer to any four-legged creature. Conversely, "dog" may refer to the family pet alone, a clear underextension of the word's meaning.

With each new experience, a child's knowledge of word meanings is refined, tweaked, and even corrected. Clark's *semantic feature hypothesis* from 1973 described words as the sum total of facts, features, and associations. As children acquire experience with words, they deepen their understanding through the addition of semantic features. Children initially may perceive their father's occupation to be something that occurs elsewhere. With time, however, children come to understand that Daddy performs a function to get money in a building where he spends a good part of the day.

We cannot discuss children's emergence into communicative speech without discussing their use of pragmatics. After all, communication is not always in the words (in this case, the word) but the way that words are used. Halliday (1975) found that his son's pragmatic skills increased greatly when he began to speak. He could satisfy needs and wants, interact and control the behavior of others, explore his environment, pretend, and give voice to his own thoughts and experiences. Greenfield and Smith (1976) reported that children begin to develop assumptions about others. Bloom, Rocissano, and Hood (1976) noted increased skill with turn taking. The development of pragmatics is tightly entwined in the development of communicative speech.

Putting Words Together: Beginning of Syntax

At about 18 months of age, children experience a dramatic growth, or word explosion, in their vocabularies. This rapid rate of growth continues until they reach the age of 6 with children acquiring as many as nine words per day (Carey, 1978). This period of word acquisition is unmatched throughout the life span. Try as we might, we adults simply no longer have the neurological disposition to acquire words at such a prolific rate.

At about the same time that children are engaged in building their lexicon, they begin putting words together into two-word utterances. This simple act is a feat that marks the beginning of syntax or sentence structure. It is thought that the increase in vocabulary and dawning of syntax is not coincidence (Bates, Bretherton, & Snyder, 1988). According to Bates, Dale, and Thal (1996), there is a strong relationship between vocabulary size and increases in utterance complexity. This relationship, they report, is observed in children with a variety of profiles, including early and late talkers, children with focal brain injury, and children with Williams syndrome (a neurodevelopmental disorder that is characterized by a developmental delay and unusually well-developed language skills).

Children's first multiword utterances are often described as telegraphic, reminding us of a time preceding e-mail when messages were sent via telegram. Because Western Union charged by the word, customers eliminated all nonessential content, resulting in messages such as ''In jail. Send money. Love.'' In children's telegraphic speech, glue words that typically hold sentences together are omitted; conjunctions, articles, auxiliary verbs and prepositions are absent (*Mommy mad*). Pronouns are forgone for their more concrete counterparts (*Lucas hurt*). Negation is expressed by *no* or *not* placed at the beginning of the utterance (*No go*). In addition, morphological markers for person, number, and tense, suffixes that are used to make messages more precise are lacking (*Mommy car*).

It was Roger Brown (1973) of Harvard University who taught us that we could learn much from what children had to say. Steven Pinker (1998) quoted Brown as saying:

> *All over the world the first sentences of small children are being as painstakingly taped, transcribed, and analyzed as if they were the last sayings of great sages. Which is a surprising fate for the likes of ''That doggie,'' ''No more milk,'' and ''Hit ball.'' (p. 206)*

R. Brown (1973) proposed a grammar of children's speech based on semantic relations. He believed that children's language development was a reflection of their world knowledge and that children understood something about language. In his examination of two-word utterances provided by English, Swedish, Finish, Samoan, and Spanish children, Brown found that utterances could be

Table 3.1 **Semantic Relations**

Utterance	Semantic Relations
mommy eat	agent + action
pet kitty	action + object
daddy car	agent + object
doggy nice	entity + attribute

classified into sets of semantic relations, such as those shown in Table 3.1.

As tempting as it may have been, linguists could not assume based on Brown's research that young children have a conscious awareness of parts of speech as they are understood by the adult mind. Even without this assumption, however, Brown's research indicated that children at the two-word stage were obeying English-language constraints for word order. It was remarkable; children as young as 18 months were learning about syntax.

R. Brown's (1973) interest in children's speech gave rise to the question of how children determine the correct meaning of a word. In many cases, the labels by which we identify things are ambiguous. How do children discern the difference between ''I have a pet'' and ''I pet the dog''? Brown believed that children used their knowledge of syntax to figure out word meanings. He proposed the concept of syntactic bootstrapping, by which children encode language in an abstract format, consider how verbs combine with other parts of speech, and map nouns in a one-on-one fashion to each participant or thing being observed (Gleitman, 1990; Pinker, 1994).

Mean Length of Utterance

Brown's contribution to the study of language acquisition did not end with the study of semantic relations and the foundations of syntax. He also provided linguists with an important tool for measuring early language growth: the mean length of utterance (MLU). The MLU is the average number of morphemes (free and bound) in an utterance. As the number of morphemes increase in an utterance so does the child's skill with syntax. In order to understand Table 3.2, it is important to know what the MLU is and how it is calculated.

Table 3.2 **Brown's Stages of Language Development Based on Mean Length of Utterance**

Stage	Age in Months	Description	MLU
I	12–26	**Semantic Roles and Grammatic Relations:** telegraphic language with evidence of correct word order	1.0–2.0
II	27–30	**Grammatical Morphemes and the Modulation of Meaning:** little words including some prepositions, occasional articles, copular am, is, and are as well as plurals, possessives, the progressive, past tense, and third person	2.0–2.5
III	31–34	**Modalities of the Simple Sentence:** yes-no interrogatives, wh- questions, negatives, and imperatives	2.5–3.5
IV	35–40	**Embedding of One Sentence Within Another:** object noun phrase complement (I hope we can go.), indirect embedded wh-questions (I bought what I could), relative clauses (I saw the girl who came from Boston.)	3.5–4.0
V	41–46	**Coordination of Simple Sentences and Propositional Relations:** coordination of full sentences and the creation of sentences with compound subjects or compound verbs (Jim and Ethan eat cookies.)	4.0+

Source: Adapted from *A First Language: The Early Stages* by R. Brown, 1973, Cambridge, MA: Harvard University Press.

1. Obtain a sample of 100 fully transcribed utterances. Count the morphemes in each utterance. Do not count filler words (um, ah). Compound words, irregular past tenses, catenatives (wanna, hafta), and diminutives (doggie) count as 1 morpheme. All inflections are counted as separate morphemes (bats = 2 morphemes).
2. Add the total number of morphemes and divide by 100. A child who produces a total of 230 morphemes over 100 utterances has an MLU of 2.3.

Based on his study of language development in three children, R. Brown (1973) proposed five stages of growth and development based on the MLU. His book *A First Language: The Early Stages* focused on the first two stages.

According to R. Brown (1973), his stages were not like Piaget's stages of cognitive development in which each stage was qualitatively different from its predecessor. In Brown's schema, children in each stage continue to develop and refine underlying skills. Grammatical morphemes are not mastered in stage II; children continue to develop their expertise in morphological markers well through stage V and beyond. Brown's research also told us something else important: All children acquire syntax in the same way regardless of their native language.

During the late 1950s and well into the 1970s, Harvard University and the Massachusetts Institute of Technology became home to many researchers who were inspired by Brown's work with children. One of them, Jean Berko, conducted one of the most creative and even beloved studies of children's skill with grammar. In her article, ''The Child's Learning of English Morphology'' (1958), Berko described how children ages 4 to 7 were presented with nonsense words and asked to apply grammatical endings to form inflections and derivations given the context of a sentence and an illustration: ''This is a wug. Now there is another one. There are two of them. There are two . . . ?'' (p. 154).

The use of nonsense words in Berko's test ensured that children would not be parroting back words they had memorized. Instead, they had to analyze the root word and apply the correct suffix. While the suffix -ing does not present much difficulty (it is the first bound morpheme mastered), other suffixes present greater challenges. The suffix -ed, for example, has three allomorphs: /t/, /d/, and /əd/ adding an element of phonological decision making to the process. Whether we say backed, bagged, or batted is dependent on our assessment of the sound in the root-final position.

Typically, children between the ages of 20 and 36 months acquire skill with bound morphemes in the same sequence: -ing, plural -s, possessive -'s, past tense -ed, and third-person singular -s. Interestingly, this order does not reflect the frequency of what children hear from their parents. According to O'Grady et al. (2005), factors such as word position, whether the suffix constitutes a syllable on its own, lack of exceptions, allomorphic variations, and an easily discernible purpose all affect the ease with which children become proficient at making word meanings more precise.

Because English presents young language learners with a fair number of irregular inflections, children are often tempted to overgeneralize what they know. Examples, such as ''I eated the cookie'' or ''The mans play a game,'' stand not just as evidence of poor grammar, but as evidence of active rule making in English.

Preschool Years

During the preschool years, children become more skilled at putting words together to convey their intent. One of the major milestones that preschoolers face is how to negate statements and how to form questions. Although many parents may think that their 2-year-old is an expert at saying no in ways that are exceptionally clear, the ability to negate a statement presumes a fair degree of linguistic expertise.

Negation: In 1966, Klima and Bellugi documented three phases of development in negation. During the first phase, children express negation by putting *no* at the beginning of the utterance, as in the examples ''No bed'' or ''No go home.'' In the second phase, *no* is moved to an internal position before the verb: ''Nolan no eat peas.'' Shortly thereafter, *can't* and *don't* make their appearance. While we might be tempted to think that our child has become skilled with contractions, our pride is premature. Children at this age learn *can't* and *don't* as vocabulary and not as short forms of *cannot* and *do not*. Auxiliary verbs, in fact, such as *can, do, does,* or *did*, do not appear until about 30 months of age. Finally, in the third and last phase, the negative particle takes its proper place, and we hear ''Lucas is not tired.''

Question Formation: A rudimentary understanding of syntactic structures (phrases) is also required for the formation of questions. Typically, yes-no questions are formed by moving the auxiliary verb to the front of the sentences, as in ''Was Lisa good?'' This process, however, works only in sentences with auxiliary verbs. In order to turn the sentence ''Mimi eats carrots'' into a question, we have to add the appropriate form of *do*: ''Does Mimi eat carrots?'' ''Do they want ice cream?'' In the world of 2-year-olds, there are no auxiliary verbs, and children have to content themselves with marking yes-no questions with a rising intonation. ''Mimi eat carrots?'' Children at this age also engage in *what* and *where* questions, a possible reflection of their interest in naming and location. With time, children 31 to 34 months of age begin to create questions with auxiliary verbs and inverted word order, as is the practice in the adult world. Additional wh- questions—*why, who*, and *how*—soon also appear.

Pragmatics: As preschoolers work on increasing their vocabularies and their command of sentence structure, they are also learning lessons about using their words effectively. Two-and-a-half-year-old children are interested in having conversations, and they are learning different strategies for clarifying their intent and getting what they want. Parents experience a deluge of questions, requests, descriptions, and repetitions, and there are more than a few parents who joke about the wisdom of having taught their children to speak at all.

While preschoolers are not close to mastering the fine art of conversation, they are beginning to grasp some of the subtleties of turn taking and when it is permissible to speak during a conversation. According to Ervin-Tripp (1979), young children often confuse syntactic junctures or pauses as a signal that they may speak. As they acquire more experience, however, they can tell the difference between a syntactic junction and a true pause that signals the end of the speaker's turn. Silence, they learn, can have meaning in the same way that words do. In addition, young children develop an understanding of conversational rhythm, and they adjust their response time to match that of adults. Conversational timing offers one of the first lessons in the old axiom, ''Timing is everything.''

With the increased self-awareness that comes from being a mature child of 1 to 2 years, children also come to realize that their attempts to communicate are not always successful. They now have a sufficient vocabulary with which to fix breakdowns in communication (Gallagher, 1977): ''If I can't say it this way, maybe another way will work.'' Conversational repair is the ability to analyze and clarify misunderstandings and miscommunications. Initially, children's efforts at reparation are clumsy; they have, after all, only limited tools with which to do the job. As their vocabularies increase, however, children become more precise in their messages and in their corrections, and they are better able to express themselves in a manner suited to the needs of the listener.

Awareness of the listener and how listeners react to requests, demands, and pronouncements plays a large role in how children gauge their requests and responses and how they weigh their words. Parents work hard to instill the proper use of ''please'' in their children. At the same time, however, children must figure out on their own how to make requests indirectly. In American culture, we make our requests with a certain degree of planned subtlety; in this way, we avoid the appearance of being too assertive and, worse yet, possibly even self-centered or threatening.

The rules of etiquette which call for a degree of humility in our deed and in our language manifest themselves in syntactic forms known as semantic softeners (Becker, 1984). Semantic softeners include modal forms of verbs (*could, would*, and *should*), pauses designed to feign uncertainty, and indirect hints (''My tummy is hungry.'').

Language and the School-Age Child

When children enter our classrooms, we hope that they come well prepared. It is our hope that they have had numerous experiences and that they have been exposed to the words needed to label those experiences. Children entering school should be able to describe events in the past, present, and the future. They should be able to use language effectively to inform us of their needs, wants, and desires. They should be able to carry on conversations for several turns and recognize when it is appropriate to take the floor.

We also hope that they have a command of basic concepts and direction words that are critical for classroom lessons and discussions. Prereading activities, including story time and alphabet play, are essential. Not only do we want children exposed to the rich language of books, we want them to grasp the rudiments of plot structure (*once upon a time* and *happily ever after*). Listening to stories provides children with experience in attending to language as discourse. They have to pay attention for longer periods of time. There is less back-and-forth and even less individualized feedback.

In addition to the transition from home language to classroom language, children still have much to do in terms of developing their basic language competence. Language will serve not only as the foundation for reading, writing, and math; it is also the medium of instruction. There is no part of the school curriculum that does not involve and, indeed, require skill in language, and the language demands only increase as children advance through school.

Syntax: As children progress through school, sentences they hear and read become longer requiring a higher level of expertise in how words are combined to create meaning. As we saw in the discussion of question formation, children have to become knowledgeable about what constitutes a phrase or a clause; their ability to interact with text, in fact, will depend on it. Unfortunately, the acquisition of syntax is not always straightforward. In this section, we focus on some of the higher-level syntactic skills that support listening and text comprehension. Before we focus on some of these challenges, however, we spend some time on what is called the *canonical sentence schema* or *strategy* (Bever, 1970; Slobin & Bever, 1982).

According to Slobin and Bever (1982), children develop strategies for language processing based on their experience with their native language. As a result, children develop certain expectations about word order that permit them to process the majority of sentences with a high degree of efficiency and accuracy. In English, it so happens that subject-verb-object sentences (SVO) predominate (This is not the case for all languages. Russian, for example, has a more flexible word order; the end of the sentence is often reserved for the most important information.). Understanding that the first noun in a sentence is the agent or doer and that the second noun is the recipient or what is acted on establishes a syntactic framework, or a default strategy that works with many sentences. However, the English language does not always conform to SVO order. This unruliness on the part of English is what confounds many young children as well as older children with language impairments.

Passive Voice: In English, the agent—the one performing the action—typically is found at the head of the sentence. This expectation is often the cause of misunderstandings in young children who attempt to process sentences word by word in the order that they occur. Because the passive voice—as in ''The book was read by me''—violates a basic expectation for word order, it remains one of the most challenging milestones of language acquisition. Many students do not develop the passive voice until adolescence, and some reach adulthood without being able to distinguish between ''Samuel bit his sister'' and ''Samuel was bitten by his sister.'' The challenge is so pervasive, in fact, that most graduate students (and professional writers) are advised to change passive constructions into active ones. They are just easier to process and understand.

As is true of many language skills, young children understand passive sentences well before they can produce them. It is possible that this understanding is not based on their expertise in syntax; they actually may be relying, to some degree, on context and on background knowledge. The sentence ''Lucas was bitten by the dog'' just makes more sense, given the likelihood that it was the dog that did the biting. O'Grady (2005) suggested that the difficulty with passive constructions is not only in the word order but in the ''little words'' and suffixes that are unstressed and are, therefore, not always heard.

Most children come to the realization that word order does not always follow the agent/object expectation. Many children by the age of 5 are able to grasp passives that are constructed with action verbs, such as ''Joshua was called by his mother.'' Passives with nonaction verbs, as in ''Joshua was loved by his mother,'' present a greater challenge. Unexpected word order coupled with a nonaction verb may overwhelm young children who are trying to manage what has now become a more complex and even cognitive task. However, regardless of whether the verb describes a mental or physical state, children of 4 years of age can produce the shortened form of the passive, ''Joshua was called.''

Our discussion of the passive and young children, however, is not yet over. There is also an issue related to reversibility. A passive sentence is deemed to be reversible if either of the two nouns can function as the subject or the agent. If the sentence ''The fox was chased by the dog'' is reversed, it will still make sense; we say, therefore, that it is reversible. If we reverse the sentence ''The apple was eaten by the boy,'' however, it will not make sense. Horgan (1978) found that reversibility was an important element in children's skill with passive sentences. According to her research, children from the age of 4 begin with the formation of passive sentences that are reversible. As they become older, they acquire skill with nonreversible passives. Only 50% of children at the onset of adolescence (11 to 13) are actually skilled in producing both forms. This finding suggests that we may have to clarify the use of passives in the classroom well into the middle school years, if not into high school.

Principle of Minimal Distance: In our discussion of syntax, we saw that children's skill in language processing is built, in part, on understanding word order and phrase structure. Carol Chomsky (1969) investigated the principle of minimal distance (PMD), which states that, generally speaking, the noun that directly precedes the verb will be the subject of the sentence. This rule helps us interpret sentences that might be otherwise ambiguous. In the sentence ''Sam wanted to go,'' the PMD tells us the understood subject of *to go* is Sam. It is Sam who is to leave.

The PMD also functions in the more complex example, ''Mom told Jan to do her homework.'' In this case we readily understand that it is Jan who is to do her homework. We do so because, according to the PMD, the noun (Jan) immediately preceding the infinitive acts of the subject of the infinitive. As good language processors, we follow the rule. Jan is the closest to the verb, and as such becomes its subject.

Despite what we tell children, however, following rules sometimes gets us into trouble. The PMD does not apply equally to all verbs. Even though we may think that a verb is just a verb, the verb *promise* defies the rule. Let us take another look: ''Mom promised Jan to do her homework.'' In this case Mom retains control of the infinitive (she retains the *subjectship*, as it were), and even though Jan is still the closest to the verb, the PMD no longer applies. Similarly, the verb *asks* creates even more confusion. In the sentence ''Misha asked Eli to bake cookies,'' we know that Eli will be the one baking. If we rephrase this sentence to read ''Misha asked Eli what kind of cookies to bake,'' Eli is no longer the one in the kitchen. Carol Chomsky found that children gradually learn the exceptions to the PMD and that by the time they are about 10 years old, they have mastered both the rule and the exception.

Beyond Simple Sentences: Although young children can successfully process simple and compound sentences using their knowledge of SVO word order in English, there comes a time when they have to learn to process and build sentences of different types. Initially 3-year-old children conjoin sentences with the conjunction *and*. As they enter their school years, however, they are faced with the need to use a greater range of connectors. It is no longer sufficient to describe events as isolated incidents connected by an endless series of *and*s. As children develop cognitively, they grow to perceive events in terms of their relatedness. Events may be connected in terms of their sequence. They can be related by cause and effect. Some events are conditional upon others. Still others express a turn of events. The relationships expressed in complex sentences are a direct reflection of a child's ability to perceive the world, make connections, and put those connections into words. Complex sentence structure is not just about language; it is about how we think.

Menyuk (1964) studied children's acquisition of sentences, and she categorized conjunctions according to the relationship between clauses as shown in Table 3.3.

The expression of logical connections between clauses is complicated by children's efforts to process sentences word by word in sequential order. Children make an assumption that the order of events in a sentence matches the actual sequence of events. They also assume that the cause precedes the effect. The logic is ''If I hear it first, it must have happened first.'' As a result, many children have difficulty with conjunctions that violate this expectation. Mastering *because* is particularly problematic. In sentences with the word *because*, the cause often follows the effect: ''I am in trouble because I broke the lamp.'' Sentences with *after* are also challenging, and I have often wondered how often we confuse young children when we tell them ''You may play video games after you do your homework.''

Table 3.3 **Relationships Expressed by Clauses**

Relationship	Conjunctions
Temporal	then, when, before, after, since
Conditional	If
Causal	because, so, therefore
Disjunctive	but, or, therefore

Embedding Clauses in Sentences: As children lose the notion that sentences are processed word by word in the order heard, they demonstrate greater flexibility in the sentences that they understand and produce. Whereas preschool children are limited to producing relative clauses in the object position of sentences (''I saw the girl who was reading''), school-age children now embellish their sentences with embedded clauses in the subject position (''The girl who I saw was reading''). The subject position is more challenging because it requires that young listeners and speakers understand how clauses modify the meaning of the sentence as a whole. The example ''The girl who watches the boy is sitting at the table'' is confusing to many young children because if processed sequentially instead of clause by clause, they might think that it was the boy who was sitting at the table. Relative clauses in the object position are not well established in school-age children until about the age of 9.

Pragmatics in School: Proficiency in vocabulary and syntax provides children with the tools they need to devote more of their attention to expressing their thoughts with the listener in mind. Conversational skills at the elementary school level still need fine-tuning. Children now recognize the importance of staying on topic, even when the topic may not be of particular interest to them. While preschoolers engage in a lot of repetition during conversations with adults, school-age children learn how to transition from one topic to another, adding new information as they go along. They have greater stamina and, indeed, better skill at fixing conversational breakdowns, and they may even attempt to clarify their intent a second time. If pressed for a third explanation, they may then respond with ''oh, never mind,'' a behavior that we often see in adults.

Children develop more subtlety in their word use, and they manipulate language to achieve unspoken agendas. They are better at interpreting indirect requests, and their efforts to hint become less obvious (Ervin-Tripp & Gordon, 1986). They can even adjust their language to show greater respect for those they are dependent on (Corsaro, 1979). School-age children begin to recognize that people do not always say what they mean and that, in some cases, others (not them, of course) actually lie. They learn how to speak with sarcasm and even to read between the lines.

School-age children also learn to organize what they have to say, and they structure their explanations beginning with necessary background information and the big picture prior to launching into less important detail. Narrative skill emerges, a critical milestone for written expression. Children's narratives develop from isolated events related only by the conjunction *and* to tales with cause and effect, motivation, and a clear resolution. We discuss narrative skill in more depth in Chapter 9.

Finally, children become aware of language in its own right, and they use their metalinguistic skills to evaluate the use of language at all levels from phonemes in words and word endings to higher-level issues related to vocabulary, syntax, and semantics. The stages of language development can be viewed in Table 3.4.

Communications Disorders

Children present with a variety of speech and language skills in the classroom. Not all these differences, however, reflect actual disorders in communication. Suffice it to say that whenever a communication disorder is suspected, the child should be referred for evaluation. Untreated language deficits place children at high risk for behavioral challenges, anxiety, depression, and academic failure.

Given the variety inherent in children's communication skill, the question arises of when speech and language differences actually become a communication deficit or impairment. According to Van Riper and Emerick (1990), ''Speech is abnormal when it deviates so far from the speech of other people that it calls attention to itself, interferes with communication, or causes the speaker of his listeners to be distressed'' (p. 34). Although we may find that this definition is not grounded in test scores and statistics, it promotes an understanding of communication that stresses the impact of the deficit on the individual. Speech and language skills are the major way in which we interact with others at home, with friends, and in the classroom. When children's communication skills fail them, and when this lack of skill cause discomfort, it is not just a language issue. It is an issue of self-esteem and confidence. When faced with the prospect of yet another public communication failure in the classroom, some children actually become quiet or withdrawn. I have always wondered how many of the males of the ''strong, silent type'' were actually struggling with undiagnosed language impairments.

There are different types of communication disorders, and for the sake of thoroughness, we review the major categories in which they fall. Communication disorders are described as organic or functional. Organic disorders involve a physical impairment of a speech organ. Children with a cleft palate, for example, often have difficulty articulating sounds clearly because there is no separation between the nasal passage and the mouth. Functional disorders are those that are a consequence of learning, psychological, or environmental factors. The four main types of communication disorders are discussed next.

Articulation and Phonological Disorders

Articulation and phonological disorders interfere with the intelligibility of speech, and they involve difficulty with the production of speech sounds. Some children with articulation problems have a limited range of sound production due to the physical structure of the mouth. Plosives, for example, are difficult for children with a cleft palate because they cannot build up enough air pressure to produce the puff of air needed, as in the case for a /p/. When we speak of *phonological disorders*, we refer

Table 3.4 **Stages of Language Development**

Stage	Description
Prebirth	Hearing develops at 26 weeks in utero, and sensory stimulation promotes neurological development.
Infancy	Infants seek out smiling voices and human voices as a foundation for nonverbal turn taking and language acquisition. Birth: vegetative sounds 2 months: Locke's "goo stage" 5 months: marginal babbling 6 months: babbling 9–18 months: nonreduplicated babbling
One-Word Stage: 12 months	Infants use one word to express their needs and wants. Meaning is overextended or underextended. Turn taking begins. Infants use language to interact and control the behavior of others.
Two-Word Telegraphic Stage: 18–24 months	Two-word utterances that inform, comment, question, and predict. There are no prepositions, auxiliary words, or conjunctions. There are no morphological markers for number, person, or tense. Pronouns are absent. Articulation is characterized by elimination of unstressed syllables, deletion of final consonants, and substitution of sounds made in the front of the mouth.
Preschool Years to Fluency: 2 to 5 years	An explosion of language that is accompanied by sustained turn taking, mechanics of conversational timing, and conversational repair. Morphemes, pronouns, auxiliary verbs, function words, and phrases make their appearance. Grammar is overextended. Question formation (why, who, and how) is practiced intensively, occasionally overwhelming adoring caregivers and parents.
School-Age Child	Language is used effectively to achieve needs, wants, and desires in conversations lasting several turns. Passives are introduced; the principle of minimal distance is understood. Children begin to think not just about what they say; they think about how they say it. Hinting becomes effective as a tool for pursuing hidden (or not so hidden) agendas.

Source: Adapted from "Language: Structure and Acquisition," by M. Farrall, in S. Brody, 1994, *Teaching Reading: Language, Letters, and Thought* (pp. 37–62), Milford, NH: LARC.

to children who have the physical capacity to produce speech sounds but who may omit sounds in different contexts. Take, for example, the case of a child who can produce a /p/ sound in isolation or in the word-initial position but who cannot produce it in the word-final or medial positions.

Phonological processing disorders have different etiologies. In some cases they are the result of structural abnormalities; they can result from neurological deficits, which impair the ability to control the motor movements that govern speech. In other cases they may be the consequence of environmental factors in the home, hearing loss, and/or auditory perceptual deficits.

Dysarthria is a motor speech disorder that is the product of a muscular impairment. Children with dysarthria have muscular weaknesses that can impair all of the basic processes of speech, including respiration, phonation, resonance, articulation, and prosody. Their speech may be slurred; they may speak at a slow rate. Errors in speech are consistent; consonants may be imprecise, and vowels may be reduced in quality. Voice quality may be affected, as well as chewing and swallowing.

Childhood apraxia of speech (CAS) is a motor disorder in which children experience difficulty positioning and sequencing the muscles needed for the volitional production of phonemes. In contrast to dysarthria, CAS is not the result of muscle weakness. Rather it is a problem that the brain has in coordinating the speech organs to do their job. Children with CAS often are inconsistent in their production of speech sounds, a challenge that increases along with the complexity of syllables and words. They may have a reduced phonetic or phonemic inventory; they may not have a full inventory of vowel sounds; and they may be more prone to errors in vowels.

Voice Disorders

Voice disorders involve difficulty with pitch, loudness, and voice quality. The pitch of a voice can be too high, too low, or in some cases monotonous. *Monotonous* in this particular sense does not mean boring but rather refers back to its primary meaning and its Greek roots: ''single tone.'' These children speak with little inflection.

In some cases pitch disorders are the result of individuals who try to alter their vocal presentation. In other cases the pitch is a reflection of the size of the larynx. Larger larynxes produce deeper pitches; smaller ones, a higher sound. Voices can be too loud or too soft. Speaking at too great a volume is sometimes the result of a hearing loss or environmental noise. Speaking too quietly can be associated with problems in the middle or outer ear that makes it seem to the speaker as if the voice is louder than it really is. Vocal quality disorders characterize problems with resonance and laryngeal tone. Speakers can have too much or too little nasality; their voices can be too harsh, too breathy, or too hoarse.

Fluency Disorders

Fluency disorders are those behaviors that interfere with the flow of language, such as hesitations, repetitions, and prolongations. There has been much controversy about what stuttering is, why it occurs, and why sometimes it dissipates without intervention at all. According to Hulit and Howard (1993), stuttering typically begins in the interval between 2 and 4 years of age; it occurs more frequently in boys than in girls. In a majority of the cases, stuttering ceases by 6 years of age. The challenge of fluency disorders, and stuttering in particular, is that they wax and wane. Individuals who stutter, for example, often experience a degree of performance anxiety in speaking that may aggravate the problem.

Language Disorders

Children with language disorders experience delays in language acquisition; they may have difficulty understanding and speaking with proper grammar, precision, and style. First and foremost, it is important to ensure that the language disorder is not a product of a hearing loss. As we have seen, it is difficult for language to develop in the absence of good and clear language input.

Language disorders can be associated with a variety of factors, including hearing loss and deafness, environmental deprivation, cognitive delays, and autistic spectrum disorders. A specific language impairment (SLI) is a profile of language difficulty that is distinct from developmental delays. Children with SLI generally have many age-appropriate skills. They may be adept at puzzles and problem solving, and they may be skilled athletes. Despite these skills, these children experience challenges in receptive language, expressive language, or both. The profiles of individual children will vary, warranting a thorough evaluation with individualized recommendations for treatment.

Children with receptive language impairments, sometimes referred to as auditory processing disorders, experience difficulty understanding language as it is used by others. They may not be interested in listening to stories, and they may be overwhelmed by lengthy, complex sentences. Multistep directions can be problematic, and they frequently misunderstand content.

Children with expressive language impairments have difficulty using language to express themselves with precision and correct grammar.

Inefficient and inaccurate word finding may impede children's efforts to express their thoughts in a manner commensurate with their understanding. Their speech may be littered with filler words, such as "um," "like," and "you know." They may try to talk "around" words that they cannot access. This profile causes many children frustration in classroom discussions, writing assignments, math problem solving, and testing. Word-finding deficits make it hard to respond to fill-in-the-blank or open-format questions on tests. The test becomes, in essence, a highly concentrated "tell me everything you know right at this particular moment" experience. How many of us have had the frustration of not being able to retrieve a word only to have it surface mysteriously later without apparent prompting and effort.

Many children with language impairments do not have a variety of sentence structures at their disposal. In a study conducted by Klee, Schaffer, May, Membrino, and Mougey (1989), children with SLI spoke in shorter utterances (based on mean length of utterance in morphemes) than their peers with typical language development. Many children with language impairments have a reduced fund of word meanings. A study by Loeb and Leonard (1991) of 4-year-old children with SLI highlighted challenges with sentence formulation, in particular verb forms, subject case marking, and noun/verb agreement. Young children with language impairments have more difficulty with grammatical correction tasks than their typical peers (Fujiki, Brinton, & Dunton, 1987). Overall, their skills were delayed. Kamhi, Lee, and Nelson (1985) found that children with language disorders had a poor awareness of sound segments in sentences and words and that this lack of awareness placed them a higher risk for reading challenges.

Children with language impairments also experience difficulty with higher-level language skills. Bishop and Adams (1992) found that children with language impairments had difficulty with literal and inferential questions, and they questioned whether comprehension difficulties were due to an inherent processing deficit or from limited background knowledge. In Liles's (1985) investigation of story grammar, she noted that children had considerable difficulty relating a series of events, and she speculated that this problem might reflect a weak understanding of cohesive ties: pronoun use, substitution, ellipsis, categorization, and connectors. Overall, children with language disorders had greater difficulty participating in conversations, answering questions, engaging in conversational repair, and softening their words.

Special Education Identification

Children with language impairments who require specialized instruction are identified under the Individuals with Disabilities Education Improvement Act of 2004 (IDEA; 20 U.S.C. §§ 1400 et seq.) as having a speech and language impairment or as having a specific learning disability in the areas of listening comprehension and/or oral expression. The two areas overlap; with the learning disability (LD) identification there has been a historical notion of discrepancy between ability and achievement that has never been part of a speech and language impairment. In addition, the identification of LD does not generally include articulation disorders, although there is no reason why an LD in oral expression could not.

Children with language impairments are at higher risk for academic challenges, particularly in the areas of reading comprehension and written expression. Interestingly enough, longitudinal studies reveal that young children with language delays remain at risk for reading challenges even when their performance on tests suggests that they have closed the language gap with their peers (Scarborough & Dobrich, 1990). There is considerable evidence that 50% of preschoolers and kindergarteners with language impairments are likely to have subsequent reading difficulties in primary or secondary grades (Bishop & Adams, 1990; Catts, Fey, Zhang, & Tomblin, 2001; Catts & Kamhi, 2005). Research on the relationship between language and reading in older students is problematic due to the role that reading plays in language development (Stanovich, 1986).

Given the data provided in longitudinal studies, children with language impairments need to be monitored closely for challenges in reading. Whenever there is any doubt about language proficiency, it is important to consult a speech and language pathologist and ensure that a comprehensive speech and language evaluation that addresses all concerns is performed.

Conclusion

The study of language acquisition has provided many insights into the nature of human language and the all-important role that caregivers, parents, and teachers play in how language develops. Understanding the structure of language is critical for educators who must consider the impact of language usage in the classroom. Knowledge of language milestones is important if we are to recognize children who are at risk for learning and in particular if we are to recognize children who are at risk for learning and reading problems.

Review Questions

1. Why is social interactionism considered to be more than the combined product of nature and nurture?
2. The concept of a ''critical period'' for language acquisition has serious implications for children with significant delays in their language. What should be our response to those who suggest that some children are too old for remediation?
3. R. Brown's research (1973) showed that young children's language development could be measured by the mean length of utterance (MLU). Explain what the MLU is and what it has to tell us about how humans acquire language.
4. What was the significance of Berko's work (1958) on English morphology? Why do we care about wugs?
5. What are our expectations (and hopes) for children's language development as they enter our classrooms?
6. Certain types of conjunctions violate the expectation that the order of events in a sentence matches the actual sequence of events. What are the implications for following directions and understanding story content?
7. N. Chomsky (1957) believed that phrase structure was the primary unit by which we process language. What are the implications for children who do not easily recognize how words are chunked into meaningful units? What types of sentences would be particularly challenging for these students?
8. Explain the difference between a receptive language impairment and an expressive language impairment.
9. What are the implications for children with language impairments in the classroom?

Linguistic and Cultural Diversity

Chapter 4

Introduction

The American classroom is changing rapidly. Gone is the vision of the United States as a cultural melting pot in which newcomers assimilate into a common linguistic and cultural milieu. In today's society and particularly in the classroom, diversity reigns, placing unprecedented demands on educational professionals. This chapter addresses the challenges that diverse learners face in the classroom. What role does poverty play in how children learn to read? How do we accommodate ethnic and cultural diversity in young readers? What is best practice for teaching children with limited English proficiency (LEP) to read? Given the role of language in reading, how do we assess the reading skills of English-language learners (ELLs)?

Poverty

Snow, Burns, and Griffin (1998) identified three group risk factors that are associated with challenges in reading: low income, schools with high rates of poor performance, and linguistic differences. According to the U.S. Census data (DeNavas-Walt, Proctor, & Smith, 2010), poverty is a factor in the lives of approximately 20% of all children under the age of 18 (about 15 million). Sattler and Hoge (2006) indicated that poverty in and of itself is not a "necessary or sufficient condition to produce intellectual deficits, especially if nutrition and the home environment are adequate" (p. 84).

That being said, poverty reduces access to health insurance, healthcare, and a quality education. Children in families living below the poverty line are more likely to have lead poisoning (a cause of learning disabilities) behavioral problems, and more serious health complications (Federal Interagency Forum on Child and Family Statistics, 2007). Schools in poor communities often lack the resources required to maintain high standards for education; children at higher risk may attend schools that are less adept at mediating those risks. Snow et al. (1998) were careful to point out that the third risk factor, linguistic differences, does not necessarily increase risk for reading problems. Linguistic differences, however, do contribute to difficulties securing employment, accessing social services, and receiving high quality healthcare.

In 1995 Hart and Risley published their seminal study, *Meaningful Differences in the Everyday Experience of Young American Children*. They examined the language growth of children from professional, working-class, and welfare families. They asked why preschool programs for low-income children were not successful in changing the trajectory of children's vocabulary growth over the long term, and they came to some interesting conclusions.

Hart and Risley (1995) found that the language experience during children's first 3 years was critical in establishing a foundation for future language acquisition and that language skill at age 3 was a strong predictor of language skill at age 9. A painstaking analysis of the language spoken in these families documented large differences in language experience among children in the three groups of families. Over the course of 1 year's time, children from professional families were reported to experience 11 million words; children from working-class families, 6 million words; and children from welfare families, a meager 3 million. Hart and Risley's research spoke to the need for educators to support language in the home as a foundation for future achievement in school. An important caveat to this study (Snow et al., 1998) indicated that weak language and literacy skills in kindergarten do not necessarily predetermine reading failure and that much is possible given well-designed and intensive instruction.

Variation in Language

When we contemplate language, we generally think of a socially agreed-on convention for communication. This definition, however, is vague and imprecise. It does not come close to conveying the dynamic nature of language and how language changes in response to economic, migratory, and cultural events.

Not all English speakers speak in the same way. Those who live in the Appalachian Mountains talk of flapjacks, greenhorns, and ragamuffins, all words preserved from Elizabethan English and the time of Shakespeare. Cajun English spoken in southern Louisiana has taken liberally from French; chef Justin Wilson of PBS fame began his show with the words ''How y'all are? I'm glad for you to see me.'' Teenagers in Honolulu borrow words such as *aloha*, *kahuna*, *luau*, and *ukulele* from Hawaiian and a smattering of Asian languages. Fans of the television show *Buffy the Vampire Slayer* delighted in speaking ''slayer slang,'' a.k.a. ''Buffyspeak.'' Slayer slang created new words (*ubernerd, mathiness, break and enterish*) in ways that excite the hidden linguist within us, and many of these words have made their way into popular usage (M. Adams, 2003). Our use of language embodies our view of ourselves as individuals, our ethnicity, and our social identities.

Dialects and Accents

Variations in the way that a language is spoken are generally referred to as *dialects*. Many confuse the difference between dialect and accent. The term *accent* refers only to pronunciation whereas a *dialect* also includes grammar and vocabulary. Most commonly, we think of dialects in terms of a geographic locale. We know that the English spoken in Great Britain differs from the English we speak in the United States; we know that both differ from the English spoken in Australia or Canada. These are cases where geographical borders and proximity have served to localize particular speech patterns, grammar, and vocabulary usage.

Dialects, however, are not defined by geography alone. A dialect may reflect a group's socioeconomic or class status, as was portrayed in the movie *My Fair Lady*. In that film, Professor Higgins aspired to remake (and, in his opinion, improve) Eliza Doolittle by endowing her with the speech of the British aristocracy.

Dialects may also reflect ethnic heritage. The term *African American English* (*AAE*), previously referred to as Black English and/or Ebonics, is used to describe speakers in African American communities. There has been considerable debate (which is beyond the scope of this discussion) regarding whether AAE is a dialect or a language in its own right. Suffice it to say that AAE has a set of rules and a vocabulary that set it apart from what many consider to be Standard American English (SAE). Even within African American communities, however, there is considerable variation in speech. As is true of many cultural and ethnic groups, not only do African Americans speak in different dialects, but individual speakers may opt to use different dialects depending on the cultural and pragmatic demands of a particular environment, setting, or task. Language as it is spoken by an individual is called an *idiolect*, and we all change our style of speaking to suit our moods, purpose, and audience.

The relatively recent rise of mass media beginning with the printing press in 1440 has contributed to the notion of a standard form of language. In the United States, SAE is said to be the dialect used for law, government, and broadcast journalism. SAE, however, is not well defined, and while we may recognize SAE grammar when we see it, we might have to seek the assistance of an accent coach in order to acquire the SAE manner of pronunciation and phrasing that we hear elsewhere, such as on television.

A dialect is not a lesser form of language. Although many Americans consider the dialect of English used by the royal family and the British Broadcasting Company (BBC) to be more prestigious than what is spoken in the United States, we can rest assured that one dialect is not inherently superior to another. All dialects in all languages, regardless of their provenance, share a core of grammatical features and vocabulary; they are all bound by rule-governed structures.

Dialects reflect a wide range of pronunciation, and not all dialects share the same relationship to a language's spelling system. AAE, for example, has some distinctive phonological features in which sounds are simplified, reduced, or downright omitted. These changes can result in a less transparent correspondence between sound and symbol (Wolf, Orkin, Barzillai, Norton, & Ullman, 2009). According to Snow et al. (1998), however, no research suggests that the pronunciation of U.S. dialects is associated with reading problems.

Unfortunately, dialect differences are not always understood and respected in the classroom. Some researchers have even questioned whether teacher attitudes toward nonstandard English have served as a greater barrier to learning than the actual dialect itself (Blake & Cutler, 2003). As educators, we have to be careful to avoid the subtle (and not-so-subtle) prejudices that sometimes arise when we hear speech that we consider to be nonstandard.

Language Differences and Language Disorders

In 1972 Labov called for schools to adapt to the language and learning needs of children in inner-city schools. In his article ''Academic Ignorance and Black Intelligence,'' he decried the prejudices of educational psychologists who mistook language differences for evidence of an impoverished intellect. Labov urged linguists and educators to use their knowledge and skills to address the fallacy that inner-city children performed poorly because they lacked verbal skills. Since that time we have learned that it is important for educators to be knowledgeable about the rules that govern how a dialect is spoken. Only in this way can we distinguish between a language difference and an actual language disorder.

Children can be inappropriately identified as having learning difficulty when educators fail to recognize the differences between standard and nonstandard language. In some dialects, for example, the words *tin/ten* and *fine/fined* are pronounced in the same way. Educators who are not knowledgeable about language differences might inadvertently identify these speakers as having weak decoding skills when they are actually reading in dialect. On a similar note, educators might consider the sentence ''She done her homework'' to be grammatically flawed, potentially resulting in a lower score on a measure of expressive language skill.

Children who speak in dialect are not candidates for specialized instruction unless there is evidence that their speech is actually disordered. This type of assessment has been problematic, given the lack of tests that are linguistically and culturally sensitive. The tide, however, is beginning to change. The Diagnostic Evaluation of Language Variation (DELV; Seymour, Roeper, & deVilliers, 2010), for example, permits educators to assess the language structures that are common to all English-speaking children regardless of their dialect.

Dialect in the Classroom

How should we be handling language differences in the classroom? According to Craig, Zhang, Hensel, and Quinn (2009), all children who speak nonstandard dialects should receive explicit instruction in the differences between their dialect and SAE. These authors also believe the children require direct, systematic instruction in the structure of language and practice in shifting (referred to as code-switching) from nonstandard language to SAE. According to these researchers, African American students who learn to use SAE will achieve better performance in reading than their peers who do not.

Bilingualism and Second Language Acquisition

The accelerated pace of immigration to the United States has led to new challenges for a society that seeks to ensure that all children learn to read. According to the National Center for Educational Statistics data from 1999 through 2009, the number of ELLs enrolled in preschool through 12th grade has doubled (The National Clearinghouse for English Language Acquisition, 2011). Such children currently occupy more than 10% of the seats in our schools.

The prospects for these children and our society are alarming; they are at high risk for dropping out of school and unemployment (Laird, Lew, DeBell, & Chapman, 2006). In an effort to address this challenge, No Child Left Behind (NCLB), federal legislation passed in 2001 governing education in public schools, has provided us with specific requirements for the education and assessment of children who are learning English. According to NCLB, children must be provided access to research-based instruction and challenging academic content (20 U.S.C. § 6301(9)) specifically highlighting progress in mathematics, reading, language arts and science (20 U.S.C. § 6311(b)(3)(C)(7)).

Diversity Among English-Language Learners

ELLs are a large and diverse group. At present about 20% of the school-age population speaks a language other than English at home; the majority of this group speaks Spanish (Espinosa & Lopez, 2007). The parents of ELLs may range from those who speak no or very little English to those who speak fluently. Language usage in the home can range from no English to multiple languages, such as in homes where families speak two languages interchangeably. In some households English may be spoken to one relative while Spanish is reserved for another. Some households encourage and support English-language acquisition while others zealously guard and protect native language proficiency. After all, one's cultural identity is at stake. S. E. Morbey (personal communication, October 28, 2010) comments that in many homes, a dying language may not be well spoken; she recalls an Indian reservation near Armstrong, Ontario, where children spoke neither Ojibway nor English well. The parents had been taken to residential schools to learn English as children, and because they did not speak their native tongue well, they were not able to pass it on to their children.

Dual-Language Learners

To further complicate matters, children are at different developmental stages in their native language at the same time that they are expected to learn English. As we have seen in previous chapters, children work to develop their native language skills (L1) well into adolescence. Preschool is a time when the foundations of sentence structure are established, along with a corpus of words for labeling events, things, persons, and ideas. Many young children are thrust into a second language (L2) well before they have established an awareness of what grammar is. These children are referred to as dual-language learners (DLLs).

As a group, DLLs are more likely than children from the general population to come from poverty, with fewer opportunities for healthcare and learning. In this land of opportunity, the prognosis for students with LEP is not as bright as we would hope. According to the Nation's Report Card, which provides reports based on the data from the National Assessment of Educational Progress, students with LEP do not perform as well as their English-speaking peers in grades 4 and 8 on standardized tests of reading, and they are ill prepared to enter the work force (Lee, Grigg, & Donahue, 2007). LEP students are less than half as likely as their typical peers to meet the criteria for "basic" skills. On the NAEP, only 6% of these students in grade 4 and 3% of students in grade 8 were at or above the "proficient" level.

Second Language Acquisition and Reading

It has been well documented that oral language proficiency is critical for reading comprehension. Snow et al. (1998) identified sentence or story recall, vocabulary, and receptive/expressive syntactic skills in kindergartners as important correlates with reading. What this means, however, for the second language learner is not well understood. There is no doubt that these ELLs require time to acquire English. Depending on variables in the home, school, and community, these children may require anywhere from 1 to 10 years to achieve native-like proficiency in English. The variables are many; they can include foreign-born status, access to formal schooling in the native country, preschool experiences, poverty, as well as access to health and social services (G. Garcia, 2000). According to research conducted by Hakuta, Butler, and Witt (2000), students in school districts meeting high standards for teaching English as a second language may require 3 to 5 years to develop oral proficiency. Academic proficiency can take 4 to 7 years.

If you find the prospect of 7 to 10 years to be excessive, you may be reacting to a common misunderstanding about what it really means to be proficient in a given language. According to van Leir (1999), who reviewed several case studies of second language acquisition, young children who, to all appearances, were conversing with ease within just a short period of time of their initial exposure to English were actually speaking in a highly modified form of language. Although this code was sufficient to support them in daily conversation, it was not the syntactically and lexically rich language that is required for academic success.

Basic Interpersonal Communication Skills and Cognitive Academic Language Proficiency

The language skill of second language learners is typically discussed in terms of basic interpersonal communication skills (BICS) and cognitive academic language proficiency (CALP) (Cummins, 1984). BICS is described as the language used for social communications. It might include conversations between neighborhood children or discussions between a teacher and a student. CALP is the level of language proficiency needed to function academically. According to Cummins (1984), it may take as many as 3 years to acquire BICS and 5 to 7 years to attain CALP.

The BICS/CALP distinction has contributed to our understanding of the types of instructional supports required by ELLs and the degree to which psychoeducational testing for ELL students is valid (Cummins, 2008). CALP scores are typically reported in five or six levels, ranging from "negligible" to "advanced." Students who earn a rating of "negligible" will find the English-language demands of the classroom to be impossible. Students who earn ratings of "fluent" or "advanced" will find the English-language demands of the classroom to be manageable, possibly even easy.

What It Takes to Acquire a Second Language

There are many misconceptions about ELLs. Contrary to what many think, there is no evidence that younger students acquire a second language faster than their older peers. August and Hakuta (1997) found that children who start learning English in kindergarten or preschool require more time to demonstrate age-appropriate academic skills than do students who do not begin until grades 2 through 6. Collier and Thomas (1989) suggested the possibility that mastery of grammar in one's native language makes it easier to develop competence in the second language (L2). They also reminded us of the need for school programs to consider the unique needs of children whose native language development has been interrupted due to circumstances well beyond a family's control. With insufficient exposure to native language at home and limited exposure to English at school, for example, these children will not easily develop vocabulary and language proficiency in either language.

How best to instill the English language into young minds has been subject to vigorous debate. English immersion programs have been based on an expectation that children will learn in English and that their native language is not important for learning how to read English (Rossell & Baker, 1996; Rossell & Ross, 1986). Immersion programs are distinguished by their commitment to use English texts exclusively. The support to children in immersion programs varies considerably, from occasional translations by classroom helpers and aides to separate classes that are geared to building English-language skills.

Slavin and Cheung (2005), however, disagreed with much of the research on immersion programs, citing the research as methodologically flawed. Instead, they threw their support to bilingual education programs. There are two types of bilingual education programs: (1) Paired bilingual programs teach children in their native tongue and in English at different times during the school day; and (2) transitional programs provide a limited period of instruction in the native language prior to reading instruction in English. Slavin and Cheung (2005) reported that most bilingual education programs are conducted in Spanish and English.

Bilingual Benefits

For those who might be concerned that instruction in two languages (bilingual education) might be damaging to young minds, research into the relationship between bilingualism and cognition has affirmed that bilingualism makes us smarter (Peal & Lambert, 1962). In the study by Peal and Lambert, bilingual children performed significantly better on most measures of intelligence (both verbal and nonverbal) than those who were monolingual. There is evidence that many young bilingual children enjoy accelerated phonological awareness (R. Campbell & Sais, 1995) and that bilingualism supports the acquisition of reading and writing in English (Lesaux & Siegel, 2003). Research by Kuo and Anderson (2010) spoke to the bilingual enhanced "structural sensitivity" (p. 369) that affords children greater flexibility in their perception of phonological segments and suprasegmental features. A more recent study even suggested that bilingualism is good for our health; bilingualism has been reported to delay the onset of dementia by 4 years (Baycrest Centre for Geriatric Care, 2007).

Lest we get too excited, the benefits of bilingualism do not appear to occur immediately. Cummins (1976) hypothesized that there was a threshold level of LI and L2 ability that had to be achieved prior to such effects taking place. He noted that unsupported L1 skills decay with time. Families that are concerned over the possible loss of their children's native language have good reason to worry. Native languages have to be nourished; language proficiency and growth are dependent not just on hearing a language but on living it.

Bilingual education in which children receive reading instruction in their native language provides multiple benefits for young children. According to Thomas and Collier (2002), the amount of schooling in L1 is the strongest predictor of achievement in L2. The evidence is clear; students with no primary-language schooling in either the home country or the host country do not reach grade-level performance in English. In fact, the more instruction that children have in their native language, the higher their achievement in English. Participation in a bilingual program can have a significant, long-term, positive impact on academic performance.

Thomas and Collier (2002) warned that the path to English proficiency takes time, and they cautioned that students must not be placed in short-term programs (which they define as 1 to 3 years). Presuming that the program is well designed, the minimum length of time required to demonstrate grade-level performance in L2 is 4 years. According to Thomas and Collier (2002), well-designed bilingual programs are those that are designed to meet students' developmental needs. They offer ''natural, rich oral and written language'' (p. 7) within a context of real-world problem solving.

Reading Instruction for Bilingual Learners

In order to achieve and maintain grade-level performance in regular education schools, children have to become English-language readers. Reading instruction in the native language strengthens ultimate performance in English. Greene's research from 1997 told us that performance in Spanish literacy skills at the end of second grade predicts how well children will read in English at the end of third grade. Other researchers have confirmed the same. Reading instruction in a child's native language supports reading acquisition in English (August, 2002; August, Calderon, & Carlo, 2001; Slavin & Cheung, 2005).

Many have questioned the timing of L2 reading instruction and whether it is necessary to delay instruction until oral language proficiency is attained. Geva's research (2000) indicated that language proficiency need not precede the development of English reading skill as it does with typical learners. Children who are learning to read in L2 simply develop their native language skills and English reading skills at the same time.

In the past, ELLs' lack of progress in decoding often was blamed on a poor command of English. Geva (2000) reviewed the research related to three areas: reading comprehension processes, word recognition processes, and the relationship between word recognition and reading comprehension. According to Geva, L2 reading comprehension is related to L2 oral language proficiency. However, Geva stated, ''[P]rovided that children have been exposed to appropriate literacy instruction, there is no reason why they should not be able to decode words even while their L2 language proficiency continues to develop'' (p. 18).

Phonological Awareness in English-Language Learners

ELLs build their reading skills on the same foundation as native English speakers. This foundation cannot be overstated: The development of early reading skills is more dependent on phonological awareness, rapid naming, and instruction than on English-language proficiency (Geva, Yaghoub-Zadeh, & Schuster, 2000; Lesaux & Siegel, 2003). A study by Chiappe, Siegel, and Gottardo (2002), for example, compared the performance of native English speakers, bilingual children, and ELLs during their kindergarten year. The researchers found that children learning English acquired L2 literacy skills in a manner akin to their native English–speaking peers. They also found that phonological processing and alphabet knowledge were as predictive of reading skill for ELLs as they were for native speakers.

Further, research has found that phonemic awareness is not only an important foundation skill for reading in both Latin-based and non-Latin-based languages, but it also is important for learning languages that are logographic, such as Chinese (Geva, 2000; Hu & Catts, 1998). Phonemic awareness in one's native language correlates with awareness of individual speech sounds in English even when the two languages are quite distinct from one another (Gersten & Geva, 2003). Numerous studies confirm that phonological awareness skills transfer from L1 to

L2 (Cisero & Royer, 1995; Durgunoglu, Nagy, & Hancin-Bhatt, 1993). These skills do not have to be taught separately for each language (Geva et al., 2000); however, to become proficient decoders, children may have to learn the speech sounds in English that are not part of their native repertoire. Recent research suggests that when teachers understand the relationship between L1 and L2, they can accommodate and proactively teach sounds or sound combinations that may be problematic or challenging (Geva, 2000).

Given the similar role that phonological awareness plays in L2 beginning readers, it is possible to assess for potential reading disabilities prior to proficiency in English. Geva (2000) recommended examining phonological processing skills together with basic reading. She also recommended determining whether there is a gap between listening comprehension and reading comprehension in L2. Such a gap would be an indication that part of the reading difficulty was due to processing print and not just the challenges associated with English.

According to August and Hakuta (1997), explicit teaching and systematic assessment are critical for ELLs who are also learning to read. The challenge of the linguistically diverse classroom is to ensure that instruction is made understandable and that it meets children's individual needs. Although we may speak of children categorically as ELLs, in the end it is the profile of the specific child that matters. ELLs will vary in the amount of instruction that they require. They will also vary in the intensity of instruction required. We can rest assured that the same instructional methods used with native speakers of English will be effective with ELLs.

Issues Related to Assessment and Instruction

There has been much confusion over how to distinguish a tried and true reading disability from LEP. Historically, children with limited language proficiency have been overrepresented in special education programs. At the same time, however, there is an overriding assumption among many educators that challenges with reading are a normal casualty of the acculturation process (Limbos & Geva, 2001). While we do not wish to identify children as having educational disabilities inappropriately, we do not wish to deny children in need.

Research indicates that individual differences in phonological awareness and rapid naming are predictive of decoding and word recognition skills in L1 and L2 children (Geva, 2000). It is possible to screen ELLs in kindergarten and first grade for learning disabilities in reading. Ultimately, L2 reading comprehension is built on a foundation of decoding, word recognition skills, and L2 proficiency.

Assessment of English-Language Learners

This discussion brings us to an important discussion regarding the assessment of ELLs. Best practice in the assessment of ELLs requires that evaluations be performed by professionals who are knowledgeable about the process by which children acquire a second language. It also requires that these professionals understand the acculturation process, how to nourish the native language and literacy in the home, and how to conduct assessment in a manner that is culturally sensitive and relevant. In an ideal environment, ELLs would be assessed by bilingual evaluators who are knowledgeable about assessment, language development, nonverbal communication including the use of gestures, and customs and culture of the native language. Further, these evaluators ideally would use tests that are properly normed in both languages.

Unfortunately, this is generally not the case, and as a result, children may be referred for testing due to L2 characteristics that are misinterpreted as signs of an educational handicap. Rhodes, Ochoa, and Ortiz (2005) noted several factors that contribute to the inflated rate of referrals for ELLs: examiners and teachers who are not trained in working with linguistically and culturally diverse populations, lack of expertise in assessing this population, and failure to observe federal and/or state guidelines.

Always be sure that your assessment practices are in keeping with federal law and professional standards.

Working With Interpreters

Given that we have a dire shortage of bilingual examiners, we must rely on the services of interpreters. Unfortunately, it is common practice to rely on interpreters who are not trained, and I have observed situations where young children are asked to interpret for their parents. According to Standard 9.11 of the Standards for Educational and Psychological Testing (American Educational Research Organization, American Psychological Association, & National Council on Measurement in Education, 1999), when an interpreter is used in testing, the interpreter should be fluent in the examinee's native language and the language of the test. The interpreter should also have expertise in interpretation, as well as assessment.

Expertise in language, however, does not presume expertise in culture. Sattler and Hoge (2006) cautioned educators to be particularly mindful of any stereotypical views that they may have. In addition to the insidious effects of stereotypical thinking, it has been my experience that dialect and stylistic differences in language can inadvertently inspire distrust and suspicion. President Carter was once ridiculed on a visit to Poland in 1977 when his nonnative interpreter committed many errors in translation, including one embarrassing incident where he indicated that Carter desired the Polish people carnally (Gwertzman, 1977). William J. Miller, in a New York Times editorial from 1988, recalled another error in translation, in which John F. Kennedy was reported to have stated, "I am a jelly-donut" instead of "I am a Berliner" (Kennedy, 1963). The interpreter's job is to convey information accurately, without embellishment and without prejudice. This job is best accomplished when interpreters are informed about the nature of the interview and the types of questions that will be asked. In this way, they can give thought to translating vocabulary and/or concepts that may not have equivalents in the target language.

Using Standardized Tests

Under no circumstances can standardized tests be translated unless, of course, it is part of the actual test development. The very process of translation violates the standardized nature of the test. At present, not many tests are specifically designed to assess bilingual children, and they suffer on the whole from less than perfect standardization. One such test, the Bilingual Verbal Ability Tests (Muñoz-Sandoval, Cummins, Alvarado, & Ruef, 1998) provides measures of vocabulary in English and 15 other languages. The test is first administered in English; the failed items are then readministered in the examinee's native language.

The Individuals with Disabilities Education Improvement Act of 2004 (20 U.S.C. §§ 1400 et seq.) clearly states that children are to be evaluated in their native language unless it is not feasible to do so. In many cases children are assessed in English due to educators' misconceptions regarding children's competence in English. In some cases children are presumed to be proficient in English because they can carry on a conversation; as discussed earlier, evaluators must understand the difference between the vocabulary and language used in casual social settings and the vocabulary and language needed for academic success. In other cases children may have been discharged from a bilingual program, sometimes due to factors unrelated to actual language proficiency. Rhodes et al. (2005) recommended that educators be familiar with the state requirements for removing children from bilingual programs.

Best Practice in Assessment

According to Ballantyne, Sanderman, D'Emilio, and McLaughlin (2008), young DLLs required "ongoing and multiple assessments" (p. 32) to ensure that performance on one test does not eclipse other valuable sources of data. An evaluation should include a detailed background history that documents the child's language development in both the native language and in English. Parent and teacher interviews can shed light on all important developmental milestones as well as language usage in different settings. It is particularly important to ascertain whether a child is able to communicate with linguistically and culturally similar peers.

Assessment of language skills should include both formal and informal measures, both of which have their disadvantages. Informal methods rely on the expertise of the evaluators, who often lack in-depth training in linguistics. Jacobs and Coufal (2001) recommended dynamic assessment as an informal way to measure progress in ELLs. Dynamic assessment is based on Vygotsky's theory of proximal development and how well children learn with the support of a teacher. A test-teach-retest format, which provides evidence of actual learning that occurs during an instructional period, can potentially document the amount of support a child requires in comparison to peers, to what degree individualized strategies and methodologies are required, and whether children are on task or off task (Roseberry-McKibbin & O'Hanlon, 2005). Because the focus of dynamic assessment is on how a child learns instead of what he or she has learned, children are not penalized for lack of educational experiences or for cultural differences.

Formal methods that measure language skill will overidentify ELLs as having language disabilities. In a field that often lacks consensus, there is widespread agreement that nonbiased assessment methods and materials for ELLs are few and far between (Kritikos, 2003; Sattler & Hoge, 2006). Three main problems plague standardized tests: content bias, linguistic bias, and disproportionate representation in normative samples (Laing & Kamhi, 2003). A test has content bias when it presumes that children have all had access to the same vocabulary, concepts, and experience. Children who come from other cultures that do not share our appreciation for speed, for example, may not share our urgency during timed tests. Children living in remote areas may not understand pictures of city life or exotic animals. Linguistic bias occurs when there is a mismatch between the language of the test, the language of the examiner, and/or the language of the child. Studies, for example, have documented that African American students routinely produced AAE when reading texts that were written in SAE (Craig, Thompson, Washington, & Potter, 2004).

Finally, the normative samples of most tests do not include children from diverse ethnic and linguistic groups. Even when test publishers make an effort to include diverse populations, it is almost impossible to account for diversity in the linguistic experience of ELLs. How does a test publisher fashion a normative sample that includes the many different ages at which children begin to learn English? Sattler and Hoge (2006) commented, however, that representation in a norming sample does not guarantee that a test is free of bias and that absence of a specific ethnic group in a norming sample does not necessarily mean that the test is invalid for those individuals. There are those educators who support the creation of pluralistic norms for specific ethnic groups, believing that it is more appropriate to compare children to their own ethnic groups. Others believe that it is more appropriate to compare a child to society in general; only this comparison permits us to understand a child's functioning within the context of the culture at large.

Some researchers have suggested that testing bias for ELLs can be reduced by using measures that focus more on processing abilities and less on prior knowledge, such as vocabulary (T. Campbell, Dollaghan, Needleman, & Janosky, 1997). Processing-dependent measures include tasks such as repeating numbers (short-term memory), repeating numbers in reverse order (working memory), nonsense word repetition, and certain auditory perceptual tasks. According to Laing and Kamhi (2003), ELLs who perform poorly on such measures are likely to be demonstrating some type of language learning issue.

Recommendations

Vaughn, Linan-Thompson, Pollard-Durdola, Mathes, and Hagan (2006) reviewed the research on interventions for young children with reading difficulties and presented their findings on interventions for bilingual students at risk for reading problems in Spanish and English. While they cited the need for additional research on ELLs, they also presented implications for instruction for at-risk readers. These recommendations are elaborated on next.

1. Reading programs should be designed to reflect commonalities between languages. Instruction, for example, in oral language and reading comprehension is important for both L1 and L2 learners. A study by Droop and Verhoeven (2003) stressed the importance of oral language proficiency for the development of first and second language reading comprehension in third- and fourth-grade students.
2. Reading programs should address all of the critical elements of beginning readers and gradually transition to elements that are important for mature readers. Gersten and Geva (2003) identified six successful instructional strategies for children in first grade who are learning English. These strategies include:
   a. explicit teaching;
   b. explicit instruction in English that support students' oral language development;
   c. instruction in phonemic awareness and decoding with particular attention to sounds that are not present in L1;
   d. instruction in vocabulary;
   e. active participation of students; and
   f. instruction that is specifically geared to the needs of low performers.

   It should come as no surprise that ELLs who receive explicit phonics instruction as part of a comprehensive literacy program develop stronger skills than peers who do not (Denton, Anthony, Parker, & Hasbrouck, 2004).
3. Reading programs need to consider that not all languages are created equal and that alphabetic languages vary in their transparency (i.e., some languages are more regular in the written form than others). Languages that have a consistent phoneme-grapheme correspondence are referred to as having shallow orthographies; they are essentially easier to learn. Because the English language is morphophonemic (combines morphemes and phonemes), it is considered to have a more complex orthography. As a result, ELL students may require additional instruction in rules for sound/symbol correspondence.
4. Reading programs for ELL students should emphasize connections between L1 and L2. Children who are literate in L1 will benefit from instruction that links their current skill set to English. DLLs will benefit from learning rules that both systems have in common.
5. Reading instruction needs to provide students with extensive opportunities to use their oral language and to engage in higher-order critical thinking.
6. Explicit instruction must be provided in order to facilitate vocabulary development; vocabulary cannot be expanded through context alone. Given the relationship between vocabulary and reading comprehension for L1 readers (Beck & McKeown, 1991), it is not surprising that vocabulary is also a major factor for L2 readers. Carver (1994) indicated that deep comprehension of a text for L1 readers was dependent on knowing virtually all of the words in a text.
7. Peer learning and cooperative groups should be used to increase proficiency in English. Peer learning provides ELL students with more opportunities for discussion and feedback in an environment that may be more supportive for linguistic risk taking than raising one's hand and speaking in front of an entire class.

Conclusion

Diversity in our classrooms has placed new and unprecedented demands on educators who may have little training in dialects, accents, and second language acquisition. Best practice in the assessment of ELLs, however, requires that evaluations be performed by professionals who are knowledgeable about second language acquisition, and issues related to native language and literacy in the home. They must also know how to conduct an assessment that is culturally sensitive, and that is designed in keeping with what research tells us about how ELLs learn how to read: Children learning English acquire L2 literacy skills in a manner akin to their native English-speaking peers. Their progress will be dependent on the underlying processes that support reading development in speakers of Standard American English: phonemic awareness, decoding, and vocabulary.

Review Questions

1. Hart and Risley's study from 1995 pointed to a language experience gap for children in low socioeconomic status homes. What is the significance of the study?
2. How do we tell the difference between a language difference and a language disorder?
3. Why is it important to be knowledgeable about nonstandard language usage?
4. You are working with a child in the fifth grade who has a history of English as a second language. This child is not making adequate progress in reading. The teacher notes that this child socializes easily (and frequently) with others; the student, however, rarely completes homework requiring reading, and the teacher perceives her to be unmotivated and lazy. Based on your knowledge of BICS and CALP, what would you suggest?
5. Compare immersion programs for ELL students to bilingual education programs. Which type of instruction is supported by the research?
6. You are working with an educator who believes that instruction in reading decoding should be delayed until children become proficient in English. How would you address this position, and what research would you cite?
7. You have been asked to participate in the assessment of a child with LEP who has been making poor progress in reading. Discuss potential concerns in this evaluation. What does IDEA say about the assessment of ELLs?

Statistics and Test Development

Chapter 5

Introduction

Experts at job interviewing stress the importance of never saying anything negative about oneself or one's work. Contrary to prevailing wisdom, I will state up front that this is the chapter that students often dread. Not that they have any experience with how assessment is taught. Their reaction is also a product of how our society views mathematical thinking. Many see math as the domain of the engineers and scientists. The language of math is foreign, and formulas can be intimidating.

Particular mathematical concepts, for all their otherworldliness, are necessary in order to understand the instruments that we use to measure children's learning and progress. They are, after all, the tools of the trade, and it is possible to grasp them without being a mathematical savant. This chapter introduces you to different types of tests and to concepts of test development. A basic understanding of statistics enhances your knowledge of scoring systems and test design. Learning these concepts will make you a better evaluator and a stronger participant at team meetings. Learning these concepts will give you the tools to ensure that evaluations are well crafted and defensible.

Criterion-Referenced and Norm-Referenced Tests

There are two main ways to measure student performance: criterion-referenced tests and norm-referenced tests.

Criterion-referenced tests are designed to measure mastery of a particular skill or set of skills according to some criteria. The word *criterion* comes to us from the Greek *kritērion* meaning the standard by which something is judged (Stevenson (Ed.), 2007). *Norm-referenced tests* are designed to measure students' performance with respect to their peers (typically age or grade). The word *norm* comes from the Latin *norma*, meaning carpenter's square, a standard for measurement (Stevenson, 2007).

Criterion-Referenced Tests

Not all tests are created equal, and some produce information that is more helpful to teachers than others. Criterion-referenced tests are the sine qua non of the classroom; a well-designed criterion-referenced test informs good teaching. When Ms. Smith, a third-grade teacher, administers a spelling test on Friday, she is seeking to determine how well her students have mastered their spelling rules for the week. A grade of 60% suggests the need for more practice and instruction. A grade of 90% is an indication that the week's lesson has been learned and that the student may be ready to move on. Criterion-referenced tests are one of the major tools by which teachers judge student competence and design their lesson plans.

Mastery—an Elusive Concept: Criterion-referenced tests express their results in terms of percentages or number correct out of the total number presented.

$$\text{Level of Mastery} = \frac{\text{Number Correct}}{\text{Number Presented}} = \text{Percentage (\%)}$$

Ninety percent, or 9 out of 10, is frequently used as the benchmark for mastery. I used the word *frequently* here deliberately because the standard for mastery is somewhat arbitrary. Although we generally accept 90% as the standard, there is no consensus on what constitutes mastery, and if truth be told, there are cases where 90% mastery simply does not cut it. I would hope that mastery for surgeons performing appendectomies would be 100%.

The dilemma over the concept of mastery has its roots in the diversity of students in our classrooms. Effective teaching in the classroom requires a careful balance between mastery of skills and exposure to new skills. Students who grasp new content quickly benefit from aggressively paced instruction. Our classrooms, however, are filled with learners who require additional practice and instruction. This is the challenge of teaching in an inclusionary classroom: exposing all children to wide, varied, and rich content without sacrificing actual competence and standards of performance.

The response to the dilemma of mastery versus exposure to rich and varied content has been, in many cases, to propose different standards of mastery for different groups of students. And yes, the basic premise of an individualized education program (IEP) is that instruction is designed to complement the unique learning needs and strengths of the individual. I have been told at numerous IEP meetings that students with attention deficit hyperactivity disorder (ADHD) should not be expected to achieve mastery even with specialized instruction. The apparent reasoning behind this double standard is that students with ADHD are known for their "consistent inconsistency" and that the disability itself somehow warrants a less-than-perfect goal. Similarly, students with an intellectual disability are often declared to have mastered a skill when performing a task 6 out of 10 times. This is just a little better than a coin toss and, indeed, it is the nature of a child with intellectual challenges to struggle profoundly with learning. I am not saying that we can and should have the same expectations for all students. However, expectations have a lot to do with overall achievement in school. Having different goals for mastery can have unintended consequences for our students in the long term.

The criteria for mastery are an important part of an individualized education program. One of my favorite IEP goals is "Johnny will cross the street successfully 9 times out of 10." Another IEP goal that I have found to be somewhat curious is "Mary will learn the alphabet with 80% accuracy." Although the second goal is certainly not an issue of life and death, we find ourselves wondering what letters of the alphabet will not be learned. Given that research in reading has confirmed and reconfirmed the need for accuracy in decoding, a goal that does not target all of the 26 letters of the alphabet is uninformed and poorly conceptualized. Most researchers now call for a mastery level of 95% in basic decoding skills.

High standards for mastery are not intended to cause children anxiety and stress. They are intended to ensure a strong foundation for the development of higher-level skills. When we lower our expectations for fundamental skills, we condemn our students to a future of poor achievement and frustration. Decisions regarding mastery need to be made with care and understanding of how students progress from one stage of learning to another. Decisions regarding mastery need to be based on scientific research.

Automaticity: Mastery does not tell the whole story, and it may not distinguish between students who perform tasks easily and those who struggle. While mastery is necessary, it may not be sufficient. *Automaticity*, or the ability to respond without conscious effort, has been an important component in survival of the fittest. From an evolutionary perspective, those who responded to imminent danger quickly had a better chance of escaping to live another day. Karate instruction, in fact, requires that students practice skills until they can execute them rapidly without effort; the concept of ''no mind'' is taught—the ability to respond skillfully without thinking.

When we execute lower-level skills with automaticity, they become useful for higher-level endeavors. Automaticity is a key component of academic functioning. Research tells us that children who read, write, or do arithmetic slowly not only require more time to complete their assignments but they understand less and are more prone to errors. Skills that are performed with effort require more memory.

Automaticity in word recognition is the foundation for reading fluency, the ability to read with ease, phrasing, and intonation. The role of automaticity and fluency in reading is so important that dysfluent reading was recognized as a new area of a specific learning disability in the Individuals with Disabilities Education Improvement Act of 2004 (IDEA; 20 U.S.C. §§ 1400 et seq.). This change in the law was a response to high school students who were failing because they were reading too slowly to meet the demands of the curriculum.

Unfortunately, the role of automaticity in math and written expression has not yet been formally recognized. Children who are slow to recall their basic math facts tend to have difficulty with multistep calculations. Children who labor to produce basic, syntactically correct sentences may not have the mental energy to concentrate on the organizational demands of an essay or story. Nancy Mather, one of the authors of the Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a), has stated that lack of academic fluency is a major reason for special education referrals at the high school level (Mather, 2006). Higher-level reading, writing, and math skills all presume a skill set that operates like a well-oiled machine.

Automaticity and Working Memory: Robbie Case (1980), former director of the University of Toronto Institute of Child Study, in his model of working memory, described how the act of performing a novel task consumes working memory and leaves little memory available for the application of higher-level skills. Learning to drive a standard-transmission car serves as a good example. In the beginning, working the clutch, operating the brake, and steering the wheel all require intense concentration. So much concentration is required that novice drivers cannot engage in light conversation, resulting in the often-heard ''Leave me alone. I have to concentrate.'' As the process of driving, however, becomes more automatic, we can engage in discussions, talk on cell phones, operate CD players, and drink our coffee. (I am not saying that these are good practices.) We are able to accomplish these tasks because we have now automatized the process of operating the car and have freed up what Case called ''functional memory'' so that we can multitask. Many of us have found that we occasionally arrive at our destination without recalling the trip; this apparent memory lapse is actually the result of having automatized the route. We start and stop, turn, and even change lanes without much conscious thought. Frightening, isn't it?

The role of automaticity in academic achievement has been given a new, more important role in our efforts to measure student progress. Progress monitoring probes that measure performance over time are more sensitive to changes in student skill levels than are tests that just measure performance. Timed tests help us distinguish among students who are adept and adroit versus those who labor. As the progress monitoring researchers become more proficient at defining benchmarks for speed and accuracy, we may well see an increased focus in the classroom on automaticity of lower-level skills as a means to higher-level achievement.

Norm-Referenced Tests

Norm-referenced tests serve a different purpose from criterion-referenced tests. They may or may not speak to us in detail of what a child actually knows, and the scores, in and of themselves, are not necessarily helpful in the design of an educational program or lesson plan. Norm-referenced tests are designed to establish a child's skill levels with respect to others of the same age or grade of a school, state, or national sample, a distinction that is particularly important when determining the presence of an educational handicap.

Norm-referenced tests generate scores by sampling skills, and they should not be confused with a thorough inventory of what a child knows. A Letter & Word Identification subtest on a norm-referenced test, for example, may require students to name only five or six letters of the alphabet. While it may seem reasonable to infer based on an average score that students have mastered the entire A to Z sequence, it may not be the case. Children with reading difficulty, in fact, have gaps in their decoding skills that may not be readily apparent on a norm-referenced test.

Good teaching presumes an in-depth knowledge of a student. Evaluations, therefore, should not just be about the label, the score, or the percentile rank. Sometimes we have to delve deep into a test in order to document what a child knows and what he or she is ready to learn.

I was recently at a workshop where a young teacher inquired about an upcoming 3-year evaluation. We had a brief discussion about a student who was reportedly outperforming his potential. When I suggested that it was not possible to exceed one's potential, she shrugged and stated that this unusual turn of events had been clearly documented by test scores. She added that this was ''just a 3-year evaluation'' and the whole exercise was really of no importance anyway. I suspect that her experience with evaluations and team meetings has not been particularly helpful to her as a teacher and that the process at her school was little more than a pro forma activity requiring a lot of unwanted paperwork and dull recitation of numbers.

Testing is not just about the numbers, and it should not be a mindless exercise in lining up scores in columns in reports, an activity that bright children in high school could be trained to do. Evaluations that state ''Johnny got a standard score of 85; he is below average in reading'' do a disservice to school staff, parents, and the children themselves. The thoughtful interpretation of findings is the heart of evaluation. When evaluators focus exclusively on numbers and/or labels to describe children's performance, they often lose sight of what is truly important to teachers: What does Johnny know, and what does he need to learn?

Norming Samples: Norm-referenced tests compare student performance to the scores of a group of people who were part of the sample used when the test was developed. The scores that are generated may be based on age or grade. These scoring systems include, but are not limited to, standard scores, scaled scores, stanines, percentile ranks, and age or grade equivalents.

Because the norming sample is the yardstick by which we compare our students' performance, it is important that the sample be well designed. Just imagine what would happen if we were to compare a second grader from northern New Hampshire to children living in Cambridge, Massachusetts, whose parents attended Harvard University. This child would probably earn a lower score not because she was not skilled but rather because our yardstick was not a good measure and the standard for performance was not reasonable. Norming samples should be designed to reflect the current demographics of the population as determined by the U.S. Census Bureau. These demographics include geographic location, age, grade, sex, ethnicity, education, socioeconomic status, and a variety of disabilities.

When developing new tests, test publishers seek out evaluators in diverse communities to ensure that they accurately represent the current population distribution as reported by the U.S. Census Bureau. An acquaintance who has assisted with the development of several tests tells of having to approach parents on the streets of ethnic neighborhoods in order to convince them to let her (a stranger) work with their children.

In addition to securing a norming sample that is representative of the population, test publishers produce revisions of their tests to ensure that the sample is based on current population trends. Populations change over time. The information age has brought us unprecedented access to facts, figures, and concepts, theoretically increasing our knowledge base. If we were to use old and out-of-date norms, we would all look smarter than the average bear. New norms mean that individuals are now being compared to peers with the same cultural experience and the same access to information. The standard for average performance on intellectual assessments is now higher; this increase in IQ scores is called the *Flynn effect* (Flynn, 1984, 1987, 2007).

Before, however, we start to congratulate ourselves on our generational superiority, we need to take into account the fact that there have been cases where skill levels have decreased. When the Woodcock Reading Mastery Test, Revised Edition (Nu norms) was published in 1998, there were complaints that the test was dumbed down to reflect the state of reading in the country at that time (Willis & Dumont, 2002). Many thought that the popularity of whole language instruction had taken its toll on reading scores in the United States. More recently, poorly written stories and essays that met the criteria for an average score have elicited reactions of ''Oh, that can't be!''

The scoring systems that we use in norm-referenced tests have meaning only when we are comparing students to a relatively current norming sample. We would not want to compare a 9-year-old child's reading skill to the 9-year-old population 30 years ago; the comparison would not be valid. According to Salvia and Ysseldyke (2007), authorities on assessment in special education, intelligence tests should not be older than 15 years, and achievement (academic) tests should not be older than 7 years. Kubiszyn and Borich (2000) stated that the age of norming sample for tests, in general, should not exceed 12 years.

Bell Curve: One of the most important concepts in norm-referenced testing is the bell curve. It is what makes sense of the scores that tests generate. The bell curve, or normal curve, was initially conceptualized by Abraham de Moivre (1667–1754), a French mathematician who was a contemporary and colleague of Sir Isaac Newton. De Moivre was one of the first individuals to study mortality statistics as a foundation for the actuarial tables used by the insurance industry. (He also has the unique acclaim of having predicted the day of his own death.)

Despite a well-documented talent for statistics, de Moivre was forced to earn his living by gambling. Apparently his experience with games of chance, together with his expertise in mathematics, led to a revelation in his seminal work, the *Doctrine of Chances*, published in 1718. De Moivre found that events cluster around an average value and that these events vary according to a law of nature that is now known as standard deviation (SD) (*Encyclopaedia Britannica*, 2011).

Two main concepts are important when looking at a bell curve: the concept of *average* and of *standard deviation*. The shape of the bell curve reflects the fact that there are more average events, things, and characteristics than extreme ones. We have more average temperatures than extreme temperatures. We have more average athletes than exceptional ones. We understand when we gamble that we have a greater chance of winning smaller sums (or nothing at all) than larger ones. (This is the foundation for casino profits.) The same is true with respect to intelligence and academic achievement: There are more individuals with average skills than with exceptional expertise or exceptional dysfunction.

The bell curve permits us to use a common language and scale to discuss how students fare relative to their peers. The scores of norm-referenced tests are generated by comparing the raw scores of individuals to a group of their peers.

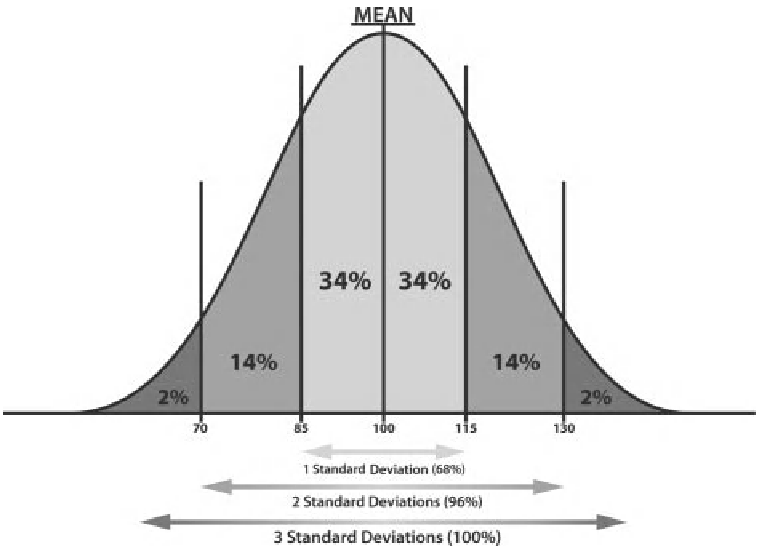


Figure 5.1

Bell Curve With Rounded Values

When we look at the diagram of student performance, we can see that the bell curve is symmetrical about the mid–*average point,* or what is also called the *mean*. On Figure 5.1, the exact mid–average point is labeled ''100,'' which is the most commonly used mid–average score. Relative to the mean, the number of high-performing students is equal to the number of low-performing students.

In order to make the scoring systems meaningful, we also need to know how the scores are distributed. The concept of SD defines the distribution of the population or, more simply, how the scores spread out. By definition, about two-thirds (68%) of the population falls within 1 SD of the mean when the scores are distributed normally. Of the remaining population, about 28% is called the 2nd SD. When we discuss 2 standard deviations (SDs), we are referring to about 96% of the population. Three SDs bring us to a grand total that is just shy of 100%. There are very few students whose skill sets fall into this extreme; we have few geniuses and few students who fail catastrophically.

We have already discussed the importance of a well-designed norming sample. It is also important that each student in the norming sample have the same testing experience. Test authors must ensure that the test administration is *standardized,* a process ensuring that test content and the rules are followed exactly as prescribed thus preventing students from experiencing unfair advantage or disadvantage.

Test authors attempt to write their manuals with painstaking clarity. Evaluators are directed to read the manual, practice giving the test, and ensure that they are giving the test correctly. Any deviation from the prescribed procedure may render scores invalid. Testing is not like good teaching; evaluators are not permitted to individualize the administration of the test.

Scoring Systems

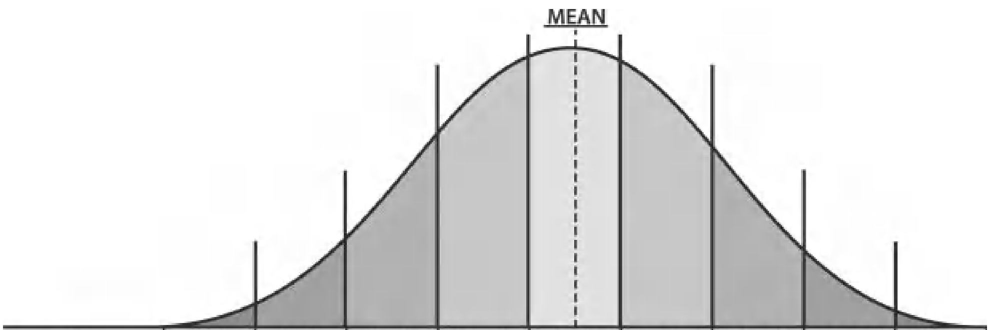
Unfortunately for most laypeople, tests use a variety of scoring systems. In some cases, one test may use one system for composite or total scores and another system for subtest scores. Test authors provide tables of different scores in the manuals so that scores can be translated from one system to another. They also provide multiple scoring systems in order to accommodate evaluators with different preferences.

Standard Scores

The use of different scales and the expertise required to interpret them creates a serious disadvantage for those who have not had a graduate course in assessment. Many participants at team meetings are at a loss for what the different scoring systems mean. Figure 5.2 presents the most commonly used scoring systems for reading tests.

- *Standard scores* can be confusing—not the scoring system per se but rather how the term *standard score* is used. The term usually refers to a scoring system with a mean of 100 and a standard deviation of 15. For normally distributed data (producing bell curves), two-thirds of the population will fall between 85 and 115. Confusingly, the term *standard score* also refers to a variety of other scoring systems, including stanines and scaled scores.
- *Scaled scores* have a mean of 10 and a standard deviation of 3. About two-thirds of the population in a bell curve will fall between a scaled score of 7 and a scaled score of 13.
- *Stanines* have a mean of 5 and a standard deviation of 1.96. Stanines hold a special place in the hearts of many evaluators. Willis and Dumont (2002) explained that stanines have the distinct advantage of being quick and easy to explain to the uninitiated. Stanines are a scale of 1 to 9; anything within stanines 4 to 6 is roughly in the average range.

Stanines represent a broader band of performance than scaled scores or standard scores. As a result, small differences in scores that are minor and without significance should be less distracting. Some parents, for example, may become overly concerned when their child goes from a standard score of 98 (45th percentile) to a standard score of 96 (39th percentile). The 2-point difference between these scores is not statistically significant;



Percentile	1–4	4–11	11–23	23–40	40–60	60–77	77–89	89–96	96–99
Standard Score	–73	74–81	82–88	89–96	97–103	104–111	112–118	119–126	127–
Scaled Score	1–4	5 6	7	8 9	10	11 12	13	14 15	16–19
Stanine	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**
	Very Low 4%	**Low 7%**	**Below Average 12%**	**Low Average 17%**	**Average 20%**	**High Average 17%**	**Above Average 12%**	**High 7%**	**Very High 4%**

Figure 5.2

Test Scoring Systems and Their Distribution

Source: Adapted from J. Willis and R. Dumont (2002), *Guide to identification of learning disabilities* (3rd ed.) (Peterborough, NH: Author).

it could have occurred by accident. In contrast, when a child goes from a stanine 5 to a stanine 3, there may be genuine reason for concern.

J. O. Willis (personal communication, August 24, 2001) recommends that evaluators provide stanine scores in addition to whatever scoring systems are used by the test author. This practice provides a common system for test interpretation, making it easier for those who do not have multiple scoring systems at their beck and call.

Percentile Ranks

Percentile ranks are unique from other scoring systems. They do not measure a child's skill with respect to the mean but rather show the percentage of children who earn a given score. When a second grader earns a 60th percentile rank, it essentially means that this child's score was better than or equal to 60% of the second graders in the norming sample. This 60th percentile rank is better than the mid–average point (percentile rank 50) and is usually considered to be satisfactory. It must not be confused with 60% correct or 60% mastery, which usually is considered to be a weak or failing grade.

Percentile ranks are not equal units. They are not equally distributed; there are far more students scoring in the middle (average range) than at the extremes. Because they are not equal units, percentile ranks cannot be added, subtracted, multiplied, or divided in order to measure a student's progress; teams must not, for example, consider a move from the 25th percentile rank to the 50th percentile rank to represent the same progress as a move from the first percentile rank to the 25th percentile rank (which is much more impressive progress).

Age and Grade Equivalents

Despite their lack of usefulness, age- and grade-equivalent scores are widely sought by administrators, teachers, and parents. Test publishing companies are happy to provide them in their efforts to satisfy public demand and win customer approval.

Many teachers and parents assume that age and grade equivalents provide relevant information for instruction and measuring progress. While age and grade equivalents have a certain seductive power, they do not speak to actual levels of performance and instruction. A 13-year-old child who demonstrates a mental age of 7 years, 6 months is in no way similar to a typical child of 7 years, 6 months. A 15-year-old student who reads on a first-grade level is in no way similar to a first grader who is reading on grade level. Children can have the same age or grade equivalents and have very different instructional needs. Age and grade equivalents do not help teachers design instruction.

Age and grade equivalents are based on the average grade or age placements of students in the norming sample having the same raw score as the examinee. *Age equivalents* are measured in years and months; *grade equivalents* typically are measured with a bow to the school year and a 9-month calendar (except for the Kaufman Test of Educational Achievement, Second Edition, which introduced the 12-month academic calendar to the world of testing). Contrary to what we might think, age and grade equivalents are not founded in student performance; they are extrapolated from test data. Test publishers do not actually test children at all points in the school year or at all ages. So, the determination of age and grade equivalents becomes a fill-in-the-blank exercise. Table 5.1 represents the data obtained in the second-grade norming sample at Happy Town School.

Table 5.1 **Second Grade at Happy Town School**

Month	Words Read: Raw Score	Grade Equivalent
September	10	2.1
October	12	2.2
November	14	2.3
December	Not tested	2.4
January	Not tested	2.5

With the miracle of extrapolation, we can deduce that students in December would likely earn a raw score of 16 and that students in January would probably earn a raw score of 18. This may or may not be the case. The progression of grade equivalents presumes that the skills actually sampled are well chosen and that children accumulate knowledge at a steady rate.

Most standardized tests do not measure skills with a sufficiently large sample of items to make an assessment of progress in terms of months or years. On the Woodcock-Johnson III Tests of Achievement Passage Comprehension subtest, for example, it is possible for a child to make close to a year's progress as measured by age- or grade-equivalent scores by reading one additional passage or by recognizing one more word. As a result, parents hoping to track their child's progress over the course of the year would be sorely disappointed, elated, or downright confused should their child happen to make a few inadvertent errors or fortunate guesses.

In addition, grade equivalents do not represent equal intervals, and they cannot be subtracted. The matter is further complicated when we realize that grade equivalents are not consistent from one test to another, and there is simply no way to compare the grade equivalents from one test with those of another. A child with a grade equivalent of 4.0 on the Wechsler Individual Achievement Test—Third Edition (WIAT-III) Numerical Operations subtest who has answered all items correctly in sequence has been taught subtraction with regrouping as well as single digit multiplication. A child with a grade equivalent of 4.0 on the Kaufman Test of Educational Achievement—Second Edition (KTEA-II) Math Computation subtest who has also answered all items correctly in sequence demonstrates some skill with multidigit multiplication and short division.

Grade equivalents can be deceiving. A child who is, according to grade equivalents, a year below or a year above grade level may not actually be a year behind or ahead of same-grade peers. Classrooms typically encompass a range of grade levels, all within the average range. If we look at the second edition of the KTEA, a fifth-grade classroom in the spring will include students with grade equivalents in reading comprehension ranging from third to eighth grade, all performing within 1 standard deviation of the mean (standard scores from 85 to 115).

An age and or grade equivalent score is based on the entire norming sample. Two students can have the same raw scores but have different skill levels. It is crucial to understand that the actual skill level of the items is not involved. As Willis aptly pointed out in 1977, it is possible for students to earn a specific grade-equivalent without actually performing any grade-level tasks. It is also possible for students to function much higher than their reported grade equivalent because they have made errors on relatively easy items while successfully answering high-level questions. A decrease in grade-equivalent scores due to careless errors causes undue consternation in teachers and parents alike, who erroneously assume that a grade-equivalent score reflects that grade level of work.

Despite warnings from many astute organizations (and test publishers themselves) regarding the use of grade equivalents, such equivalents are routinely provided in standardized tests because parents and teachers expect to receive such data performance (International Reading Association, 1981). Many teachers and parents do not distinguish between grade equivalents (based on the raw score comparison, as described) and *grade-based* material (based on the level of difficulty of the actual material). Instead of measuring progress with grade equivalents (Johnny will make 1 year's progress in reading comprehension), parents and teachers would be better served with the results of criterion-referenced material (Johnny will demonstrate his understanding of grade-level passages by identifying the main idea and three supporting details).

If I have not convinced you yet of the shallow nature of age and grade equivalents, let me go on. In addition to misinforming parents and teachers about students and their skills, age- and grade-equivalent scores do not specify instructional levels. Students who are ''reading on a third-grade level'' according to a grade-equivalent score may well warrant instruction that delves into foundation skills, skills that are typically taught in first or second grade. If grade equivalents do not provide information about a child's actual level of achievement or instructional level and do not permit us to measure progress, then what is the point of including them in reports?

In the words of Nancy Reagan: Just say ''no'' to age and grade equivalents. Think instead about using your knowledge of tests and curriculum to provide teachers with meaningful insights into children's skills and their needs.

Labeling Systems for Scores: Tests typically provide language labels for scoring systems. There are, however, a few problems associated with this practice. Although there is agreement about what constitutes average on the bell curve (the middle two-thirds or sometimes the middle half of scores), the descriptive labels for scoring systems used by test publishers are arbitrary and vary greatly; for example, one publisher may call a score below average while another calls the identical score low average. Some test publishers do not provide a labeling system at all.

When we look at the chart in Figure 5.3, we can see that the labels differ depending on the scoring system and on the test publisher. By many scales, the label *average* would encompass anything between 85 and 115 (standard scores). When using a stanine scale, in which a score of 5 would be average, the range of standard scores within the average range would be 97 to 103.

A descriptor that captures two-thirds of the population is very broad, and it is not helpful to teachers. Students at the low end of the ''average''

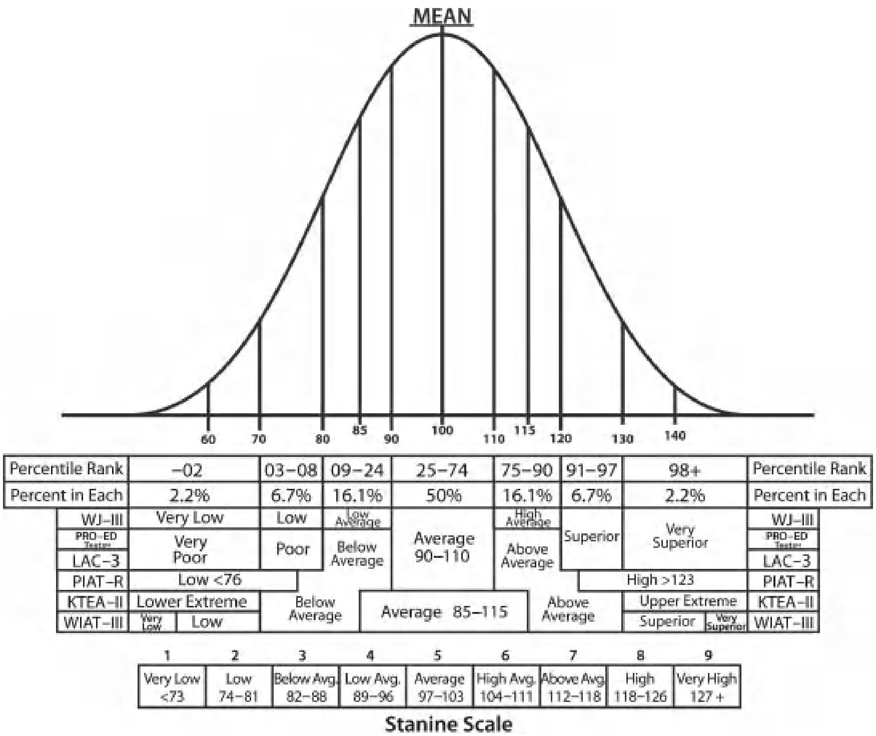


Figure 5.3

Labeling Systems

Source: Adapted from J. Willis and R. Dumont (2002), *Guide to identification of learning disabilities* (3rd ed.) (Peterborough, NH: Author).

range may have great difficulty with tasks that are designed for those at the high end. I frequently use a stanine scale when reporting my results.

Labeling systems are a convenience; they permit us to speak in words instead of numbers. They do, however, have their limitations. Team members sometimes focus on descriptors when they should be discussing skills and deficits. The term *average* should not be confused with competence or acceptable levels of skill. Sometimes students can earn average scores and still be in need of assistance to address gaps in crucial skills.

An average score is one piece of evidence that teams need to consider in a comprehensive multidisciplinary evaluation involving the thoughtful interpretation of findings. An average score may not exclude a child from special education eligibility. By the same token, an average score may not necessarily warrant a discharge from special education on the grounds that the disability no longer exists. A child who reaches the average range after having received effective remediation still may require ongoing specialized instruction in order to make continued progress.

The language labels used by test publishers do not help teachers plan instruction. Regardless of the language labels used to describe student achievement, all evaluators should provide information in their reports about what students know and what they are ready to learn.

Age Norms and Grade Norms

Publishers of academic tests provide scores based on age norms and/or grade norms. Scores based on *age norms* compare children's performance to other children of the same age. Scores based on *grade norms* compare performance to others in the same grade. Measures of intelligence, speech and language skills, and visual-motor ability are typically, but not always, based on age. Measures of academic achievement are usually based on both age and grade norms.

The decision to choose age versus grade norms needs to be made with thought. When testing for a specific learning disability, we generally compare a child's ability to learn (typically measured by an IQ test) to a child's actual achievement in reading, writing, math, or language. In order for there to be a valid comparison (apples to apples), the evaluator must compare the scores for intelligence and achievement using the same type of norms. With respect to questions of progress, comparisons of a child's performance over time also need to be made with the same type of norms. It would not make sense to judge a child's progress over 3 years by using age-based scores for the first year and grade-based scores for test results 3 years later. The comparison would not be valid.

For many students, the decision to use age or grade norms is not going to result in qualitatively different scores. Complications ensue, however, when children are retained or when they are provided with a year (or more) of readiness.

Children who are retained have not been exposed to the same academic content as other children of the same age. With respect to math testing, for example, a 10-year-old child who is completing her second year of third grade typically will not have been taught multidigit multiplication or division. If we compare her performance to typical 10-year-old children, we would essentially be comparing her skills to the other children in fourth grade who have already had multiplication and division. This comparison would result in scores that are low and misleading.

It would be nice if we could advise evaluators to use grade norms. However, as is sometimes the case with statistics, this practice would also result in a distorted picture of this child's performance. Many children are retained or provided with a year of readiness instruction due to the learning difficulty associated with their disability. If we were to use grade norms alone, we actually might be disguising the child's struggle by comparing him or her to a younger group with lower skill levels. There are cases where children with multiple retentions were denied eligibility for special education because test scores based on grade norms suggested satisfactory grade-level performance. In the team's opinion, these retentions reportedly had met the child's needs (the child was now average compared to same-grade peers) and, as a result, he or she did not require specialized instruction. (The National Association of School Psychologists [2003] has an excellent position paper on the efficacy of retention for struggling learners.)

The case with reading is a little more complicated. Suffice it to say, the top third of the population will learn to read on its own without the need for direct, systematic instruction. The middle third of the population will require direct, systematic instruction incorporating the five core elements (phonological awareness, phonics, vocabulary, fluency, and comprehension) as dictated by the Report of the National Reading Panel (2000). They will, however, learn to read with relative ease. The bottom third of the population will require more intensive direct, systematic instruction in the five core elements with additional support and perhaps even specialized instruction.

For some children, reading develops easily; these are the lucky students who have been equipped by nature to internalize the sound patterns of the language and who will perceive the relationship between sounds in words and letter symbols. For the majority of children, however, reading will be linked to instruction. That being said, reading instruction in most classes is presumably matched to the child's skill level. Within one classroom, there are usually multiple reading groups. Hence, there are reading groups called ''Leopards,'' ''Tigers,'' and, alas, the poor ''Turtles.'' As a result, a grade-level comparison may be less relevant than we may be inclined to think.

Best practice would be to look at scores based on both age and grade norms. (Unfortunately, not all tests provide both.) Whatever the norms used, scores should be considered within the context of a child's overall performance, work samples, instructional history, and teacher observation.

Floor and Ceiling Effects of Tests

Young children and older students who fall at either end of the norming sample warrant special consideration. When tests are developed, they are designed to assess the skills of a wide range of students. On many tests, however, there are an insufficient number of test questions in the very easy and very difficult ranges.

In many cases, the number of items that a young student actually is required to complete is insufficient to generate a standard score that is accurate and realistic. Because many tests lack sensitivity for skills that should be part of a first grader's repertoire, it is not unusual for raw scores of one or two—that is, correct answers to only one or two questions—to yield standard scores that approach or are in the average range. When this occurs, we say that the test does not have a sufficient floor.

The wait-to-fail model commonly associated with special education owes its reputation, in part, to tests that have an insufficient floor. These tests fail to distinguish between young children who are struggling and those who are not. For example, on the Comprehensive Test of Phonological Processing (Wagner, Torgesen, & Rashotte, 1999), a child who is 6 years, 5 months would have to complete only 5 items correctly on the Elision subtest in order to earn a score in the 50th percentile rank (scaled score of 10). Most teachers would agree that 5 items constitutes a small sample on which to base an average test score, particularly when only 2 of those items require skill at the phoneme level. When testing young children, the relationship between the standard score and what actually was accomplished to earn that score needs to be clearly understood and stated in the report. Many of these tests are not valid measures of young children's performance, and the failure to understand the limitations of these tests has denied many children prompt and effective remediation.

On a similar note, evaluators should also beware of the pitfalls of scoring the results of children who do not answer any of the questions correctly (raw scores = 0). Although somewhat perplexing, it turns out that many tests generate scores for children who are not capable of completing any of the tasks on the test correctly. Children who are sleeping, are in comas, and have died have been known to earn scores well above the first percentile on several different measures of academic achievement (Willis & Dumont, n.d.). The failures of both the test and the interpretive powers of the evaluator have resulted in team meetings where classroom teachers stare in disbelief over the reported skill levels of young nonreaders who by test definition appear to demonstrate average skill on measures of word recognition and passage comprehension.

Similarly, tests do not always capture the skill set of children at the high end of the scale. The test ceiling is the highest score that a given test provides. (A *ceiling* also refers to the rule governing how many items are administered on a test or subtest.) When tests do not have a sufficient ceiling, they might fail to differentiate among the skill levels of students who score above the mean. On the Phonological Awareness subtest of the Kaufman Test of Educational Achievement, Second Edition, for example, a difference of 4 correct items produces a standard score range of 100 to 122 (the 50th percentile rank to the 93rd percentile rank). While above-average students may not elicit the same concerns as their lower-performing counterparts, there is an insufficient number of items on this subtest to adequately define student performance or measure progress.

Test Development

Unfortunately, there is no perfect test, and just because a test is published does not mean that it is good and helpful to teachers. When designing an evaluation, it is the evaluator's responsibility to ensure that the tests used will provide information that is accurate and helpful and that the evaluation will benefit the child. What then should we be looking for when we select a test?

Reliability

It stands to reason we want our tools to be reliable, but what does this mean in the world of testing? *Reliability* refers to the dependability or consistency of a test. In order to have faith in the scores that standardized tests generate, we must have evidence that the test will produce similar results under similar conditions. Reliability is a product of several factors, including the skill set sampled, the length of the test, how well the rules for test administration are explained, and to what degree different evaluators are able to score the test and produce the same results.

Reliability is expressed as a *correlation coefficient*, a decimal scale of 0 to 1. A correlation coefficient of 0 reflects no relationship or consistency between test results under similar conditions. A correlation coefficient of 1 suggests a perfect correlation between repeated administrations, presuming once again that all conditions for standardization were met. A correlation coefficient of .8 or .9 is a reasonable and appropriate level of reliability.

Test that are reliable permit us to interpret changes in scores as significant and real indicators of progress; the repeated administration of tests in a 3-year evaluation, for example, has the potential to document improvement. When test authors contemplate the design of the test, they must consider its length as well as the specific skills to be measured. As stated previously, most standardized tests do not have a sufficient number of items in order to judge progress over the short term.

Test designers seek a critical balance (a golden zone; see Figure 5.4) between a test being too long and being too short. We want enough items to be meaningful but not too many to be annoying. Brief measures of IQ and achievement tend to be less reliable than longer ones. When only a few skills are sampled, inadvertent error and lucky guesses can have a large impact on test scores, resulting in decreased reliability. Exhaustingly thorough assessments, however, may result in fatigue, boredom, and occasional irritability. Students who are angry with their evaluators tend not to test well, making it hard to obtain results that are reliable.

Too Short: Unreliable	Just Right: Reliable	Too Long: Unreliable

Figure 5.4

Golden Zone

Although we may like to think of ourselves as being consistent in our performance from day to day, in fact, variability describes the human condition (That is what makes us interesting). We vary in our energy levels, our motivation, and our tolerance for being tested. We vary in our attention and in our moods. Sometimes we vary in our capacity to retrieve what we know from memory on demand. All of these factors reduce the likelihood that we will perform with perfection on any given day.

There are also difficulties with the skills that test publishers choose to sample. Test publishers choose items that they hope are standard, but whether these items have actually been taught in the classroom is another question. First-grade students might have just learned some of the words on the reading test. If they had taken the test 1 week earlier, they might not have received the same raw score.

Standard Error of Measurement: We use the *standard error of measurement* (SEM) to account for the measurement error that occurs on all standardized, norm-referenced tests. No matter how hard we try, the human condition and sampling difficulty makes it impossible to ever really know a child's exact or true score. The SEM permits us to discuss scores with a certain degree of confidence; hence what is known in testing circles as the *confidence band*. We create confidence bands by adding the standard error to the score to determine the high end of the range and by subtracting the standard error to determine the low end of the range. If the SEM for a given subtest equals ±5 and the standard score is 90, the confidence band would be the range of 85 to 95, or 90 ±5. The size of a confidence band varies with respect to the task and with respect to the age or grade of the student.

Further explanation of a child's ''true'' score might help with understanding this concept. A child's ''true'' score is the hypothetical average of all the scores he or she would obtain if the test were administered many times and each time without the benefit of practice and without fatigue factors. The larger the confidence band, the greater the likelihood that the true score can be found within it. Tests typically provide standard errors for confidence bands of 68%. That is to say, we have a 68% chance that our confidence band actually captures our true score.

Table 5.2 **Confidence Bands: How Confident Are You?**

Bandwidth	Likelihood
1.00 SEM	68%
1.65 SEM	90%
1.96 SEM	95%

If you wish to increase the odds to 95%, simply double the confidence band. Using the example just given, we have a 95% chance that our confidence band actually captures our true score when we double the SEM, so the confidence band becomes 90 ± 10, or 80 to 100. We can see the relationship between bandwidth and the odds in Table 5.2.

Validity

Validity refers to the accumulated evidence that a test measures what it is supposed to measure. Tests can be valid for different purposes, and the research provided by test publishers helps evaluators to determine what types of conclusions we can draw based upon test performance. The 19th-century practice of phrenology, in which intelligence and personality characteristics were assessed by measuring the topography of the human head, was found to be reliable, but not valid. The practice of identifying witches in Salem through the flotation test was also not known for its validity. There are different types of validity:

- *Content validity* describes the degree to which a test measures the skills or curriculum being taught. We would hope, for example, that a test would provide a valid measure of what a student has learned. It is not unusual, for example, for students who are in a multisensory phonics-based program to fare poorly on formal measures of word identification. Word identification subtests frequently focus on words that are irregular. Because sequential phonics-based programs teach to the rule, many word identification tests would not actually measure the skills being taught.

- *Construct validity* seeks to establish a correlation between test performance and the research base for the particular field. Test authors attempt to build the case for the validity of their test by documenting the theoretical and research underpinnings for test content and design. The research provided in a test manual is often a gold mine for evaluators who wish to learn more about research in the field.
- *Concurrent validity* refers to the practice of documenting a new test's validity by comparing results to a well-respected established test that is administered at the same time. This is known as respectability through association.
- *Predictive validity* describes tests that can be used to predict future performance. Colleges review Scholastic Aptitude Test scores as a means of narrowing their applicant pool to those who have the greatest chance of being successful at the college level. A cumulative average of 4.0 on a report card is not considered to have sufficient predictive value for most colleges.

Test Selection

As evaluators, we want to ensure that we write reports that will inform instruction based on instruments that are reliable and valid. We also want to be sure that we use our time well when testing and that we spend our assessment budgets wisely.

There is no one test that will measure performance in all areas related to reading and oral language. A variety of tests permits evaluators to assess reading in different ways. It permits them to individualize their evaluations, compare performance with different response styles (multiple choice versus fill in the blank) and see patterns of strengths and weaknesses. Sometimes children earn spurious scores on tests; it is important not to attribute too much weight to a score that is not verifiable through other means, such as classroom performance or other tests.

A well-designed test battery should include measures of these skills:

- phonological awareness,
- rapid naming,
- alphabet knowledge,
- word identification (real words and nonsense words),
- spelling,
- automaticity and fluency,
- comprehension,
- written language, and
- oral language.

We examine all of these areas in greater detail in later chapters.

Conclusion

Knowledge of scoring systems and concepts related to test development will help you to make good decisions regarding test selection and give you the tools that you need to help teachers, administrators, and parents. While test scores may help us understand a child's skill level of performance with respect to his or her peers, they do not help teachers design instructional programs. A comprehensive reading evaluation should not only provide information regarding a child's skill levels with respect to others of the same age or grade; it should also tell us what children know and what they are ready to learn.

Review Questions

1. Why is it important to consider automaticity when assessing basic skills?
2. Norm-referenced tests are designed to assess overall levels of functioning. Why might this be problematic when assessing basic reading skills?

3. Pam earned scores in the average range on the Anybody-Can-Do-It-Reading Comprehension test when it was read to her. Explain why these scores are not valid.
4. Mrs. Black occasionally rewords questions on standardized tests when she feels that the wording is not consistent with the language she uses during instruction. Why is this a problem?
5. The team wants to measure Opie's progress using percentile ranks. What do you say?
6. Mrs. Jules is concerned about her son's progress in reading. Last year he earned a grade equivalent of 4.3 on the ABC Reading Test; this year he earned a grade equivalent of 4.5 on the DEF Reading Test. Explain why grade equivalents should not be used to measure progress. What other options might there be?
7. You have been asked to test a child who has been retained. What norms should you use and why?
8. Sherry is in the first grade. Her teachers referred her for testing due to lack of progress in reading. Sherry, however, earned scores in the average range on her reading tests. How do you reconcile the seemingly contradictory results?
9. Although we like to think of ourselves as precise in our work, we always have to think in terms of the standard error of measurement. Why can't tests give us exact scores? Why should we use the standard error of measurement when discussing a child's performance?

Test Administration and Report Writing

Chapter 6

Introduction

For years, we have administered tests of reading comprehension to students with learning difficulty. When students demonstrate average or above-average skill, teachers and parents are generally happy. When students do poorly, there is typically a discussion about how to address the problem. An all-too-often response to perceived reading problems is to recommend instruction in identifying the main idea and supporting details.

I am not saying that working on the main idea is not appropriate. The truth is, however, that poor readers are a diverse group, and instruction in identifying the main idea will not necessarily help them to become better readers. In order to ensure that recommendations are linked to a child's profile as a learner, we must be sure that we craft evaluations that address the components of reading comprehensively. If we are going to ask children to spend their time testing, we have the responsibility of writing reports that will be helpful to them.

This chapter focuses on how to design, administer, and write a comprehensive reading evaluation. We begin with referral questions and background history. We examine issues relating to test administration, and we learn how to write and present our data in a report format that is professional and easy for teachers and parents to understand. Some of the content in this chapter is designed for those who are new to assessment. Experienced evaluators may wish to skip the sections that are marked as being appropriate for beginners.

Informed Assessment

When children are referred for testing, we should be provided with the background history leading to the referral. Ideally, we receive information regarding the nature of the difficulty as well as what attempts have been made to improve the child's skill set. As part of the evaluation, it is important to document the reasons for the referral.

Referral Questions: Teacher, Student, and Parent Concerns

Referral questions are often a lost opportunity. How often do we read the pro forma ''Monique is being tested as part of her 3-year evaluation''—a statement that leaves the distinct impression that we are testing because we have to and not because we are truly interested or concerned. Referral questions actually have the potential to serve as more than required boilerplate. They can establish a framework for the report, help us use our time more efficiently, and ensure that we address questions or concerns. They can even serve as a hook to inspire interest in those who read our reports.

A well-written referral should accomplish three things. First, it should identify the child and the reason for concern. Second, it should give us a little background information on current efforts to remedy whatever is not working. Last, but not least, it should tell us what teachers, parents, and the students themselves want to know.

Teachers may have questions regarding a student's ability to read what is written on the board, and they may want help identifying what types of assistive technology would be helpful to provide access to textbook content. They may want to have a better understanding of what types of instruction they can provide in the classroom or what techniques they can use to help generalize skills learned in the resource room. They may want to know whether it is possible for weak readers to access a gifted curriculum, and if so, how?

Parents may be at a loss for what they can do at home; should they force their children to read? What kinds of texts are appropriate? Some parents may not understand the true impact of a reading disability, and they may be concerned that their child is just lazy and unmotivated. Students themselves have questions regarding their own identities as learners and their own intelligence. They may want to know what they can do to improve. They may want to know what it will take for them to go to college.

SAMPLE REFERRAL QUESTION

Evan is an 8-year-old third grade student who was referred by his mother, Mary Ann Davis, for an evaluation of his skill in reading. Mrs. Davis describes her son as a highly verbal, curious child who is eager to learn and to please. Although he is generally happy, Mrs. Davis reports that Evan is often frustrated by his schoolwork and that he is becoming increasingly reluctant to read. His handwriting and his spelling are poor.

Evan's reading instruction in school is described by his teacher, Ms. Auburn, as ''eclectic'' with a focus on reading for meaning. Children in the class are taught how to select ''just right'' books; phonics instruction is embedded into classroom discussions of story content. Evan has been receiving additional support in reading twice weekly for the past year. This support focuses on strategies for reading comprehension as well as work on vocabulary and critical thinking skills.

Mrs. Davis would like to document Evan's skill in reading, writing, and spelling. She would also like receive recommendations for programming, accommodations, and modifications that would help Evan to be successful in school. Mrs. Davis would like Evan to enjoy reading.

Background History and Previous Testing

An evaluation documents a child's performance on a given day at a given time. While we like to think that our evaluations are the be-all and end-all of educational decision making, it is important to put children's performance in the context of their medical, behavioral, educational, and cultural history. Sometimes learning problems are not intrinsic to the child; sometimes they reflect factors in the classroom or in the home.

I always try to stress to my graduate students the importance of the background history. A good background history tells the child's story from birth (or even earlier) to the present. It creates a picture of the child, the family's experience, and what has happened in the classroom. Background history typically comes from three main sources: the school, the parents, and the student. Each one of these sources has the potential to introduce a degree of subjectivity into the discussion (Willis & Dumont, 2002). Be alert and respectful.

Information From Parents: Including parents in the evaluation process increases their comfort levels and often relieves anxiety and guilt that they did not spend enough time reading to their children. It is helpful to have a developmental history form. In this way parents can take the form home and check on information that is not readily available or easily recalled. Some parents themselves may have difficulty with reading and writing, and they may require assistance. I always offer to go through the form with parents with the goal of collecting information in these areas:

1. *A description of the pregnancy, birth, and infancy*. Such information often illustrates early signs of difficulty that are often precursors to learning challenges.
2. *Developmental milestones*. Developmental milestones generally fall into two areas: gross motor milestones and fine motor/speech milestones. Gross motor milestones include sitting, crawling, walking, handedness, and bike riding. Fine motor milestones may include toilet training, dressing (buttons and zippers), coloring, and learning to hold a pencil. Speech milestones typically include speaking in words and sentences, although there may be cases where the speech-language pathologist may investigate earlier signs of joint attention and turn taking. When developmental milestones are age-appropriate you can describe these milestones in your report quickly with the words ''within normal limits.''
3. *A health history*. Such a history speaks to us about a child's availability for learning. Children with learning difficulties have a high incidence of allergies and ear infections (Boucher, 1986). In some cases, medical conditions have associated learning difficulties, and these children may require additional monitoring of their academic skills. You may find it helpful to inquire about or research unfamiliar medical diagnoses; always check the spelling of unfamiliar terms in a medical dictionary. In your evaluation, list all current and past medications. State whether there is a history of learning difficulty in the family. In particular, note whether family members have had difficulty learning to read. When parents are sensitive to their own learning difficulties, I may write a general statement to the effect that ''There is a history of learning difficulty in the family.'' In this way I do not intrude on their privacy.
4. *Hearing and vision*. Hearing and vision are the gateways to learning. Sometimes poor hearing and vision masquerade as processing deficits or lack of motivation, and it is important to be sure that we do not mistakenly identify a child with a reading disorder when the problem could be easily fixed with glasses. Hearing and vision are, in fact, exclusionary criteria for the identification of a specific learning disability.
5. *The impact of reading difficulties at home.* Parents often have a lot to say about this area. They can provide information about efforts to learn the alphabet, enforce bedtime reading, study for spelling tests, and complete homework. Many parents find themselves engaged in a monumental effort to help with homework; some provide their children with private tutors and incentives. Other parents find that learning challenges create stress and competition among siblings.

Information From Schools: Teachers are the authorities on a child's experience in school, and they have much to say regarding a child's participation in classroom discussions and activities, independent work skills, sense of wellbeing, and social interaction. In addition to interviewing teachers, it is often very helpful to observe children during their reading and writing instruction with the goal of examining time on task, the ability to follow directions, and the degree to which assigned tasks are commensurate with skill levels. The observation, however, should not be limited to the student in question. Individual behaviors should always be considered in context; to what degree are the other students in the classroom on task and participating successfully? Is the instruction well organized, multisensory, sequential, and cumulative in its presentation? Is the program being delivered with fidelity? Is the content appropriate for this child's skill levels and needs as a learner?

There is a wealth of information to be gleaned from school sources:

1. *An educational history provides information about continuity of instruction, attendance, and performance as judged by teachers.* Your report should include a list of the schools attended with the years and grades of attendance. Children with high rates of absenteeism or who are chronically late for school may have missed important lessons. Note when and why children are retained or provided with a year of readiness.

   Report cards and progress reports can be valuable sources of information; however, they have to be read carefully. Report card comments are generally designed to be positive in nature. Comments calling for additional practice at home during summer vacation may be teacher-speak for skills that are not yet mastered. Grades do not necessarily reflect children's performance, particularly when the program is modified (M. Wagner et al., 2003). In your report, make a note of content that is modified; while it is may be important to adjust children's assignments, modifications sometimes have the unintended consequence of reducing expectations and opportunities for practice.
2. *Previous testing provides a context for interpreting current test performance.* A good background history should include a section that reviews all educational testing, as well as all relevant data and conclusions from psychological, speech and language, occupational therapy, physical therapy, neuropsychological, neurological, and psychiatric reports. It may be helpful to include office notes by physicians as well.

   For each of the reports included in this section, provide the evaluator's name and credentials, the date of testing, the reason for the referral, and a summary of the conclusions and relevant diagnoses and recommendations. Verify that the age and grade are calculated correctly; note whether age norms or grade norms were used. Resist the temptation to rewrite the report; it is already written. Include a list of relevant test scores with their corresponding percentile ranks and/or stanines. They provide a common system that makes it easier for parents and other educators to interpret what the scores mean. If there are no recommendations or if the report is not signed, say so.
3. *A history of reading instruction*. This history will clarify what has been tried in the past. For each intervention, provide the name of the reading program, the term, and the hours of instruction. If the reading program requires training, state whether the teacher or tutor was trained and/or certified as per the requirements of the program. Note whether the instruction was provided individually or in a group (if so, what size). Provide summaries of progress reports in reading.
4. *A history of special education services.* Be sure to include the category or categories for identification and when services were initiated. Review the content of the individualized education program (IEP). Depending on the case, you may want to review previous IEPs as well. For each IEP reviewed, describe the student's strengths, challenges, and the goals. If the goals lack continuity or if they are repeated from year to year, say so. Describe all related services (transportation excluded).
5. *Other evaluations being conducted concurrently.* List these in your report. You may wish to communicate with other evaluators regarding the scope of their testing to ensure that its sum total addresses all areas of concern. If so, you will require parent permission.

Information From Students: Last but not least, do not forget the student. Students are happy to discuss their aspirations, and many will speak candidly about their struggles as readers. Students who are receiving direct, systematic instruction in reading should be able to identify the skills that they are working on and describe a typical lesson plan. I often ask whether students recall when reading became difficult or if reading had always been a challenge. I always ask whether students read for fun. Many students can identify styles of teaching that, in their opinion, have worked well or those that have not. Some may speak to their efforts to cope in classrooms that presume reading skill. While students are speaking, my ear is always tuned not just to the content of their words but also to their skill with language.

Hearing and Vision

We need to verify that hearing and vision have been checked. I am sometimes surprised at the number of well-educated parents who have not thought to have their child's vision and/or hearing tested. No children with learning difficulty should embark on the path of formal assessment without verification of their hearing and vision. Children with poor vision and/or poor hearing are sometimes mislabeled as having attentional deficits. They are sometimes described as lacking motivation. It is hard to be motivated and pay attention when one cannot see what is on the board or hear what the teacher is saying.

Vision and hearing screenings are just that—quick checks that do not always identify children with impairments. Vision screenings conducted in school or in a general practitioner's office do not always include both near-point and far-point vision. By the same token, hearing screenings conducted by the school nurse may not identify children with subtle hearing losses. School audiological equipment is not always calibrated properly, an understandable problem particularly when school nurses travel from school to school. A school nurse's office that is located next to the gym or another typically noisy environment is not necessarily conducive to conducting hearing screenings.

Impact of Ear Infections: Histories of ear infections are frequent in children with learning difficulty. If the ear infections have ceased, often we presume that associated difficulties are also in the past. John O. Willis (1998), in an article based on the research of J. Phillip Boucher (1986), described the impact that multiple episodes of middle ear fluid buildup have on children and their ability to learn. Willis noted that the difficulties associated with ear infections persist long after the fluid buildup has dissipated and hearing has reportedly returned to normal. He stated:

> *That intermittent and unpredictable hearing loss can, at its worst, interfere with acquisition of basic oral language skills, both vocabulary and grammar. More subtle effects can include deficiencies in auditory perception and development of ''phonemic awareness'' or the ability to recognize the separate sounds that make up a word, skills that are essential for the development of reading and spelling . . . (p. 6)*

Willis noted that, in addition to having delays in language, reading, and writing, children with postotitis auditory dysfunction (POAD) do not develop their listening skills, and they often appear to present with attentional deficits. What do adults do when the car radio station signal fades in and out? We take one of two courses: We either turn the radio off or switch stations. In the classroom, children with POAD may become tired and discouraged; they may struggle with self-esteem or act out behaviorally. Children with deafness or who are hard of hearing are often noted to have behavioral challenges (Vernon & Andrews, 1990). Willis cautioned teachers to presume that children with POAD have difficulty listening, and he urged teachers to provide preferential seating, visual teaching aids, and understanding.

Planning the Assessment

Given that there is no one perfect comprehensive test of reading, it is the evaluator's job to select tests and subtests that will address all potential areas of concern. Not all children require each and every component. It would be a waste of time, for example, to ask a high school student to read a list of preprimer words, such as *cat* and *book*, when he or she reads fluently and struggles to get meaning from a biology textbook. The components selected for a reading evaluation will vary depending on the referral questions, the age of a child, his or her profile as a reader, previous testing, and behaviors and skills we see during testing.

It is helpful to have a theoretical framework as a foundation for designing a reading evaluation. In general, we want to examine two main areas: decoding and receptive language. These are the areas highlighted by Gough and Tunmer in the Simple View of Reading (1986) and by Scarborough's rope model (2001). Scarborough's model also incorporates background knowledge, which we certainly would not want to neglect.

Top-Down Approach to a Comprehensive Reading Evaluation

A top-down approach to testing will help you to use your time well. By beginning your assessment with higher-level skills, it will be easier to make informed decisions regarding the scope of the evaluation and what tests you will need to use. While we may be able to make some of our testing decisions based on the background history, we should always be prepared to follow up on behaviors and skills observed during testing. When asked what tests I am going to give, I may have a list of preferred tests that would make sense given what I know. I caution everyone, however, that I may need to change my list depending on what I learn during the actual assessment.

Comprehension: Presuming that we have verified hearing and vision, we are then ready begin testing the highest level skill, comprehension.

Many reading comprehension tests do not provide us with much information about why children fail to comprehend. Reading comprehension tests should be regarded as the tip of the iceberg; on the surface they give little indication of the size, depth, or nature of the problem. Some children may appear to perform adequately on measures of reading comprehension despite challenges with reading fluency and decoding.

When performance on a comprehension test is poor, *or when there is a reported difficulty with the reading demands of the curriculum,* it is necessary to consider skill in two main areas: fluency and receptive language. The flowchart in Figure 6.1 provides a structured approach to determining how much testing we need to do.

The decision to pursue additional testing is not dependent on the scores alone. There are cases where the scores do not accurately represent a child's skill set. The decision to delve more deeply into a child's performance may be the result of an evaluator's observations during testing or the analysis of test performance.

Fluency: Fluency is a critical component of reading comprehension. Children who expend a disproportionate amount of effort on word recognition do not have sufficient memory left with which to process the content. They often finish reading the assigned chapter without a clue as to what they read.

More often than not, fluency is assessed through oral reading. When children read silently, it is difficult to determine whether they are reading all of the words. There are, however, measures of reading fluency that seek to circumvent this problem by having children mark word boundaries with a pencil (I/read/the/book.). There are also measures of reading fluency that incorporate comprehension questions (The ocean is pink: YES or NO). Not all measures of fluency are equivalent. We discuss concerns related to fluency testing in Chapter 11.

Suffice it to say that no evaluator should conduct a reading evaluation in which the child does not read aloud. Only through oral reading can we ascertain whether students are reading with intonation and phrasing, factors related to comprehension. A comprehensive reading assessment should include the timed oral reading of passages as well as the timed oral reading of real words and nonsense words in a list format.

If there are problems with fluency and automaticity, we need to follow with an assessment of word identification, word attack, and spelling skills. Be forewarned that a lack of fluency sometimes can reflect receptive language difficulty or lack of background knowledge.

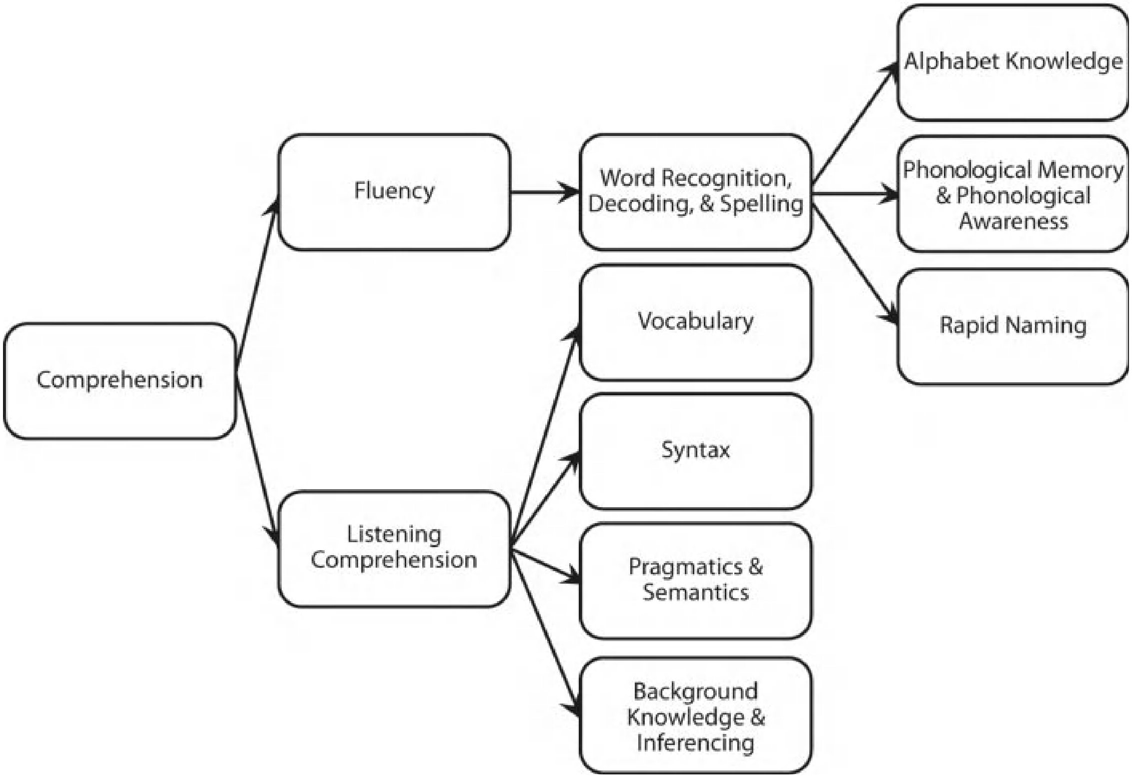


Figure 6.1

Flowchart of Reading Testing

1. *Word identification*. Word identification tests measure the ability of a child to recognize words in a list format without the aid of context. Word identification tests do not measure vocabulary; they do not require that students understand the words that they read. Word identification lists generally include words that are regular (those that follow the rules) as well as those that are not (irregular).
2. *Word attack*. No evaluation of reading skill is complete without a measure of word attack. Word attack, also referred to as decoding, provides a measure of a child's ability to apply the rules of phonics to unfamiliar words (gumfrop, zippler). Measures of word attack use nonsense words; because they are made up, we know that children cannot rely on their sight reading skills and read words as pictures.
3. *Spelling*. Children who are poor decoders are typically, but not always, poor spellers. Encoding, in fact, is harder than decoding because it requires more memory and skill with pencil in hand. Spelling is a treasure trove for those interested in discerning the phonological underpinnings of the English language. We discuss how to analyze spelling errors in Chapter 14.

Children with poor fluency, word identification, word attack and/or spelling skills warrant additional testing in alphabet knowledge, phonological awareness, and rapid naming.

1. *Alphabet knowledge*. We often associate knowledge of the alphabet with young readers. The ability to name the letters of the alphabet is

one of the best predictors of future reading achievement (M. J. Adams, 1990; Bruck, Genesse, & Caravolas, 1997; Ehri, 1997; Scanlon & Vellutino, 1996). However, I am no longer surprised to see students with severe reading disorders at the middle and high school levels who cannot write all 26 letters of the alphabet in sequence.

2. *Phonological awareness*. Difficulty with phonological awareness is the most common cause of reading disabilities (Bruck, 1990; Bruck & Treiman, 1990; Felton & Brown, 1990). Understanding a child's level of phonological awareness permits us to determine at what level reading instruction needs to begin.
3. *Rapid naming*. Rapid naming is an underlying ability that supports the development of automaticity and fluency in reading. Typically, students are asked to name pictures of familiar objects, colors, numbers, and/or letters in sequence while being timed. Deficits in rapid naming have an insidious effect on automaticity, fluency, and comprehension (Wolf, 1991). Children who are slow namers typically require more practice than their peers to apply word recognition skills with automaticity.

Receptive Language Foundation: Receptive language skills are often neglected in reading assessment and instruction. Although we may think of written language as a distinct and separate entity from oral language, oral language and written language have much in common. For the purpose of our discussion here, the similarities outweigh the differences. Both written language and oral language require an understanding of word meanings and word parts (morphemes), the ability to process different sentence types, skill with abstract and figurative expressions, and inferential thinking.

Attentional deficits and hearing impairments notwithstanding, if children cannot understand language through their ears, they probably will not understand the same words and sentence constructions when they see them in print. For some children, the stumbling block to literacy is a poor command of word meaning, sentence structure, and higher-level abstract thinking.

We can look to the language pyramid to identify areas of language skill that may warrant investigation. (Refer back to Figure 3.1.) By beginning, however, with a listening comprehension test, we may be able to rule in or rule out the need for additional language testing.

Listening Comprehension: Research suggests that listening comprehension is a better predictor of reading comprehension than scores on an IQ test (Stanovich, Cunningham, & Feeman, 1984). Listening comprehension tests, after all, provide a measure of receptive language ability—that is, what children understand through their ears. They can potentially point the way to oral language challenges that compromise reading comprehension. When listening comprehension is poor or when referral questions suggest language difficulty, we may want to investigate the next five skills in greater detail.

1. *Vocabulary*. Words are the tools of thought. In order to support the development of reading comprehension, children require a well-developed fund of words as well as a deep understanding of word meaning.
2. *Sentence structure (syntax)*. Reading comprehension presumes the ability to understand how words are chunked into meaningful units (Nation & Snowling, 1999); there is a strong correlation, in fact, between syntactic skill and reading performance (Bentin, Deutsch, & Liberman, 1990; Bowey, 1986; Fowler, 1988; Tunmer, 1989).
3. *Semantics*. Semantics is the study of how words combine to create meaning. It includes how word meanings relate to each other, abstract and figurative expressions, idioms, and metaphors. Many children who fail to get a joke also fail to grasp messages that are not directly stated.
4. *Pragmatics (social language usage)*. Insight into the subtleties of communication has important implications for understanding character development and how characters relate to each other in novels. For example, the ability to judge the appropriateness of a character's language

usage within a given context brings additional understanding to prose or poetry. When children fall on the autistic spectrum, they will have additional challenges interpreting text; these challenges should be well documented and understood not only with respect to social skills but also in the context of reading comprehension.

5. *Inferencing and background knowledge*. Texts written at a fourth-grade level or above presume that students are able to read between the lines and draw conclusions. Weakness in inferencing limits children's understanding to what is directly stated. As a result, they will miss much of the author's intent, and they may not make connections with world events and their own experience.

Reevaluations: When performing a reevaluation, it is important to review all previous testing to ensure that the current evaluation will be thorough. A review of previous testing may illuminate areas that warrant attention. In some cases, it is helpful to repeat tests from previous evaluations provided that we do not exceed test publisher guidelines for repeat administrations. It is easier to determine progress when the test instruments are the same. If the previous testing is not of good quality or if the evaluation is not complete, I have no difficulty substituting or adding instruments that I feel provide better data.

Integrating Norm-Referenced Testing With Criterion-Referenced Tests: You may find it necessary to supplement norm-referenced, standardized testing with additional samples of skills. Norm-referenced, standardized tests do not evaluate skills comprehensively, and in order to judge mastery or lack thereof, we need to turn to criterion-referenced tests (which typically involve standardized procedures). Most norm-referenced tests, for example, do not inventory children's alphabet knowledge; they sample a few letters of the alphabet. Similarly, most norm-referenced tests do not inventory phonics skills in a way that measures actual mastery. Given the importance of accuracy in reading decoding, we need to conduct a thorough evaluation of alphabet knowledge, phonics skills, and spelling skills. In this way, we can say ''Johnny read CVC words with 70% accuracy'' and provide a baseline for further instruction.

Test Administration

Rapport and Test Session Length

I always try to remember that testing is an adult concern that is not shared by most children. While some children are happy to have one-on-one attention, others rue the time lost from preferred activities or classroom lessons. Some children need some time to settle in. For others, the anticipation is the worst part; they prefer to begin immediately so that they know what they are getting into. When in doubt, ask them what they prefer.

I generally try to find out what the children think about testing. Reactions range from ''I have to show you how dumb I am,'' to ''Mommy said that we will be playing games,'' to ''Everyone wants to know why I am failing in school. They say I am smart.'' It is helpful to talk about children's perceptions of their own schoolwork as well as what they do for fun.

In addition to establishing what children think of school and reading, it is also important to establish the ground rules. Each evaluation is preceded by a brief discussion of the purpose of the testing and what the test session will be like. It goes something like this:

> *Today I am going to work with you so that I can find out what you know and what you are ready to learn. We are going to work together for about [insert here] hours/minutes. I will be asking you a lot of questions. Some of my questions will be really easy (don't be insulted). Other questions will be hard. Just because I ask you a question it does not mean that I think you should be able to answer it. I just want to see how far you can go.*
>
> *My tests are not like school tests. You cannot fail them; they are just designed to tell me about how you learn. Your job is to work hard. If you do not know an answer, just say so. If you think that you might be able to answer a question, it is important that you try. I need you to work with your*

best effort. I have to be able to say in my report that you worked hard.

I will be offering you a break around [specify time]. If you have any questions or concerns about the testing, please ask. Just remember that I cannot help you with the test. Do you have any questions? Are you ready?

Be sure to record all relevant behaviors during testing. Questions, requests for repetitions, and comments all provide evidence of interest, the ability to follow directions, attitude, and persistence. Note whether responses are automatic or not; also note whether children self-correct their responses. Automaticity and accuracy are important for reading with fluency. In some cases, credit for correct responses does not reflect the labor required to produce that response. Note whether children are distractible, and describe their level of activity. Children who are busy with their hands and feet cannot concentrate on the job to be done. Describe the pencil grip, pressure, and overall handwriting presentation. Also note whether the child is wearing glasses and/or hearing aids. Verify that the child is taking medication(s) as directed by a physician.

Test sessions can vary in length from 15 minutes to 2.5 hours. Some older children prefer to work without a break. (By doing so, they finish sooner.) Young children may require multiple breaks. I generally try to use their body language as a guide in determining how long we can work. Do not fall into the trap of responding to questions regarding ''How many more?'' If you try to answer those questions, I guarantee that you will underestimate the number, and your student will then be annoyed with you. I typically say ''Just a few more'' (presuming that this is true). If I do know definitively how many more tests, I sometimes create a list for the student, and we check them off together.

Children who require multiple brief sessions are telling us about their stamina in the classroom. Teachers and parents often ask about attentional deficits. Many children with attentional deficits, however, are able to function very nicely within the structure of a formal one-on-one assessment. In a formal evaluation, directions are clearly worded, tasks are often modeled, and there are few organizational and planning demands. This highly structured environment sometimes makes it possible for students to function in a way that is not possible in a classroom where children are expected to hold their own with respect to following directions and task completion.

Test Administration for Beginners

The test protocol is your record of your test session. From your protocols we should be able to recreate the test session, including session length, breaks, response style, attitude, behaviors, unanticipated events and interruptions, and oral language skill. Here are 10 rules for those who are new to testing:

1. *Be sure that you are using the current version of the test.* If the test has two forms, be sure that you have the correct form.
2. *Have within easy reach all materials, including protocols, pencils, stopwatches, manuals, and easels.* The student's work area should be clear of all extraneous items. It is helpful to have a clipboard so that you can take notes discreetly. Some children take a great interest in how they are doing and what we to have say about them. Except for practice items, we are not permitted to provide feedback to children about how they are doing. When asked, I just say ''You are doing fine.''
3. *Fill in the child's name and the date on the protocol immediately.* There is nothing worse than having a stray protocol without a name or the actual date of testing. Be sure that you spell the name correctly.
4. *Calculate the child's age and grade.* When testing over the summer, verify whether the grade is the grade completed or the grade to be entered in the fall. Be sure that you calculate the age correctly; if the age is incorrect, it is likely that all of your scores will be wrong. I frequently check my age calculation by asking my student his or her age, by looking at previous testing and/or the developmental history form, and by performing the reverse operation (addition).
5. *Administer the test precisely as directed.* Do not make any changes to directions or to the test

materials themselves. This is what makes the testing standardized. It is not poor form or the sign of a beginner to read the administration instructions exactly as written. All examiners should read directly from the easel, manual, or protocol as advised by the publisher. Do not paraphrase unless the manual permits.

6. *For each subtest administered, record the time, and all relevant behaviors, concerns, questions, and remarks.* S. E. Morbey, Specialist in the Assessment of Intellectual Functioning (personal communication, May 9, 2009) stated: ''You should be mindful that not all tests measure what the test publisher states and that interpreting the data in meaningful ways includes the need to take notes continually while testing.'' Keep your language nonjudgmental. Be sure to write down the responses to all open-ended questions. Oral responses often provide insight into problem-solving approaches and expressive language skill. Some children take delight in watching you scramble to write down what they say. Try to make it appear without effort; you may want to develop a shorthand style of writing so that you can keep up. Some evaluators omit vowels or use common ''texting'' lingo, such as B for ''be.''
7. *Determine whether you will be using age norms or grade norms*. If you are testing as part of a learning disability evaluation, use age norms. If a child has been retained, best practice is to use both age and grade norms. Some tests only provide age norms.
8. *Use a proof-as-you-go process when scoring to save time in the long run.* Be sure that you have added in credit for items below the basal. Be sure that you have not given credit for items above the ceiling. Check the raw score totals. Count the points from the top down and again from the bottom up. Be sure that you copy the raw scores to the front of the protocol correctly.
9. *Think about whether the child worked with good effort and whether the results are an accurate representation of skill levels.* As an evaluator, this is one of the most important decisions that you can make.
10. *When given a child to evaluate, create a file immediately*. Keep all relevant documents together in this file in a secured location as per your school or office policy.

Learning a New Test for Beginners

Acquiring a new test can be like getting a present at Christmas; unlike things that we get at Christmas, however, we have to take the time to read the directions before assembly and use. The next 12 steps are important for administering a test correctly.

1. *Read the manual.* Be sure that you meet the requirements for being a qualified examiner.
2. *Verify that the test is valid and reliable for the purpose intended.* If you anticipate testing children who are on either end of the norming sample, check to be sure that the test does not suffer from floor or ceiling effects.
3. *Verify that you have all required materials.*
4. *Read the manual again.* Some test manuals provide information on the theory supporting the test structure as well as the type of items included. This information can help you with your discussion of test results.
5. *Listen to the CDs that are provided with the test for examples of correct pronunciation.* Be sure that you can pronounce all words with ease.
6. *Be sure that you understand the ceiling and basal rules.*
7. *Be sure that you know how to work with any required technology,* such as CD players and headphones.
8. *Practice administering the test to yourself.*
9. *Practice administering the test to someone that you can cajole into helping you.* My own children were frequent victims of my occupation. Bribing helps.
10. *Practice scoring.* Be sure that you are on the correct page and the correct column when looking up scores. Double-check all scores. Whenever possible, have your scoring checked by someone who is more experienced and skilled at testing. Discuss scoring differences with others. Do not be afraid to contact the publisher for clarifications. Sometimes publishers make mistakes, and it is important to let them know. If you are using a computer scoring program,

be sure that you have a current version of the program. Verify that you have typed in the correct date of birth and the correct age. The computer cannot score your test correctly if you mistype this information.

11. *Add tabs to the manual to identify pages that you will be using frequently.*
12. *Read the manual again.*

Report Writing and Presentation

Using a Template

At the risk of sounding well advanced in my years, I am going to say that it was not all that long ago when evaluators wrote reports without the benefit of a computer. There are still those of us who are actually nostalgic for the clicking and clacking of typewriter keys.

Although I rather liked the sound myself, I am the first to say that word processing offers many opportunities to write with greater accuracy and efficiency. A template has considerable potential for saving time and for producing reports that are professional in their presentation. Templates reduce the amount of proofing required, and they provide a framework for writing a report that can potentially address any and all referral concerns. Templates will help you to avoid embarrassing errors that occur when you give in to the temptation to copy a section from a report written on another child in order to save time. I guarantee that you will not successfully remove all references to the other child (name and pronouns), and you will have the unfortunate experience of apologizing before a team of eight adults for a report that is littered with references to an unknown individual or a child or one who has somehow changed gender.

Consider the template the skeleton of your report. It is your job to turn the skeleton into a living, breathing individual with flesh and blood. It is important to keep more than one copy of your template. There is nothing more discouraging than having to recreate a template from scratch. I typically try to spend one day a year on my template in order to update the content, change words that I am no longer happy with, add new tests, or delete tests that are no longer in use.

How to Create a Template

Follow the next seven steps to create a template.

1. *Create a file* titled EVALUATION TEMPLATE.
2. *Create the heading.* I have adopted J. O. Willis's conventions for place-holders: Use namexx and lastxx for first and last names. Use hxx as a place-holder for his/her and he/shexx

SAMPLE REPORT HEADING FOR READING EVALUATION

READING EVALUATION

Name: namexx lastxx	Date(s):
Parent(s):	
Address:	DOB:
Telephone:	Age:
School: schoolxx	Grade:
Evaluator: Your Name and Credentials	

for he/she. I use xx as a note to myself to individualize content or to go back later when I have more information. When I am finished, I can then search for xx to be sure that I have addressed all my concerns.

3. *Add in sections for the referral, background history, test behaviors, an explanation of scoring systems with a visual, test results, conclusions, and recommendations.* You may want to have a separate template for an appendix that would include a complete list of the test scores, test descriptions, and information on scoring systems. Placing the appendix in a separate document makes it easier to cut and paste scores from the appendix into the narrative, where you may wish to group scores from various tests together in order to support your discussion.
4. *Decide on how to structure your report.* Some evaluators organize their reports by test. I find that the report is more cohesive when it is organized by topic. In this way, it is possible to discuss all of the testing that relates to a particular concern at one time in one place. I typically structure my content in the order shown next. (You may, however, feel that a different order will suit your style of presentation better.)

   a. Oral Language
   b. Phonological Processing
   c. Decoding
   d. Fluency
   e. Comprehension
   f. Written Expression
   g. Spelling

5. *For each section, write in language for content that is generic from report to report.* The referral section and the background history section will not have much generic content because these sections should be written based on the individual child; your explanation of the scoring systems used, however, probably will not change much from report to report. If you take the time to develop a visual (see Chapter 5), you will find that parents and novice evaluators will have an easier time understanding your report.

SAMPLE EXPLANATION OF SCORING SYSTEMS USED IN TEMPLATE

The scoring systems used for standardized, norm-referenced tests are not like those used in the classroom. They are based on a comparison between the student and a sample of the population, called a norm group. When a new test is developed, the publishers must ensure that the norm group is representative of the population and that the directions for administration are well written. If the directions do not enable evaluators to administer the test in a standard fashion or if norming sample is not well designed, the scores will not be meaningful.

The different types of scoring systems can make it hard to understand how well a child performs. In the world of standardized, norm-referenced testing, a percentile rank of 50 is perfectly acceptable; it is average. A grade, however, of 50% on a spelling test is not a good thing; it means that the child has failed the test.

In order to understand what the scores mean on standardized tests, we need to have two pieces of information: the mean (M) and the standard deviation (SD). The M is the average; the SD tells us how far the scores spread out or distance from the M. In a normal distribution, ±1 SD captures about two-thirds of the population. Some test publishers (not all) call this span the average range. The specific labels that are provided in test manuals (which differ from publisher to

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publisher) are arbitrary, and they do not specify the need or lack thereof for assistance or specialized instruction.

We can use the Mean and the SD to eyeball scores:

Standard scores (SS) have an M of 100 and an SD of 15. Scores between 90 and 110 capture the middle 50% of the population.

Scaled scores (ss) have an M of 10 and an SD of 3. Scores between 8 and 12 capture the middle 50% of the population.

Stanines (s9) have an M of 5 and an SD of 1.96. Scores between 4 and 6 capture approximately the middle 50% of the population.

Percentile ranks tell us the percent of students in the norm group who earned the same score or a lower score as our student. Percentile ranks from 25 to 75 capture the middle 50% of the population.

A standard score of 110 and a scaled score of 12 both describe the same level of skill; they represent the 75th percentile rank, which is in stanine 6.

Each table of test scores in this report includes whatever type of score is used by a particular test, the percentile rank, the stanine, and the stanine label. In this way, we can discuss performance with respect to one labeling system (stanine) instead of confusing ourselves with different labels for the same score. If you wish to know the label for a score as it is identified by the test publisher, please see the appendix of this report.

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6. *Create tables for test scores.* Tables should include tests of similar content. For each test/subtest provide the test/subtest name, the standard score (SS) or the scaled score (ss), percentile rank, and the confidence interval. Some also add stanines and stanine labels. A table might look like the one shown in Table 6.1. I have bolded the composite scores so that readers recognize that they are not the same as individual subtest scores.
7. *For each test/subtest write a general description of performance (a skeleton statement).* This statement should include three components: the name of the subtest, what the child was asked to do, and the score. I also include the percentile rank because it provides an immediate context for understanding the score.

SAMPLE SKELETON STATEMENTS

On this day, namexx earned a standard/scaledxx score of xx (xx percentile rank) on the ABC Word Identification subtest when asked to read regular and irregular words in a list format.

On this day, namexx earned a standard/scaledxx score of xx (xx percentile rank) on the ABC Fluency subtest when required to read passages aloud while being timed.

On this day, namexx earned a standard/scaledxx score of xx (xx percentile rank) on the ABC Comprehension subtest when asked to respond to multiple-choice questions based on passages that he/shexx read aloud.

Table 6.1 **Sample Test Score Table**

Tests and Subtests of Phonological Processing	Standard/ Scaled Scores	Percentile Rank	90% Confidence Interval	Stanine	Stanine Label
Comprehensive Test of Phonological Processing (CTOPP)					
CTOPP Memory for Digits					
CTOPP Nonword Repetition					
CTOPP Phonological Memory Composite					
CTOPP Elision					
CTOPP Blending Words					
CTOPP Phonological Awareness Composite					
CTOPP Rapid Digit Naming					
CTOPP Rapid Letter Naming					
CTOPP Rapid Naming Composite					
Lindamood Auditory Conceptualization Test, Third Edition (LAC-3)					

My template includes tables and skeleton statements for tests that I commonly use. For each subtest, it is important to describe what the child did and what he or she did not do as well as noteworthy behaviors, comments that students make, and their overall effort. Typically I do not include specific examples from the test; it is important to think in terms of skills and not specific items. There are times, however, when examples, not the actual items, can be used to make a point.

SAMPLE TEST PERFORMANCE DESCRIPTIONS

Aaron identified CVC (consonant-vowel-consonant) words; he did not identify words with VCe (vowel-consonant-silent e) and VV (vowel team) patterns. Aaron hesitated prior to reading; he made numerous attempts to sound out words, but his efforts were compromised by confusion over the rules that make vowels long and short.

Rupert responded to my queries quickly and with confidence. He segmented sounds in the word-initial position; he did not segment sounds in the word-final or word-medial positions. When asked to segment sounds in words with blends, he looked at me quizzically and rolled his eyes.

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Sophie read slowly; she reread passages numerous times before responding. She answered literal questions; she did not respond to inferential questions that required her to think beyond the text and draw conclusions. She frequently attempted to answer my questions by reading sentences word for word from the passage. The sentences that she read were apparently picked because they contained words from the question itself.

The next example was provided by S. E. Morbey (personal communication, August 31, 2011):

There were two subtests involved with the listening comprehension test. Tyler did better on the first one (High Average, stanine 6), which assessed vocabulary by asking him to point to the picture among four pictures that represented the given word (e.g., Point to ''resplendent''). His score on the second subtest, for understanding orally presented passages, was in the Low Average range (stanine 4). Errors suggested a mix of common mistakes, such as not remembering details (short-term memory for specifics), trouble with remembering sequential order (e.g., What was the second thing that happened?), and trouble with the concepts (e.g., What trend is suggested by this data?).

On the reading comprehension test, the passages were not removed from view while Tyler thought about the questions, so he did not have to rely upon memory for the information as on the listening comprehension subtests. He earned a score on the cusp of stanine 4 and stanine 5.

Summary, Conclusions, and Recommendations

Although I have a place in my template for my summary and conclusions, not much content can be written into a generic template. The summary is an opportunity to integrate all of the testing into a cohesive whole within the context of the child's history and academic experience. A summary can be as short as one paragraph; it may be a page in length. The purpose of the summary is to review all results and pull them together into a profile that can be helpful to parents and teachers. Note when different test scores are consistent with each other; also be prepared to provide an explanation for why test scores might differ. Small differences between tests can mean a lot. Children with word-retrieval deficits might perform more successfully on a multiple-choice test than a test with a cloze procedure (filling in the blanks).

If the evaluation is part of a special education determination, the summary should conclude with a recommendation concerning eligibility for specialized instruction. This recommendation, however, is an individual opinion based on the evaluator's interpretation of the data and will not necessarily agree with the opinion or the decision of the team. The decision not to identify a child for special education does not mean that the child does not require additional instruction or support.

Many administrators discourage the inclusion of recommendations in a report due to the fear that they could be held liable for the opinion of an individual evaluator. It is my belief, however, that all reports should end with recommendations for future instruction, whether the instruction is to be in the domain of special education, instruction in the regular classroom, or gifted programming. Willis and Dumont (2002) noted that recommendations based on team discussions potentially can be more insightful and helpful than those written by an individual, and they may defer writing their recommendations until they have had the benefit of the team meeting. If this is the case, team members need to ensure that recommendations based on the evaluation process are indeed written or otherwise recorded. ''Otherwise,'' as Willis and Dumont stated, ''much of the time and money spent on the evaluation will be wasted, and the student will be denied potential benefits of the evaluation'' (p. 218).

My template has an extensive list of recommendations, which I individualize for my student. I generally try to organize my recommendations into modifications, accommodations, and different areas of academic skills. (All reading recommendations should go together.) Each recommendation should be linked to the identified need or concern.

SAMPLE RECOMMENDATIONS THAT ARE LINKED TO STRENGTHS AND WEAKNESSES

1. Given Chuck's slow rate of reading and his poor recall of content, he will require access to text-to-speech software for all textbooks and written materials.
2. Given Chuck's inability to access grade-level text, he will require instruction in a multisensory structured language-based program for reading. This program should incorporate a daily review of sound-symbol correspondence, phonemic awareness, decoding of real words and nonsense words, spelling, and dictation.
3. In order to ensure that Chuck will continue to develop his strong verbal reasoning skills, he will also require direct instruction in word structure and vocabulary as well as activities designed to increase his background knowledge and promote critical thinking skills. Comprehension-related activities should be based on his listening comprehension; they should not be limited to what he can read.

At the close of the report, it is a good idea to say something nice about the child. Parents want to know that we enjoyed being with their children. If a child has been particularly helpful or anxious to please, it is good to say so. If he or she said something unusually perceptive or cute, it is good to end on a positive note. Always provide your contact information and your credentials. Be sure to sign the report.

Report Appendix

Willis and Dumont (2002) recommend providing an appendix to each report that contains information about test scores, a complete list of the student's test scores on one page, and lengthier descriptions of the tests used in the evaluation. In some cases, it is important to include a history of test performance, which is

SAMPLE TEST DESCRIPTION

Test: Lindamood Auditory Conceptualization Test, Third Edition (LAC-3)
Authors: Patricia C. Lindamood and Phyllis Lindamood
Publishers: Pro-Ed 2004

The LAC-3 is an individually administered test designed to measure auditory perception and conceptualization of speech sounds, also known as phonemic awareness. It is suitable for administration with individuals ages 5 through

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18 who understand the concepts of sameness and difference, quantities to 4, and left-to-right directionality. The test was normed on a sample of 1,003 individuals that was selected to reflect the U.S. Census data from 2001.

The LAC-3 consists of series of encoding tasks utilizing colored blocks to represent differences or changes in sound sequences; no reading or knowledge of print is required. The following skills are measured:

- the ability to discriminate one speech sound from another;
- the ability to perceive and compare the number and order of sounds within spoken patterns;
- the ability to identify syllables in words;
- the ability to track changes in spoken syllables; and
- the ability to track changes in individual speech sounds in multisyllable words.

The LAC-3 provides standard scores (M = 100, SD = 15), percentile ranks, together with age and grade equivalents.

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helpful when looking at a child's performance over time.

Turning the Skeleton Into a Human Being

Save your template under the child's last name. Using REPLACE ALL, insert the child's first and last name as well as his/her and he/she into the report. Delete out all references to tests and tables you are not using. You are now ready to begin writing.

Report Writing Style

An evaluation report is not an exercise in creative writing and we who write a lot of reports often have a compendium of explanations and comments in our heads that are ready to be applied at a moment's notice. I am always alert to the language and style used by other evaluators. (It is a great opportunity to learn.) I frequently think about how to update and improve my presentation so that I am in alignment with current theory and research. I also try to work on simplifying explanations so that my report can be easily understood by teachers and parents. A few rules for report writing:

1. *Be sure that you understand your topic.* I find that graduate students and evaluators who cannot write reports with organization and structure are generally struggling with basic content. They cannot organize what they do not understand.
2. *Write the appendix first*. According to Morbey (personal communication, August 14, 2011):

   > *It is helpful to do the appendix first. As you type the scores from your protocols, you will begin to grasp the big picture and related themes. After completing the appendix, you may see obvious themes and immediately know how to organize your narrative within your template. You might, however, find the need to begin the thought process by writing up one test or subtest. For each task, describe what the examinee had to do* (On this test, Sam had to read a long list of isolated words . . .) *and add your observations* (He read steadily and with confidence, easily breaking words into syllables . . .).

3. *Find meaning and implications stemming from the findings*. Again according to Morbey (personal communication, August 14, 2011):

   > *It is your job to find meaning and implications stemming from the findings. You are looking for a thread that shows up multiple times or is going to be clearly evident by your supported discussion. Teacher*

observations and concerns, weak word attack skills documented during testing, and writing samples with poor spelling are all fair game. Even if the writing test does not actually incorporate spelling within its scoring system, for example, you should analyze the writing sample for spelling skills.

Keep asking yourself ''why,'' and gradually you will refine your thinking. Why did he do well on this subtest? Why did he not do well with these items?

Think about the skills involved with the tests and the errors that your student made. If a score is misleading, say so, explaining your reasons; for example: ''Even though Sally's score for reading isolated words was Average, the words were predominantly sight words such as ''done'' and ''come'' that she appears to have committed to memory. Her work with me suggested that she has an excellent memory for words up to about a second-grade level. However, she struggled with unfamiliar phonetically regular words, such as ''eventually.''

The process of writing about your student's performance will help you think more clearly about the whys and the wherefores. With the blessing provided by cut and paste, you can then juggle your written work into an organizational structure to reflect the interpretation you eventually see. (Eureka!)

4. *Write in short paragraphs.* Paragraph structure helps us to establish a frame of reference of what we read. The space between paragraphs helps us to structure the information to come; we know that the information between the spaces goes together.
5. *Write in the past tense and keep sentences short; we are discussing what happened on a particular day.* For example, write: *Benny read slowly, using a deliberate, sounding-out strategy.* You do not know whether he always reads this way, but you may use your findings to support your interpretation or recommendation: *Based on current observations, scores, and reasons for this referral, Benny requires . . .* Do not write sentences in the passive voice. Avoid using ''was able to.'' Willis (personal communication, September 5, 2000) states, ''Students do not generally perform tasks that they are not capable of performing.''
6. *Help the reader get the point by using cue words, such as* however, similarly, but, also, *and* in contrast. Use comparison words and do not worry about repetition. For example, write: *Her strong, mid-average (stanine 5) score for reading isolated words was in sharp contrast to her low (stanine 2) score for reading nonsense words.*
7. *Avoid weasel words.* The term refers to language that is deliberately vague and even misleading. It was first popularized by Theodore Roosevelt, who used it to describe President Wilson's language usage (Lloyd, 1916). Weasel words include, but are not limited to these: *somewhat, appeared to, seemed to, sort of,* and *kind of*. Do not be afraid to write with authority and conviction.
8. *Avoid technical jargon.* We may use jargon and tech talk when speaking with other professionals, but it is not appropriate for an evaluation report. Provide explanations that are clear and concise. Define all terms that are not common to general language usage. When discussing processing disorders, be sure to explain why they are important and how they relate to academic performance. Define all acronyms.
9. *Also consider visual presentation.* Headings, spacing between paragraphs, boldface and italics can all enhance the readability of your report. Do not be afraid to use graphs and charts when the data permits. Graphs and charts are easy to read. Each graph and chart should be accompanied by a statement that summarizes the content.
10. *Be respectful.* Refer to parents by their titles and last names. Do not use ''mom'' or ''dad.'' Do not refer to the child as the ''subject.'' Avoid language that is judgmental when discussing background history and behaviors.

Proofing the Report

As an experienced evaluator, I have developed a special interest in how reports are proofed. Proofing is a process that requires a high degree of alertness to every aspect of written expression from mechanics and punctuation to syntax, organization, and content. I find it truly amazing that many of us work hard to proof our work only to see the typo on the first page of the report upside down on the table from across the room. Such is the wonder of the human brain.

While I may jest about seeing typos from across the room, proofing is serious business. There are two types of errors in reports: fatal and nonfatal. Fatal errors are those such as miscalculating the child's age or grade, which nearly always render all scores incorrect, or misscoring tests. Nonfatal errors are misprints, misspellings, incorrect word usage, and problems with grammar. Any kind of error has the potential for undermining your perceived skill as an evaluator and the strength of your report.

Over the years, I have developed a process for proofing reports:

1. *Never proof when you are tired.* Whenever possible, give yourself a day's break between writing and proofing. It helps to look at the report with fresh eyes. Some evaluators report that they proof more effectively when working with a printed report instead of reading from a computer screen.
2. *Check the first page heading for errors*, such as having ''Parents'' instead of ''Parent,'' and making sure the grade and age reflect the standing at the time of testing.
3. *Scan all scores in the report.* Verify that standard scores, scaled scores, percentile ranks, and performance labels are equivalent.
4. *Recheck all scores that are unusually high or low or that are not consistent with the student's profile.* There is a good chance that these scores are in error.
5. *Read the report carefully*. Some evaluators are better at ''hearing'' their errors than reading them. I prefer to proof my reports by reading them aloud. In this way I can hear awkward constructions and non sequiturs.
6. *Adjust paragraph length and write new topic sentences where needed.*
7. *Review summaries of previous evaluations* to ensure that you have provided the evaluator's name, credentials, the date and reason for the evaluation, a summary of the important information, and important recommendations.
8. *Review the summary, conclusions, and recommendations* to verify that you have addressed all referral questions.
9. *Use spell check.*
10. *If using Microsoft Word, check the readability of the report by using the option that provides readability statistics.* Readability statistics include the percentage of passive sentences, the Flesch Reading Ease Scale, and the Flesch Kincaid Grade Level Scale. The Flesch Reading Ease Readability Formula is based on the average number of words in sentences and the average number of syllables in words. It is a scale from 0 to 100; the higher the score, the easier the text is to understand. A target between 60.0 and 70.0 would ensure that your report is accessible to readers with reading skills at the eighth- and ninth-grade level. You can decrease the readability level of a text by reducing sentence length or by replacing multisyllable words with single syllable words. You may want to rework compound and complex sentences into simple sentences. You may also want to reduce extra verbiage in the form of phrases, adverbs, and adjectives. See Chapter 13 on readability.
11. *Spell check again* to be sure that you have captured all changes made to the report. This is a time when new errors are easily introduced.
12. Last but not least, *reformat* to ensure that tables are contained on one page and the headings do not fall at the bottom of a page. Insert page numbers.

Presentation of the Report to Parents and Educators

I always try to remember that parents often are nervous at team meetings and that nervousness makes it particularly hard for people to remember new facts and concepts. In some cases, parents are struggling with learning disabilities of their own, and their challenges may make them more vulnerable to confusion and frustration. Including a parent interview as part of the evaluation not only provides the family perspective, it also validates parental opinions.

I also try to remind myself that many teachers are not trained in assessment, and they may need as much help as the parents. Some teachers have training in reading disorders, but many of them do not.

Begin by reviewing the structure of the report: what is in the body of the report and what is contained in the appendix. I let parents know that I will be covering material that is typically part of a graduate curriculum and that they should feel free to ask questions at any time. It is particularly important to use a visual aid to explain scoring systems; these scoring systems, in fact, become the major vehicle by which we assess performance. It is always important to establish a clear link between what we test and why; otherwise, the report degenerates into a compendium of statistics. I often fall back on Chall's Stages of Reading Development (1983) or Gough and Tunmer's Simple View of Reading (1986) to put reading skill into a context that parents and teachers can understand.

Build redundancy into your discussion. People need to hear new facts and concepts multiple times. In fact, I generally invite parents to read the report and to contact me later with additional questions or concerns. ''You know,'' I state, ''the most important questions will come to you in the car on the way home.'' Leaving the door open to future contact often relieves parental anxiety and the fear that they might never understand.

Conclusion

While reading comprehension tests may tell us how well a child is reading, they do not identify the weaknesses that contribute to reading challenges. After verifying hearing and vision, comprehensive reading evaluations should potentially investigate two main areas: word recognition and receptive language. The particular components selected for an evaluation will depend on the referral question(s), background history and previous testing, and what we see during testing.

Given that there is no one perfect test of reading, it is the evaluator's job to select tests and subtests that will address all potential areas of concern. Evaluations that are technically accurate, that are based in reading research, and that are mindful of issues related to test design have the potential to help teachers and parents who are concerned about children with reading challenges.

Review Questions

1. Name three ways to double-check your age calculation.
2. Why is health an important component of a background history?
3. Why is instructional history a critical component of a reading evaluation?
4. What is the difference between a ''fatal error'' and a ''nonfatal error''?
5. Miriam's parents are concerned that she may have an attentional deficit in addition to a reading disability. Miriam's teachers also express concern regarding her ability to sustain attention in class. During your testing, Miriam had no difficulty following directions, and she worked without distraction or complaint. How might you reconcile this apparent contradiction?
6. According to his teacher, Marcus has difficulty remembering and understanding what he reads. Marcus, however, performed well on his reading comprehension test, and the team questions whether additional testing is necessary. What is your opinion?

Response to Intervention

7
Chapter

Introduction

In order to put the current debate over the assessment of learning disabilities into perspective, it is helpful to understand the history of the field of learning disabilities and the controversies associated with special education legislation and practices. This chapter examines the efforts to establish a legal framework for educating children with disabilities. The chapter also examines what Response to Intervention (RTI) might have to offer as an alternative to formal assessment and special education.

Brief Historical Perspective on Learning Disabilities and the Law

Franz Gall

The field of learning disabilities has its roots in the early 19th century when Franz Gall (1758–1828), a German physician, became interested in the relationship between brain injury and behavior. His observations of soldiers injured in battle led him to doubt the idea that the mind was part of the spirit. He believed that the mind was actually housed within the gyri, convolutions on the surfaces of the cerebral hemispheres of the brain. It was not spiritual, but corporal, a belief that placed him at odds with organized religion. Science was treading into matters previously entrusted to the Roman Catholic Church. No longer would the church have dominion over all matters intellectual. Gall's research became the genesis for the idea that human abilities could be linked to specific areas of the brain. He believed that the contours of the human skull reflected underlying brain structures and that, as such, they were the physical manifestations of an individual's personality. The field of phrenology became the psychology du jour; specialists provided insight into the human personality and the workings of the mind based on a physical examination of what were essentially bumps on the noggin.

Nineteenth-Century and Modern Studies of the Brain

While phrenology enjoyed a period of popularity among psychologists and even criminologists during the mid-19th century, it lost favor as more became known about the physical functioning of the brain. Two researchers are acknowledged as having brought the study of the brain into the modern age. In the 1860s, Pierre Paul Broca

(1824–1880), a French physician and anthropologist, further defied the church in his efforts to learn more about brain functioning through autopsies of patients with speech impairments. His postmortem research on the brains of individuals who had lost the capacity to speak led to the discovery of a specific location in the brain that governed speech; this region came to be known as Broca's area. Shortly thereafter, Carl Wernicke (1848–1905), a German physician who was inspired by Broca, researched a different type of speech and language impairment in which individuals retained the capacity to generate well-formed sentences but were unable to speak with meaning (often referred to as *word salad*). Wernicke's work led to the discovery of an area in the left temporal lobe, appropriately named after him, that governed the understanding and use of words. The research of Broca and Wernicke was both prescient and daring. Language had been wrestled from the hands of God; it was now a product of humankind.

The growing appreciation for the modularity of the brain set the stage for the concept of a reading disability and the idea that a reading impairment could exist in an otherwise healthy and intelligent adult. Adolph Kussmaul (1822–1902), a German physician known for his work in cardiac disease and labored breathing, was the first to name the phenomenon that caused adults to hear but not understand, and see but not read. Hence, the concepts of *word deafness* and *word blindness* came into the scientific community. The word *dyslexia* was first suggested by a German eye doctor Rudolf Berlin in his 1887 monograph *Eine Besondere Art der Wortblindheit (Dyslexie)* in which he reviewed several case histories of patients who, despite normal vision, could not read. Like Kussmaul, Berlin believed that dyslexia reflected an undefined type of brain dysfunction (R. Wagner, 1973). The Individuals with Disabilities Education Improvement Act of 2004 (IDEIA, as known as IDEA; 20 U.S.C. §§ 1400 et seq.) still contains references to ''conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia'' in the definition of *specific learning disability* (34 C.F.R. Part § 300.8(c)(10)(i)).

Reading Research on Children

Word Blindness: Two physicians, John Hinshelwood from Scotland and W. Pringle Morgan from England, are credited with bringing children into the study of reading disabilities (Hallahan & Mercer, 2001). Hinshelwood's research on adults inspired Morgan (1896) to publish the first case of a child who was unable to read despite recognized intelligence and the long-standing efforts of his teachers and family. Morgan focused on visual processing as the culprit, and he attributed Percy F's word blindness to a defective visual memory. Morgan's research, in turn, served as the catalyst for Hinshelwood's seminal work, *Congenital Word-Blindness* (1917). Hinshelwood's observations led him to three main conclusions: Word blindness generally occurred in males; it was often inherited; and diagnostic criteria for word blindness were poorly defined. Hinshelwood worried about the potential for overidentification, believing that word blindness was relatively rare.

Samuel Orton: Samuel Orton (1879–1948) is generally regarded as the father of the study of reading disabilities in the United States; the International Dyslexia Association was originally named the Orton Dyslexia Society in his honor. In 1925 Orton conducted a study of referred students ''who were considered defective or who were retarded or failing in their school work'' (p. 582). He found that many of these students were actually quite intelligent, and he documented their intelligence with IQ tests, thereby initiating the long-standing and now-controversial practice of including intellectual evaluations in the assessment of reading skill.

Orton (1939) brought what was considered to be a relatively rare phenomenon of a reading disability out of obscurity and into the public domain, citing a true prevalence rate of approximately 10% of the population. He called this reading disability strephosymbolia, and he attributed it to a failure of the left hemisphere to establish dominance over the right. *Strephosymbolia*, which means ''twisted symbols'' in Greek, reflected many of the symptoms that Orton observed in poor readers, including reversals, difficulty with directionality, and mirror reading and writing. Even though Orton's view of mixed cerebral dominance has not been substantiated by research, he is lauded for his insight into reading and for his recommendation that these readers receive multisensory training and phonics instruction. His recognition of reading as a complex system of auditory, visual, and kinesthetic linkages became the genesis for the work by Anna Gillingham and Bessie Stillman (1936) and what is generally referred to as the Orton-Gillingham approach.

Legislation Related to Learning Disabilities and Reading

Concept of a Learning Disability

Despite the ongoing recognition that the ability to read was not necessarily commensurate with overall intelligence, the term *learning disability* did not enter the vocabulary of education until 1962, when it was coined by Samuel A. Kirk (1904–1996), considered by many to be the founder of special education in the United States:

> *A learning disability refers to a retardation, disorder, or delayed development in one or more of the processes of speech, language, reading, writing, arithmetic, or other school subjects resulting from a psychological handicap caused by a possible cerebral dysfunction and/or emotional or behavioral disturbances. It is not the result of mental retardation, sensory deprivation, or cultural and instructional factors. (p. 263)*

Kirk, who is widely regarded as a pioneer in the field of learning disabilities, was instrumental in persuading the federal government to develop an operational definition of the term *learning disability*. While we may all think that we know a learning disability when we see it, the definition of the term has proven to be controversial and, at times, confusing (Fletcher et al., 2001).

It is not easy to define unobservable processes that take place within the brain. Those in the medical profession have historically conceptualized a learning disability as an internal, biologically based ''minimal brain dysfunction.'' In contrast, educators have stressed the notion of an external, performance-based discrepancy between intelligence and academic achievement that presumes a neurological basis (Hallahan & Mercer, 2001). A failure to learn, however, has its roots not only in biology but also in the foibles of society. Would it be possible to acknowledge a failure to learn without inadvertently including those who lacked motivation or those who were economically disadvantaged? There were many who had their doubts.

Education of the Handicapped Act

In 1965 the Elementary and Secondary Education Act (ESEA) Amendment was passed, establishing the first federal grant program for children with disabilities at the local school level; it did not include, however, learning disabilities within the spectrum of handicaps warranting special education services. According to E. Martin (1987), there was concern on the part of parental lobbying groups that the broad definition would open up the well of special education services to vast numbers of children, thereby reducing resources to children who had more commonly recognized disabilities. It took three more years of lobbying efforts to pass the Children with Specific Learning Disabilities Act of 1969, at which point the definition of a specific learning disability became law, and limited funds became available for learning disabilities through discretionary grants.

The Rehabilitation Act of 1973 and the Education for All Handicapped Children Act of 1975

Five years later, Section 504 of the Rehabilitation Act of 1973 (PL 93-112) was enacted, making it illegal to discriminate against individuals with disabilities and requiring that auxiliary aids be provided to those with impaired speaking, manual, or sensory skills. These provisions, together with the concept of equal access, became the framework for the Education for All Handicapped

Children Act of 1975 (PL 94-142), in which students with disabilities were granted the right to a free, appropriate public education (FAPE). PL 94-142 guaranteed that special education would be available to those in need, and it established a process by which decisions regarding eligibility and services were made. For the first time, children with specific learning disabilities were to be protected fully by the law.

The definition in PL 94-142, which remains almost unchanged today (''an imperfect ability'' has been changed to ''the imperfect ability''), described a specific learning disability in part by what it was and in part by what it was not. A specific learning disability could be identified when children experienced an unexpected difficulty learning that was the direct result of a disorder in psychological processing. A learning disability was not to be identified if the learning difficulty was primarily the result of various exclusionary factors.

Individuals With Disabilities Education Act

In 1986 Congress amended the Education for All Handicapped Children Act (PL 99-457) to include preschoolers ages 3 to 5 and to provide incentives to states to serve infants from birth through age 2. Four years later IDEA of 1990 (PL 101-476) passed; the IDEA was a reaffirmation of PL 94-142 that sought, in part, to adopt more child-centered language and to add new disability categories for autism and traumatic brain injury. It also sought to ensure that children were provided with transition services to help bridge the gap from school to employment and independent living. The Americans with Disabilities Act of 1992 (ADA; PL 101-336) was then passed to prohibit discrimination against individuals with disabilities in the workplace. The Americans with Disabilities Act Amendment Act of 2008 (ADAAA; PL 110-325) expanded the list of major life functions covered by the law and precluded consideration of mitigating factors (except for eyeglasses) in establishing a disability.

In 1997 the IDEA was amended (PL 105-17) to provide more detail on individualized education programs (IEPs), evaluation procedures, least restrictive environment considerations, and due process. IEPs were to document annual goals and short-term objectives, the data used to determine such goals and objectives, and the plans for implementation. The law gave preference to the ''least restrictive environment'' to ensure that children with disabilities would be removed from regular education classrooms ''only when the nature or severity of the disability of a child is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily'' (34 C.F.R. § 300.114(a)(2)(ii)).

Confusion Over a Specific Learning Disability: Despite the clarification that PL 105-17 offered, there were problems. We might think that the legal definition of a specific learning disability would provide a certain degree of clarity for teams attempting to identify children for special education and remediate their learning challenges. Unfortunately, this was not the case.

There has long been confusion over what constitutes a learning disability. According to a Tremaine Foundation study (2010), many educators, to this day, confuse learning disabilities with physical, mental, or emotional handicaps. The result of this confusion has been that expectations for children with learning disabilities are sometimes reduced, thereby initiating a cycle of diminished hope, less-than-ambitious goals and objectives, and children who in the end meet low expectations.

Part of the confusion reflects the imprecise nature of the definition. Fletcher et al. (2001) cited challenges associated with the use of one umbrella term for seven academic domains. The use of one term may imply that learning disabilities are all alike and may suggest a one-size-fits-all approach to remediation. It is not unheard of, for example, for children with distinctly different learning disabilities to be placed in the same learning disability (LD) class for a period each day even though Johnny's LD is in math, Debby's LD is in reading, and Seth's LD is in written expression.

The confusion does not end here. Children with specific learning disabilities in written expression, by way of example, vary tremendously. Some children have difficulty formulating sentences; others may formulate sentences but lack skill in organization. These different types of challenges would, therefore, warrant different types of instruction. There was also apparent bewilderment regarding the inclusion of language citing perceptual handicaps, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia. These terms were included to ensure that children diagnosed by clinicians using different terminology would be recognized by the law, presuming that the children met the full criteria for eligibility as interpreted by the evaluation team.

Misunderstandings over the federal definition were magnified by the fact that it was not the only definition in use. According to Willis and Dumont (2002), competing definitions for learning disabilities created no end of confusion for teams saddled with the responsibility of sorting out differences between special education law and medical diagnoses. What was an educator to do?

Reading as a Public Health Problem: In 1999 G. Reid Lyon of the National Institute of Child Health and Human Development cited studies indicating that almost 1 in 5 individuals were struggling with reading and that reading problems had become a national public health issue. According to the U.S. Department of Education (2000), the number of identified students with learning disabilities was approaching 3 million. Many educators expressed concern that students were not being identified appropriately and that the IQ–achievement discrepancy approach, which entailed finding a mismatch between a student's level of intellectual functioning and his or her level of academic achievement, failed to discriminate between students who were truly learning disabled and those who were just low achievers (Fletcher et al., 1994).

Defining a Severe Discrepancy: In addition to the general apprehension over the sheer numbers of students being identified with specific learning disabilities, there was a burgeoning dissatisfaction with the notion of a severe discrepancy between achievement and intelligence. The terms *achievement* and *intelligence* were not well described. The specific intent of these terms was left to the expertise and the discretion of the team, resulting in the accusation that a specific learning disability was whatever the special education team determined or wanted it to be (Coles, 1987).

The latitude given to teams in the determination of a specific learning disability was both a blessing and a curse. The lack of a strict definition meant that teams were free to individualize their evaluations to reflect the strengths and weaknesses of the child in question. The problem was that the notion of a discrepancy presumed that intelligence and achievement were easily definable. Those who study intellectual functioning, however, have never been known for their consensus on matters related to how we think and learn. Intelligence tests themselves are varied in their theoretical foundations, and one intelligence test may not produce the same IQ as another. How should teams define intellectual ability? Clearly, if not all IQs are created equal, how do teams ascertain an appropriate measure of the ability to learn? Perhaps more importantly, do not all children, regardless of their IQ scores, still need to learn to read? The IQ–achievement discrepancy approach did not necessarily involve reasons for the discrepancy. Some teams assumed that a learning disability depressed achievement; others looked for disorders in basic psychological processes.

Mark Penalty: Willis and Dumont (2002) urged that the determination of IQ not be an exercise in generating a single general intelligence quotient but rather a comprehensive evaluation of a child's intelligence with a thoughtful interpretation of the ability to learn. They questioned the validity of establishing a discrepancy when the same disorder in one or more basic processes would affect not only achievement but the IQ score itself, thereby diminishing that discrepancy. Some teams, without clear evidence of a discrepancy, would then declare that there was no learning disability. Willis and Dumont (2002) recommended that evaluators heed the Mark penalty: ''For he that hath, to him shall be given; and he that hath not, from him shall be taken even that which he hath'' (Mark 4:25). The learning disability not only served to make learning a challenge, it also compromised performance on many measures of intelligence.

By way of example, we understand that the IQ score of a child with a visual impairment performing visual-spatial tasks would not be worth the paper on which it was printed. With respect to what might be a less obvious example, the IQs of children with language-based learning disabilities should be similarly suspect. The vast majority of IQ tests include both visual-spatial and verbal tasks, and evaluators can elect to combine these areas to produce one overall, or ''full scale'' score. Difficulties with expressive language skill compromise children's ability to express their thoughts in a manner commensurate with their understanding. This weakness will not only depress measures of academic achievement, it will also depress the verbal portion of the IQ itself. In the end the discrepancy may appear to be less than severe, and the child might be deemed ineligible for special education services.

Matthew Effects: In the same vein, it is well documented that poor readers suffer from underdeveloped vocabulary, background knowledge, higher-level language skills, and abstract thinking ability, costing them all-too-precious points on verbal measures of IQs. This troublesome problem has become known as Matthew effects (Stanovich, 1986) and may well have deprived some of the most seriously involved poor readers of learning disability identifications; not only could these children not read, now they could no longer think.

How Severe Is Severe?: There were also questions about what constituted valid measures of achievement. Was the reading of short passages a proxy for reading textbooks and novels? Was the writing of sentences really representative of skill with essays? Even presuming that we could come to agreement on definitions for intelligence and achievement, the notion of a discrepancy between intelligence and achievement was still fundamentally flawed. The question remained: How severe was severe?

Even though the 1997 law did not specify, many states set up numerical discrepancy criteria, such as 1.5 standard deviation points (22.5 standard-score points) between an ability measure (IQ score) and an academic achievement score (e.g., a standard score for reading). Many school teams deferred eligibility for special education services until children's skills were well below grade level and the severity of the problem was painfully obvious. While this focus on gate keeping may have been intended to permit only truly disabled children to enter the system, it actually served to delay meaningful intervention. In the medical world, this would be the equivalent of delaying a prescription for an antibiotic until the infection was actually septic, what many have called a wait-to-fail model.

What About the Teaching?: Last, but certainly not least, the law presumed that regular education teachers would be using effective methods for teaching reading. Although evaluation teams were to consider the appropriateness of learning experiences, very few teams identified dyspedagogia (poor teaching) as the reason for weak achievement; some did not recognize it and others did not even consider it. Therefore, the LD identification captured students who did not have learning disabilities but who simply needed good instruction. Lyon of the National Institute of Health and Human Development referred to the learning disability category as a ''sociological sponge to wipe up the spills of general education'' (Colvin & Helfand, 1999, p. 1).

Research on the state of regular education was damning. Only 29 states required elementary teachers to take coursework in reading (Nolen, McCutchen, & Berninger, 1990). Louisa Moats, the authority on research-based teacher training, criticized state certification practices and preservice teacher training programs for not educating teachers in the skills needed to teach reading and spelling (1994b). Lyon, Vaasen, and Toomey (1989) found that 93% of the 440 undergraduate teachers surveyed had not been trained in student diversity; many teams lacked the ability to discriminate between a language difference and a language disorder. Special education was filled with children whose failures were not due to intrinsic processing deficits but to extrinsic deficits in instruction.

No Child Left Behind

In 2001 Congress amended the ESEA as the No Child Left Behind Act (NCLB; PL 107-110). The intent of the law was to reform education by setting high standards for schools through the establishment of measurable goals, increased accountability, and research-based instruction in the classroom. Public schools were required to ensure that all students would demonstrate proficiency in math and reading by the 2013–2014 school year. Schools that did not demonstrate adequate yearly progress would face the prospect of decreased funding and, in the worst cases, possible closure. In addition, parents would have the option of removing their children from failing schools and enrolling them in schools with proven records of success.

Individuals With Education Disabilities Improvement Act

In 2004 IDEA was reauthorized and renamed the Individuals with Disabilities Education Improvement Act of 2004 which continues to be referred to as IDEA. The reauthorization stressed the importance of aligning the law with the vision of education described in NCLB. High expectations were to be established for all children as a means of ensuring their access to the general education curriculum in the regular classroom (20 U. S.C.§1412(a)(5)(A)). Children were to be prepared for three things: further education, employment, and independent living (20 U.S.C. §1400(d)(1)).

IDEA incorporated many changes in the IEP process, due process, and the provisions for discipline. Reading fluency was added to the existing seven areas of academic achievement in which a specific learning disability could be identified. While the new law preserved the original definition of a specific learning disability, it also implemented changes in the way that a learning disability could be identified.

INDIVIDUALS WITH DISABILITIES EDUCATION IMPROVEMENT ACT OF 2004: DEFINITION OF SPECIFIC LEARNING DISABILITY: § 300.8 (A)(10)(I).

Additional Procedures for Identifying Children With Specific Learning Disabilities: 34 C.F.R. § 300.307.311

Definition of Specific Learning Disability (§300.8(c)(10))

(10) Specific learning disability is defined as follows:

(i) General. The term means a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or to do mathematical calculations, including conditions such as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.

(continued)

(ii) Disorders not included. The term does not include learning problems that are primarily the result of visual, hearing, or motor disabilities, of mental retardation, of emotional disturbance, or of environmental, cultural, or economic disadvantage.

Additional Procedures for Evaluating Children with Specific Learning Disabilities Cited in Part (34 C.F.R. § 300.307)

(a) General. A State must adopt, consistent with § 300–309, criteria for determining whether a child has a specific learning disability as defined in § 300.8(c)(10). In addition, the criteria adopted by the State—

(i) Must not require the use of a severe discrepancy between intellectual ability and achievement for determining whether a child has a specific learning, as defined in § 300.8(c)(10);
(ii) Must permit the use of a process based on the child's response to scientific, research-based intervention; and
(iii) May permit the use of other alternative research-based procedures for determining whether a child has a specific learning disability, as defined in § 300.8(c)(10).

Local educational agencies would no longer be required to make a determination regarding eligibility based solely on a severe discrepancy. They would also be permitted to use a process known as Response to Intervention (RTI).

Response to Intervention

Response to Intervention is a process whereby students are given interventions and monitored as needed. The purpose of RTI was to ensure that the needs of all learners would be met promptly, systematically, and effectively. The intent was to address the instructional needs of at-risk children through practices rooted in data taking, scientific research, and skilled teaching. The hope was that such an approach would lead not only to improved achievement in the classroom but also to decreased enrollment in special education. No longer would children be referred to special education as the result of instruction that was poorly conceptualized and badly implemented.

The RTI classroom was to feature the best of what the brightest minds in education could offer. It would reflect high-quality, research-based instruction and behavioral supports, collaboration among professionals, and ongoing monitoring of student progress. Every aspect of instruction and every tool for progress monitoring was to be executed with fidelity; not only would educators be required to ensure that teaching methods were research based, they would also be charged with ensuring appropriate student groupings and a scientifically determined instructional dosage.

National Institute of Child Health and Human Development Studies

A significant impetus behind the increased standards for accountability was the research on so-called late bloomers and the work conducted by Lyon et al. and the National Institute of Child Health and Human Development (NICHD; 1999). Three longitudinal studies addressed the question of whether early reading challenges were the result of a developmental lag or an actual skill deficit. Juel's study (1988) of children from first grade to fourth grade found that first graders with poor reading skills had deficits in phonemic awareness and that almost 90% of them would remain poor readers in fourth grade. Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1996) found that low-achieving or reading-disabled students often demonstrated a temporary improvement in grades 1 to 6 but that they were not able to maintain their rate of growth in middle school and high school. The last nail in the coffin was the third study. S. Shaywitz et al. (1999) demonstrated that, on average, children behind in reading in elementary school never caught up. Not to despair, the NICHD research suggested that early, systematic intervention for children with reading difficulty could reduce the numbers of poor readers by almost 70%, significantly reducing costs associated with special education.

Inherent within the RTI model was also the hope that the numbers of linguistically and culturally diverse students referred for special education would also be reduced (National Joint Committee on Learning Disabilities, 2005). Not only struggling English-speaking students but also those struggling to learn English as a second language would be monitored and receive the needed instruction without having to go through a long process.

RTI Service Delivery

Educators who are working to embrace an RTI model face the responsibility of defining the service delivery system, a task that has challenged special education professionals since its inception. According to Mastropieri and Scruggs (2005), ''present conceptualizations of RTI are varied and ambiguous at best with respect to the specific roles of teachers and diagnosticians'' (p. 525). RTI is generally envisioned as having two to four tiers, with each successive tier providing instruction that is increasingly specialized with teachers who have greater amounts of expertise (Burns & Ysseldyke, 2005; O'Connor, Harty, & Fulmer, 2005; Tilly, 2008). D. Fuchs, Mock, Morgan, and Young (2003) discussed four large-scale implementations of RTI that are considered to be examples of best practice: the Heartland Agency Model, Pennsylvania's Instructional Support Team, Ohio's Intervention-Based Assessment, and Minneapolis Public Schools' Problem-Solving Model. These models have demonstrated significant improvements in learning as well as a decrease in the number of students referred for special education (Burns, Appleton, & Stehouwer, 2005).

In an RTI system, children's placement in a given tier is based on teacher input, knowledge of the child's educational history as well as data from screenings and progress monitoring probes. All tiers are implemented in the regular classroom. Tier 1 instruction provides scientific, research-based instruction within the regular curriculum, accommodating about 80% of the student population. The Tier 1 core literacy program should be regarded as the first line of defense in the effort to ensure that all children become readers. Despite the apparent increase in the availability of what are advertised to be research-based programs, however, not all instructional reading programs are what they claim (Moats, 2007). Many programs that reportedly pay homage to the five core areas of good reading instruction (phonological awareness, decoding, fluency, vocabulary, and comprehension), as defined by the National Reading Panel, do so without necessarily providing sufficient direct instruction and opportunities for practice in each specific area.

Presuming that we have addressed issues relating to methodology and fidelity, children's progress toward scientifically established benchmarks is to be monitored with curriculum-based measures (CBM) (to be addressed later in this chapter). Suffice it to say here that we should be measuring the skills that are actually being taught in the classroom; the tools selected for progress monitoring should align with curriculum content. If we are teaching phonological awareness, we should be monitoring progress in phonological awareness. If we instead monitor oral reading fluency, we may not see indications of improvement, not because there is no improvement but because we are not measuring what children are actually learning.

Children who do not make adequate progress in Tier 1 become candidates for Tier 2, which comprises about 15% of the student population.

Tier 2 offers instruction that is tailored to meet the individual needs of the child. In Tier 2 children may receive small-group instruction or individual tutorials from a variety of educators and specialists. Data are taken to monitor each child's response so that instruction can be adjusted as needed. In a two- or three-tier system, there are two types of Tier 2 RTI: the Problem-Solving Model (PSM) and the Standard Protocol Model (SPM) (D. Fuchs & Fuchs, 2006). RTI models with four tiers generally offer an SPM in Tier 2 prior to the more individualized, intensive PSM that would be provided in Tier 3 as modeled in Figure 7.1.

Problem-Solving Model: The PSM is an individualized approach to remediation in which skilled educators make decisions regarding assessment and intervention. The PSM follows a sequence of four steps: (1) identification of the problem, (2) analysis of the problem, (3) implementation of an intervention, and (4) ongoing evaluation of the effectiveness of the intervention. D. Fuchs and L. Fuchs (2006) pointed out that the PSM presumes a high degree of expertise. With this model, there is no pro forma response; educators individualize all interventions and make decisions regarding interventions based on their knowledge of assessment, instruction, data, and research. Given its potential for individualization, some have criticized the PSM as a method that lacks validation by research.

Standard Protocol Model: The SPM is thought to be easier to implement than the PSM; it offers less potential for individualization. Tier 2 SPM interventions are predetermined; they are delivered in the same way for all children. School districts considering a SPM must provide research-based interventions that are implemented with fidelity by trained personnel. Decisions must be made regarding progress monitoring and the mechanisms by which children will be moved from one tier to another.

Although it might sound simple, the question of movement between tiers is quite complex. What triggers movement from one tier to another? Should children who respond to Tier 2 be returned to Tier 1, or is their response evidence that they are receiving the type of instruction that they

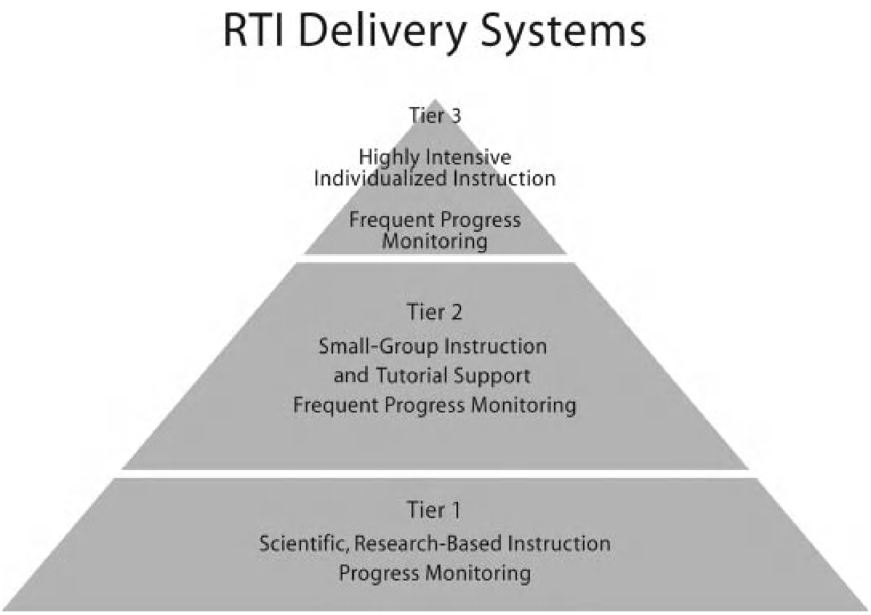

Figure 7.1

RTI Delivery Systems

require in order to sustain long-term progress? Do we know to what degree short-term progress is indicative of long-term success? Is progress linear, or do children experience surges in learning along with periods of limited growth as part of a normal learning curve?

Many of the children who are successful with Tier 2 will rejoin their classmates in Tier 1. Non-responders (about 5% of the student population) would then be considered for the more intensive and more individualized instruction that is part of Tier 3; they may also be referred and/or identified for special education. At this point, in contrast to the pre-RTI days, we should be relatively certain that children referred for special education have received good instruction and that they are not among the ''instructional casualties'' of the regular education curriculum (Gresham et al., 2005, p. 28).

Failure to Respond: Most children who fail to respond to Tier 2 interventions will be identified as having a specific learning disability that adversely affects educational performance. Currently there are many questions, however, concerning the mechanism by which children will be identified (Hale, 2008). First and foremost are questions regarding the nature of the intervention itself. Given that teacher training has not changed substantially since RTI became law, can we be certain that interventions are indeed research based and that they are being implemented with fidelity? A second question concerns the heart of the definition of a specific learning disability (SLD). Can children be identified as having an SLD without an evaluation of their basic psychological processes? Should remediation essentially be based on a series of trials in the classroom, or should it also include a comprehensive understanding of a child's strengths and weaknesses? The definition of a specific learning disability cites a ''disorder in one or more of the basic psychological processes'' (§ 300.8 (c)(10)). However, the preface to the 2006 Regulations for the IDEA 2004 states:

> *The Department does not believe that an assessment of psychological or cognitive processing should be required in determining whether a child has an SLD. There is no current evidence that such assessments are necessary or sufficient for identifying SLD. Further, in many cases, these assessments have not been used to make appropriate intervention decisions. However, § 300.309 (a)(2)(ii) permits, but does not require, consideration of a pattern of strengths or weaknesses, or both, relative to intellectual development, if the evaluation group considers that information relevant to an identification of SLD. In many cases, though, assessments of cognitive processes simply add to the testing burden and do not contribute to interventions. As summarized in the research consensus from the OSEP Learning Disability Summit (Bradley, Danielson, and Hallahan, 2002), ''Although processing deficits have been linked to some SLD (e.g., phonological processing and reading), direct links with other processes have not been established. Currently, available methods for measuring many processing difficulties are inadequate. Therefore, systematically measuring processing difficulties and their link to treatment is not yet feasible.'' (Preface, 2006 Final Regulations, p. 446651; See 34 C.F.R. Part 300)*

Differing Points of View

The 2006 Regulations set off a firestorm that has scorched the pages of psychoeducational journals and Internet blogs. The differing points of view are best represented by the Learning Disabilities Association (LDA) of America's White Paper on Evaluation, Identification, and Eligibility Criteria for Students with Specific Learning Disabilities (Hale, 2010) and the response presented by the Consortium for Evidence-Based Early Intervention Practices (Abernathy et al., 2010). I will attempt to summarize them here.

In 2008 the Learning Disabilities Association partnered with a group of professionals who were concerned that the SLD definition was no longer germane to the regulations governing SLD evaluation and identification. Those contributing to the LDA White Paper acknowledged the value of an empirically validated RTI model. They, however, advocated maintaining the SLD definition, together with a third path to identification that would assess processing strengths and weaknesses (PSW) in the context of deficits in achievement. The advantage to this approach over RTI was that interventions would be individualized based on full knowledge of a child's strengths and weaknesses and not just classroom performance.

The consortium's response (Abernethy et al., 2010) disputed the LDA findings. In a statement highly critical of the LDA experts and the research on which the position was based, the consortium stated that the PSW approach was not only irrelevant to the classroom but would also serve to divert school intervention personnel and resources from those practices that would be of real benefit to children. The consortium's response echoed the view of D. Fuchs, L. Fuchs, Mathes, Lipsey, and Roberts (2001), who believed that formal assessment has little at this point to offer the field of LD. They also believed that low achievement in the face of research-based instruction should be sufficient to serve as the primary criterion for an LD identification.

There are those, however, who are fervent in their conviction that both cognitive assessment and RTI have the potential to enrich classroom practices. Hale (2008) cautioned educators to avoid the temptation to ''jump on bandwagons'' (p. 10). Each approach, he stated, must be examined within the context of the individual child, and each must ultimately lead to effective interventions. Kavale, Kaufman, Naglieri, and Hale (2005) believed that RTI is best viewed as part of a rigorous referral process; they stressed the need for multiple data sources that include cognitive assessment. Torgesen (2001) advocated a two-stage approach that combines monitoring of early intervention with the identification of processing weaknesses in children. From Torgesen's perspective, the direct assessment of processing weaknesses would permit children with common learning problems to be identified prior to school failure. It would also potentially support a greater link between instruction and areas of need. Willis and Dumont (2006) called for a combination of both RTI and individual psychoeducational assessment. RTI, they believed, offers the potential for a faster response; individual psychoeducational assessments might offer answers to those children whose complexity warrants more than ''a shot in the dark'' (p. 907). Should RTI yield acceptable progress for a student in a reasonable span of time, there would be no need for additional assessment, but little response to several carefully planned interventions would call for a psychoeducational assessment.

The use of multiple procedures, including cognitive assessment, was stressed in 2006, in the U.S. Department of Education's ''Analysis and Commentary'' on the 2004 IDEA Final Regulations:

> *Consistent with § 300.304(b) and section 614(b)(2) of the Act, the evaluation of a child suspected of having a disability, including an SLD, must include a variety of assessment tools and strategies and cannot rely on any single procedure as the sole criterion for determining eligibility for special education and related services. This requirement applies to all children suspected of having a disability, including those suspected of having an SLD (p. 46646)*
>
> *. . . RTI is only one component of the process to identify children in need of special education and related services. (p. 46647)*

In 2009 the Supreme Court clarified the need for evaluators to avail themselves of a variety of procedures in the identification of an SLD. In the *Forest Grove School District v. T.A.* (52 IDELR 151, U.S., 129 SCt. 2484 (2009) case), the Court ruled that the parents of a child with a disability were entitled to tuition reimbursement even though the child had not previously been identified as having a disability. Germane to the decision was the fact that the multidisciplinary team did not identify the student due, in part, to a psychoeducational evaluation that did not assess the student in ''all areas of suspected disability,'' as required by law (20 U.S.C. § 1414(b)(3)(B)). According to Dixon, Eusebio, Turton, Wright, & Hale (2010), the decision should serve as a warning to school psychologists to ensure that evaluations are comprehensive and that they include all areas of a suspected disability. However, the decision appears to fault the district for failing to evaluate all suspected areas of disability, not all areas of a suspected disability.

Regardless of the method used for identifying specific learning disabilities, § 300.309(b) of the 2006 IDEA Regulations, as noted earlier, requires that

> *(b) [t]o ensure that underachievement in a child suspected of having a specific learning disability is not due to lack of appropriate instruction in reading or math, the group must consider, as part of the evaluation described in § 300.304 through 300.306—(1) Data that demonstrate*

that prior to, or as a part of, the referral process, the child was provided appropriate instruction in regular education settings, delivered by qualified personnel; and (2) Data-based documentation of repeated assessments of achievement at reasonable intervals, reflecting formal assessment of student progress during instruction, which was provided to the child's parents.

Implementing an RTI Model

RTI, as conceptualized by the law, is not intended to be a continuation of the tried and not-so-true teaching practices that have predominated in many classrooms for the past several years. In order to implement an RTI model, schools must be prepared to reconceptualize the classroom and to train teachers, evaluators, and support personnel in screening, research-based methodologies, and progress monitoring. The vision is noble; RTI practices should ensure that the natural variations in how children learn will be accommodated in the classroom. Children who fail to respond to regular education teaching practices will be offered instruction that embraces their own styles of learning without being labeled as having a disability.

According to the National Joint Committee on Learning Disabilities (2005), the RTI classroom would require educators to expand their roles and take on new expertise. Regular education teachers would assume broader responsibility for teaching and data collection; special education teachers and specialists would help with data interpretation and become trained in a variety of research-based methods and materials. Administrators would have to acquire expertise in research-based practices, dealing with appropriate allocation of support services, and knowledge of professional development opportunities. While there has been much focus on issues related to RTI progress monitoring and assessment, the success of the RTI classroom depends on a research-based core curriculum that is implemented with fidelity.

Curriculum-Based Measurement

Experienced educators are painfully aware of the controversies over how we teach children to read, and there are few teachers who have not participated in highly charged discussions over what is right for a given child. One of the untouted advantages of an RTI classroom is the potential for letting the data speak for themselves. Effective teaching practices will manifest themselves in classrooms filled with students who can read and meet research-based benchmarks for learning. What then should our expectations be with respect to a comprehensive literacy program and RTI?

Torgesen, in a presentation to the International Dyslexia Association in November 2008, addressed the question of what percentage of children could be expected to achieve grade-level skill in reading. He told of the lessons learned from the Kennewick School District in Washington state when the school board decided that 90% of its students would be reading on grade level within 3 years. As we can imagine, the elementary school principals responded with the usual complaints of a population of children with low socioeconomic status who were unprepared to enter school. The general consensus was one of doubt. Within 5 years and a lot of hard work, however, 94% of third graders at Washington Elementary School were reading on grade level. A few years later, with additional fine-tuning, 98% to 99% of the third grade students were reading at grade level. The change at Washington Elementary was attributed to three main factors: the quality, the quantity, and the timing of direct instruction in reading (Fielding, Kerr, & Rosier, 2007).

Curriculum-based measurement (CBM) is a data-based model for progress monitoring that permits teachers to track how well students are acquiring basic skills in reading, math computation, spelling, and written expression (Shinn, 2002b). (Remarkably, oral language assessment is absent.) It is meant primarily for students in grades 1 through 6. CBM testing is not summative; it is formative. Its purpose is not to measure what children have learned but to measure how well children respond to instruction. In this way, instruction can be changed or fine-tuned as needed. Jim Wright's Intervention Central (http://www.interventioncentral.org) provides at no cost a great deal of useful information and many practical tools for CBM.

According to L. Fuchs and D. Fuchs (2003), each CBM probe must be designed to measure curriculum skills for a given grade level. By measuring the same skills repeatedly, it becomes possible to document students' progress toward research-based benchmarks. This approach has the advantage of being standardized; that is, the probes are administered and scored in the same way by each teacher. As a result, data on student performance can be collected at the classroom, the grade, the school, or even at the district level.

CBM measures require students to execute basic tasks while they are being timed. The focus on speed (or fluency) permits educators to evaluate not just accuracy but also ease of performance, an important consideration that is sometimes overlooked (Hudson, Lane, & Pullen, 2005; Pikulski & Chard, 2005). The use of the term *fluency* should not be understood as reading with intonation and phrasing; fluency in the CBM world is strictly interpreted as the speed of a given task, usually skill per minute.

CBM tests, or probes, are relatively easy and quick to administer, requiring only 1 to 4 minutes of actual testing time. In contrast to traditional, norm-referenced standardized testing, they can be administered frequently, in some cases on a weekly or even biweekly basis for students who are deemed to be at risk. Benchmark testing is typically done three times yearly. Benchmark probes are administered in sets of three; the median score is used to determine benchmark status. Median scores are used because they are more statistically reliable than arithmetic averages (means) for small groups of data.

CBM for reading measures include phoneme segmentation and letter naming, as well as nonsense words, oral reading, and mazes (selecting one of three words to fill in a missing word). There are also measures for math, spelling, and written expression (correct word sequences). Typically data are graphed so that progress toward a benchmark (goal) can be easily seen.

The graph in Figure 7.2 shows Matthew's progress toward a fourth-grade-level benchmark of 115 words correct per minute. Matthew's skill is measured on a weekly basis; the vertical line indicates changes in instruction. We can see that the amount of Matthew's instruction was increased in November and that this increase resulted in a short-term improvement in his rate of learning. Unfortunately, Matthew has not been able to sustain the rate needed to meet the end-of-year benchmark. The last three data points—which are well below the aim line—indicate the need to adjust Matthew's instruction again. Matthew's team now needs to respond to the data. The team may consider a variety of options from enhancing or changing the reading program, providing Matthew with smaller group or individual instruction, or increasing the amount of the instruction provided. Progress monitoring is of no benefit if it does not serve as the stimulus for improvement.

CBM permits teachers to monitor student progress, identify students who require additional supports, and measure the effectiveness of classroom instruction. For all its advantages, however, CBM is not a substitute for diagnostic/cognitive testing that may reveal why children are experiencing difficulty and point to more individualized and specialized instruction. CBM should also not be regarded as a substitute for mastery testing or for more in-depth assessment requiring students

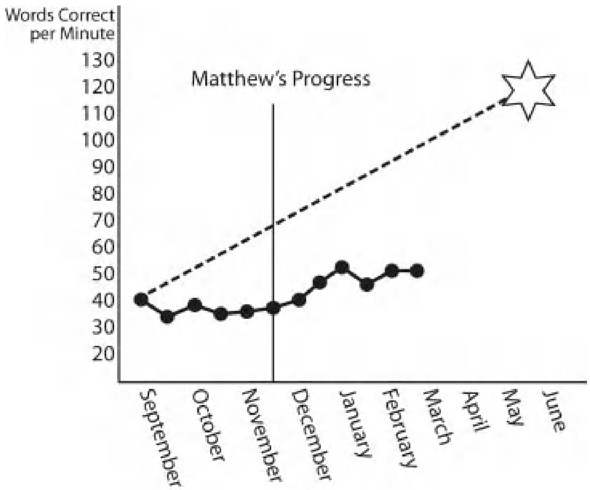

Figure 7.2

Example of CBM Graph

to engage in higher-level thinking and problem-solving skills. While the results of CBM testing may indicate who is learning and who is not, they do not provide information on specific skills that may or may not be in a child's repertoire. This is an important component of diagnostic teaching.

Dynamic Inventory of Basic Early Literacy Skills (DIBELS) Next (Good & Kaminski, 2010) and AIMSweb (Pearson, 2001) provide research-based standardized CBM assessments.

DIBELS Next

DIBELS Next (successor to DIBELS, 6th ed.) consists of several individually administered 1-minute fluency measures that can be used to determine risk status (benchmark assessment) and monitor progress in reading for students in grades K through 6 as well as provide data for system level analyses. DIBELS is not intended to be used as the sole measure of a child's reading skills; it was conceptualized as part of a comprehensive literacy support system of data-based decision making.

DIBELS can be administered to all students who are learning to read in English (students who are not physically able to take the tests are excluded). There is a version of DIBELS for Spanish: the Indicadores Dinámicos del Éxito en la Lectura (IDEL). A Braille edition with separate norms can be obtained by contacting the publisher. A limited number of accommodations are permitted, including large print, colored overlays and adjustments in lighting, amplification of the tester's voice, repetition of practice items due to distraction, and a marker or ruler to focus student attention.

DIBELS Next is available free online for those willing to download and print their own materials; preprinted materials can be purchased from Sopris at http://www.soprislearning.com. DIBELS also offers a data-management system that is operated by the Center for Teaching and Learning at the University of Oregon; this fee-based system permits school personnel to monitor progress at the student, classroom, school, and district level. The fee is $1 per student per academic year. There are different options for training. For additional information, see https://dibels.uoregon.edu/.

DIBELS Next reportedly reflects 4 years of research on over 25,000 children in over 90 schools; scores are based on aggregate norms. At the present time, no information is provided regarding the degree to which these norms reflect U.S. demographics. DIBELS Next features two new subtests (First Sound Fluency and DAZE [DIBELS Maze]), new directions and content, new scores, a checklist of common responses to aid with interpretation, and a more child-friendly font. Due to past concerns regarding the variability observed by many evaluators on the Oral Reading Fluency (ORF) 6th edition passages, DIBELS Next passages were written to meet grade-specific ranges of difficulty as measured by common readability formulas and the DMG Passage Difficulty Index (Cummings, Wallin, Good, & Kaminski, 2007). The DMG Passage Difficulty Index is based on word difficulty, semantic difficulty, and passage difficulty.

The DIBELS Next measures, shown in Table 7.1, are designed to assess basic early literacy skills while the student is being timed.

Powell-Smith, Good, and Atkins (2010) in the *DIBELS Next Oral Reading Fluency Study* provided a comparison of new DIBELS Next passages and the median DIBELS 6th Edition end-of-year benchmark ORF passage for schools that may require longitudinal data as part of their decision-making process. There are significant changes in words correct per minute from the 6th edition to DIBELS Next. Educators who are switching from one edition to the next will need to be aware of these differences. This comparison can be found at: https://dibels.org/papers/DIBELSNext_Readability TechReport_2011-08-22.pdf.

AIMSweb

AIMSweb is a fee-based progress-monitoring system that provides CBMs for early literacy and numeracy (grades K–1), reading and written expression (grades 1–8), and mathematics (grades 1–6). There are also Spanish CBMs for early literacy for grades K to 1 and Oral Reading Fluency

Table 7.1 **DIBELS Next Measures**

Domain	DIBELS Next Measure	Grade Level	Task
Phonemic Awareness	First Sound Fluency (FSF)	K: Fall and Winter	FSF requires students to identify the initial sound in spoken words.
	Phoneme Segmentation Fluency (PSF)	K: Winter and Spring 1: Fall	PSF requires students to segment spoken words into sounds.
Sound-Symbol Correspondence and Basic Phonics Skills	Nonsense Word Fluency (NWF)	K: Winter and Spring 1: Fall, Winter, and Spring	NWF requires students to read made-up words. Scoring is based on correct letter sounds and whole words read.
Fluency and Accuracy	Oral Reading Fluency (ORF)	1: Winter and Spring 2–6: Fall, Winter, and Spring	ORF requires students to read and retell passages orally. Student performance is based on number of words read correctly per minute and accuracy. The quality of the retell is analyzed for comprehension.
Reading Comprehension	Daze (DIBELS Maze)	3–6: Fall, Winter, and Spring	Daze asks students to read a passage and circle 1 of 3 words that make the most sense in the passage. It can be administered individually or in a group.
Predictor	Letter Naming Fluency (LNF)	K: Fall, Winter, and Spring 1: Fall	LNF measures risk status only; there are no benchmarks. LNF is not considered a basic early literacy skill; it is not necessary to improve reading skill.

for grades 1 to 8. This multi-tier system involves benchmark testing three times yearly, strategic monitoring of at-risk students, and progress monitoring for students with intensive instructional needs. Promotional literature describes AIMSweb as a ''comprehensive progress monitoring system and RTI solution,'' a description that some have found confusing. AIMSweb is actually designed to be implemented within the context of a comprehensive research-based literacy program.

AIMSweb materials as shown in Table 7.2 can be downloaded or purchased in a printed format. Testing is done individually or in groups, depending on the measure. The 1- to 4-minute tests are administered ''pencil/paper style''; scores are then entered into the AIMSweb system, which provides web-based data reporting and information-sharing applications with different levels of access. Scores are based on aggregated norms which means that they are based on the collective data submitted to AIMSweb by their customers. According to AIMSweb, norms are adjusted yearly to reflect new data. Targets for performance may be set based on the aggregate norms, local norms, or correlations with other standardized tests. AIMSweb stresses the importance of administering the probes precisely as delineated in the Administration and Scoring Guidelines; no modifications are permitted. There are options for online training, on-site training, and workshops with other professionals.

Data can be presented in a variety of formats at the individual, class, school, or district level based on user preference and need; the progress-monitoring graphing tool permits educators to chart progress. Educators can track individual student history as well as document referral information, team members, task assignments, and instructional planning as part of determining special education eligibility. For additional information, see www.AIMSweb.com.

Table 7.2 **AIMSweb Measures**

AIMSweb Measures	Grade Level	Task
Oral Reading Fluency	1–8	Students are required to read passages aloud for 1 minute; the passages are then scored for accuracy and fluency.
Maze	1–8	Students are required to circle 1 of 3 words that best complete a sentence for 3 minutes.
Spelling	1–8	Students are required to write dictated words for 2 minutes. Words are dictated at a rate of every 7 seconds for students in grades 3 and above; words are dictated at a rate of every 10 seconds for grades 1 and 2. Scoring is based on the number of correct letter sequences and the number of words spelled correctly.
Written Expression	1–8	Students are required to write a story for 3 minutes based on an orally presented story prompt. Passages are scored for the number of total words written, correct word sequences, and words spelled correctly.
Letter Naming Fluency	K: Fall, Winter, and Spring 1: Fall	Students are required to provide letter names while being timed for 1 minute.
Letter Sound Fluency	K: Fall, Winter, and Spring 1: Fall and Winter	Students are required to provide letter sounds while being timed for 1 minute.
Phoneme Segmentation Fluency	K: Winter and Spring 1: Fall and Winter	Students are required to segment orally presented words into individual speech sounds while being timed for 1 minute.
Nonsense Word Fluency	K: Winter and Spring 1: Fall, Winter, and Spring	Students are required to read made-up words aloud while being timed for 1 minute.

Establishment of a School-Wide System

Changing the behavior and practices of an individual can be hard; changing the collective behaviors of school professionals can be even more difficult (McBride, Dumont, & Willis, 2004; Zirkel & Thomas, 2010). ''Change by its very nature invites resistance, and if RTI is implemented without adequate administrative buy-in, support, and leadership, teachers will not buy in, and the change agent can quickly become the scapegoat for a systemic failure''(McBride, Dumont, & Willis, 2011, p. 93). Adopting an RTI approach to teaching and assessment is facilitated when teachers and specialists are confident that they will have sufficient training and support to take on new responsibilities and skills. By the same token, evaluators need to have more training in research-based instruction. All educators need to be confident that RTI practices will result in improvement in their own teaching and assessment skills and that, in the end, student performance will be the better for it.

Prevention and early intervention efforts can be instrumental in reducing the number of culturally and linguistically diverse students who are referred to special education (Garcia & Ortiz, 2006).

The next eight steps should be considered as part of a school-wide effort to adopt an RTI system:

1. Become educated about best practices in RTI and set up your own RTI system carefully. Conduct a review of current best practices in RTI models with the goal of understanding potential improvements in student outcomes. (Additional RTI resources can be found in Table 7.3.) This review should focus not only on school/district wide data but on issues related to curriculum, differentiated instruction, treatment fidelity, dosage, scheduling, and staffing. Identify the number of tiers that will be adopted; determine whether a standard protocol model, a problem-solving model, or both will be used. Determine staff needs. Ensure that a data-driven process is clearly identified for movement from one tier to another; ensure that policies for handling nonresponders and referrals to special education are documented and that they are consistent with state and federal law.
2. Develop a comprehensive research-based literacy program. Identify research-based curricula within the school district that address the five components of reading and that have a proven track record. Identify additional curricula, methods, materials, and trainings that will be required. Keep in mind the diverse needs of students who score below benchmark; some will require programs that offer more intensive instruction in phonological awareness and phonics; others will require more intensive instruction in vocabulary, syntax, and comprehension. Staff trainings must include ongoing support in the classroom for teachers and support personnel. Establish a system by which fidelity checks ensure that programs are implemented according to their research base. Parents should receive training in supporting literacy and how they can help at home.
3. Ensure that classroom practices are effective and that classroom time is well used. The National Reading Panel's review (2000) of instructional practices stressed the importance of including direct, systematic instruction in phonemic awareness, phonics, spelling, fluency, vocabulary, comprehension, and writing. The panel noted that systematic phonics instruction was particularly effective for students in kindergarten through sixth grade regardless of socioeconomic status and risk status. Juel and Minden-Cupp (2000) found that instruction based on controlled-vocabulary texts was generally more effective than instruction based on trade books. A caveat to this research, however, reminds us that children are diverse in their reading needs; students with low literacy usually benefit from direct instruction in phonics, and students with higher literacy benefited from instruction based on trade books. Moats's research (1994b) spoke to the importance of teachers being formally trained to use well-designed reading programs instead of creating their own curriculum.

   Children at risk require instruction that is more explicit and more intensive than that of their peers. Explicit instruction does not leave anything to the imagination, and it does not assume that children will make connections about the nature of sounds and letters on their own. The pace of the curriculum will have to be adjusted to accommodate students' mastery of skills taught. Although well-balanced and integrated systematic instruction in the classroom can dramatically reduce reading failure in first and second grade (Foorman, Francis, Fletcher, Schatschneider, & Mehta, 1998), children whose lack of preparedness to read may warrant instruction that is beyond what the regular education teacher has to offer, even in the best of circumstances (Torgesen, 2000).

   There are different ways to increase instructional intensity for those in need: either through more time in the classroom or by providing small-group instruction (Elbaum, Vaughn, Hughes, & Moody, 1999). Foorman and Torgesen (2001) noted the importance of providing more emotional support as well as increased opportunities for feedback and scaffolding. Simply increasing instructional time of an inappropriate program is not effective; how instructional time is allocated should be in concert with the needs of the individual child (Harn, Linan-Thompson, & Roberts, 2008). Older children require substantially more instruction than their younger peers, and more research is needed on what types of interventions will be more effective in helping children to read with fluency (Torgesen, 2004).

4. *Ensure that children who are culturally and linguistically diverse are given proper consideration*. Brown and Doolittle (2008) wrote that the presumption of research-based and appropriate instruction as part of RTI is more problematic for students who are English language learners (ELL) given most teachers' lack of expertise in the needs of ELLs. They wrote that RTI should include a systematic process for understanding the many variables that are associated with ELLs, a review of classroom practices with respect to the individual learner, multiple sources of data on students, and a knowledgeable and nondiscriminatory interpretation of performance. Teachers must have knowledge of ELL students' language proficiency in language 1 and language 2, and they must be sensitive to differences in culture. Brown and Doolittle wrote: ''In other words, a child's language and culture are never viewed as liabilities but rather as strengths upon which to build an education'' (p. 6). According to Ortiz (2001), teachers require training in instructional strategies for students who are culturally and linguistically diverse as well as procedures for monitoring progress in both oral language and literacy.

   Garcia and Ortiz (2006) provided a series of questions that need to be addressed as part of the RTI/prereferral process for ELL students. These questions have been summarized below:

   a. Is the student having difficulty and have prereferral interventions been initiated to improve performance in the classroom?
   b. Have the curricula and instructional materials been proven to be appropriate and effective for ELL students? Have teachers incorporated additional instruction in language to help students develop their academic language proficiency?
   c. Have the problem(s) been documented in multiple settings? How does the child function with respect to his or her own linguistic and cultural group? Does the child have difficulty communicating in his or her native language?
   d. Has there been a systematic effort to identify possible problems or mismatches between the teacher and the student, learning style, and teacher expectations? Is the teacher qualified to provide dual language instruction or English as a second language interventions? What resources have been enlisted to provide the student with native language support?

   If the student has not responded to bilingual education supports, it may be appropriate to consider other types of support services, such as Tier 2 instruction. Tier 2 instruction should be more explicit and more intensive than what was previously provided, taking into account the needs of ELLs. ELLs who do not respond to Tier 2 instruction can then be considered for Tier 3 and/or special education.

5. *Determine tools for benchmark testing, progress monitoring, and data management.* Set up a universal screening for all students three times yearly. Establish dates for benchmark testing and schedule necessary personnel. Establish a schedule for monitoring Tier 2 students (monthly minimum) and for Tier 3 students (bimonthly minimum). Develop a schedule for periodic data review and for decision-making regarding tier placement and adjustments in individualized instruction. Ensure that all personnel are trained in data collection and interpretation and that ongoing support and fidelity checks are provided.
6. *Identify students' risk status (low, moderate, or high) according to benchmark testing.* Place students into tiers based on their risk status, teacher input, and past educational performance. Given the diversity of students, there may need to

be more than one Tier 2 group; it may be necessary to consider grouping children from different classrooms in order to meet their needs. Monitor progress and adjust instruction to increase rate of learning when needed.

7. *Evaluate classroom, school, and district performance with the ultimate goal of ensuring that all students achieve grade-level performance in reading.* Keep the focus positive and not punitive. Examine all aspects of curriculum and implementation from fidelity to student groupings, dosage, and effective use of class time. Ensure that the intensity of instruction is sufficient to decrease and close the gap for students who are seriously discrepant in their reading skills.
8. *Celebrate growth.* Additional resources for those wishing to research support materials for RTI can be found in Table 7.3.

Table 7.3 **Additional Resources for RTI**

Source	Web Site	Comments
AIMSweb	http://www.aimsweb.com/	Product-based information regarding trainings, support services, links to curriculum, and research data.
Curriculum-Based Measurement	http://cbmnow.com/	A basic overview of CBM for parents, teachers, psychologists, principals, and school districts.
DIBELS Next	http://dibels.uoregon.edu/	The Dynamic Measurement Group provides free downloadable access to DIBELS measures as well as information related to professional development and a variety of products.
Florida Center for Reading Research	http://www.fcrr.org/	A wealth of information on reading and research-based practices, instructional materials, and progress monitoring.
Intervention Central	http://www.interventioncentral.org/	Created by Jim Wright, school psychologist and administrator, this web site provides teachers, schools, and school districts with free articles and tools designed to support RTI.
National Center on Response to Intervention	http://www.rti4success.org/	This web site was funded by the Office for Special Education Programs (U.S. Department of Education) for the purpose of supporting states and districts in their efforts to implement proven methods for RTI.
National Center on Student Progress Monitoring	http://studentprogress.org/	This web site was also funded by OSEP with the goal of disseminating information about progress monitoring.
What Works Clearinghouse	http://ies.ed.gov/ncee/wwc/	This web site was funded by the U.S. Department of Education for the purpose of providing trusted scientific evidence for what works in education.

Conclusion

Response to Intervention offers the potential for addressing reading challenges in the classroom as part of the natural variation in the way that children learn. The benefits are many; RTI presumes, however, that teachers, specialists, and support staff will be trained in scientific research-based methodologies and that such instruction will be delivered with fidelity.

Review Questions

1. Your school is presently implementing an RTI model, and there have been numerous discussions regarding a Standard Protocol Model and a Problem-Solving Model. Explain the strengths and weaknesses of each approach.
2. You are working with a team that is monitoring the progress of students in the classroom. A small group of students is not improving in the area of reading fluency. The team wishes to implement additional opportunities for repeated readings—that is, fluency training. What are your thoughts?
3. The team is discussing the profile of a child who demonstrated significantly weak skills in verbal comprehension and verbal knowledge in contrast to strong spatial abilities. His Full Scale IQ is below average. The team says that there is no severe discrepancy and that the child is performing commensurate with his ability. Discuss the possible impact of the Mark Penalty and why the team might want to reexamine the data.
4. Discuss the argument for basing interventions on a complete understanding of a child's strengths and weaknesses, together with data from the classroom.
5. What is the single most effective way of reducing the need for special education referrals?

Role of Intellectual Assessment

Chapter 8

Introduction

The 19th-century schism between the soul and intelligence led to the need for a way to distinguish between the two. Now that intelligence was earthbound, what was it? How should it be described? Was it a single unitary construct, a burst of white light fashioned in the tradition of the soul? Or was it perhaps more like a rainbow with varied colors or abilities representing a global ability to interact with the environment?

This chapter is designed to help you understand what the study of intelligence has to offer the field of reading. Whether you actually administer measures of intellectual functioning is not important. What is important is that you be able to ask questions, speak knowledgeably, and participate meaningfully in team meetings in order to make informed decisions about children's education.

In this chapter we introduce different views of intelligence and the ways in which intelligence is measured. We review different types of IQ tests and how they relate to the skill of reading. As part of this discussion, we examine the question of learning styles in the classroom, an issue that is often misunderstood by teachers and parents alike. In the end, we briefly visit the controversies associated with IQ and academic achievement.

Intelligence: What It Is and What It Is Not

There are many different ways to be intelligent. The potential for humans to excel at different types of problem solving, in fact, has made it difficult for theoreticians to reach consensus regarding what intelligence is and what intelligence tests should measure. The lack of agreement is not new; over 80 years ago, Spearman (1927) described intelligence as ''a word with so many meanings that finally it has none'' (p. 14).

The traditional view of intelligence is that it is a single entity that can be measured. According to S. E. Morbey (personal communication, February 11, 2011), most people cannot define intelligence but, when pushed, would say that it involves reasoning, knowledge, and ''being smart.'' In 1983 Howard Gardner proposed the concept of multiple intelligences as part of an effort to acknowledge skills that often go unrecognized in traditional classrooms. Gardner felt that Piaget's focus on logical-mathematical intelligence was limited in its vision; not all students with straight A's on their report cards had the wisdom to succeed in life. Gardner was critical of IQ testing; the traditional view of intelligence, in his view, was too narrow in its scope.

Gardner (1983, 1987) suggested that musical, bodily-kinesthetic, spatial, interpersonal, and intrapersonal skills should also be recognized and nurtured. In 1999, Gardner added two additional intelligences, which he called ''naturalistic'' and ''existential''; a third, ''spiritual,'' was on the horizon. The concept of multiple intelligences created a public relations coup in the popular press. Gardner successfully elevated skills that previously might have been referred to as talents to the level of intelligences in their own right; in Gardner's view, a society that valued multiple intelligences would foster a community of thinkers with infinite potential for dealing with the challenges that life had to offer.

Although Gardner's perspective was criticized for lacking in definitional rigor and empirical evidence (Waterhouse, 2006a, 2006b), other theoreticians also criticized what they believed to be an overly constrained focus in the field of intelligence. Robert Ornstein (1986) referred to the preoccupation with linguistic and logical-mathematical intelligence as ''The Western Intellectual Tradition,'' the acronym for which was TWIT. Along a similar line, Daniel Goleman (1995) suggested that traditional views did not account for factors such as emotional intelligence, which permitted individuals to function in real life. Robert J. Sternberg (1985) proposed a triarchic theory of intelligence that took intelligence out of the psychometricians' hands and placed it in real-world environments with a focus on how individuals solve problems, execute plans, and use information selectively. More recently, Stanovich (2009) asserted that IQ tests are not comprehensive and that they fail to measure important traits such as judgment and decision making—rationality. We have all, for example, praised the value of ''street smarts''—exceptional common sense reasoning in urban settings—and yet the term has not made its way onto any formal test battery.

Measuring How Smart We Are

To return to the field of psychometrics (how we measure intelligence), an intelligence quotient (IQ score) provides information regarding how an individual performs a standardized set of tasks in comparison to his or her peers. When the field of intellectual assessment was in its infancy, IQ was conceptualized as a ratio of mental age (MA) divided by chronological age (CA), multiplied by 100. (Multiplying by 100 eliminated the decimal and made the quotient more user friendly.)

$$\mathrm{IQ} = \frac{\mathrm{MA} \times 100}{\mathrm{CA}}$$

The concept of MA was intended to capture the notion of age-appropriate functioning in contrast to those who were behind or those who were advanced for their ages. An IQ score of 100 was considered average. A 10-year-old child with delays who functioned at an MA of 8 would receive an IQ of 80. A 10-year-old child who functioned at an MA of 13 would receive an impressive IQ score of 130. Unfortunately, as Kaufman (2009) aptly pointed out, a year of mental growth has different meanings for different ages, and MAs do not work well for older individuals. A 90-year-old individual functioning at a mental age of 60 would receive an IQ of 67, a score that would suggest severely impaired ability. In reality, most of us could only aspire to function as well in our twilight years. Test makers tried to solve this problem by using a selected chronological age, such as 16, as the divisor for all older examinees.

David Wechsler of Intelligence Scale fame changed how intelligence was reported. Wechsler (1939) introduced (for individually administered tests) the use of standard scores to describe intellectual functioning. Instead of focusing on mental age, Wechsler's scores enabled evaluators to measure intelligence in the context of a norming sample. Although the terminology persists, IQ scores are no longer based on a quotient, and now they have different labels, including but not limited to General Conceptual Ability, Full Scale Score, Broad Cognitive Ability Composite, and General Cognitive Index. There are those researchers who have noted that IQ scores are on the rise (Flynn, 1987). Do not get too excited; we are probably not smarter than our parents. The issue is, more likely, that we are better at the things that IQ tests measure, which Stanovich (2009, p. 13) called ''the mental abilities measured by intelligence tests'' or MAMBIT.

IQ scores fascinate us, and most of us wonder just how smart we are. It comes as a surprise to many that an IQ score is not an immutable number that is fixed in the universe or coded in our genes. Because IQ tests reflect the theoretical inclinations of their respective authors, they do not all measure the same set of skills. As a result, IQ Test A may not provide the same score as IQ Test B.

Some IQ tests, such as the Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003), are primarily designed to provide a measure of general intelligence (Willis, Dumont, & Kaufman, in press). Others, such as the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV; Wechsler, 2003a) or the Differential Ability Scales, Second Edition (DAS-II; Elliott, 2007a), include multiple subtests to permit evaluators to focus on different levels or constructs of intellectual functioning, such as verbal ability (language-based thinking) and nonverbal ability (thinking with tasks involving pictures or objects). These differences fall on a continuum; for example, the RIAS has separate verbal and nonverbal scales. The WISC-IV has four indexes (Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed). The DAS-II has three clusters (Verbal, Nonverbal Reasoning, and Spatial); it also permits evaluators to group the Nonverbal Reasoning and the Spatial Clusters in a Special Nonverbal Composite. It is the responsibility of the evaluator and respective team members, using their collective expertise, to determine the most appropriate measure of IQ.

Differences between IQ scores are compounded by the way in which the scores are interpreted. Evaluators interpret IQ scores based on their views of how intelligence should be measured for particular individuals (Willis, Dumont, & Kaufman, 2011, in press). The question of what constitutes a valid measure of IQ for a given individual has serious implications. Expectations in the classroom rise and fall based on teachers' perceptions of how smart children are. How we define intelligence also has important consequences in society at large; a few IQ points here or there can lead to life-and-death decisions for individuals with intellectual disabilities charged in capital punishment cases (McGrew, 2009a).

Without digressing too much from the larger topic at hand, suffice it to say that there are many mitigating considerations regarding the measurement of intelligence. They can potentially include one's view of competing theories, how strengths and weaknesses are determined, interpretation of the law, issues of test reliability and validity, cultural and linguistic diversity, the child's background history, referral questions, and teacher concerns.

While we may not agree on exactly what intelligence is and how to measure it, there are some things that IQ tests do that are less controversial. IQ tests measure skills at a given point in time, skills that reflect our genetic endowment within the context of interpersonal, environmental, and cultural factors. IQ test scores predict, at least in part, success in school as well as success in different careers and professions (Gottfredson, 2008; Jensen, 1998). When measured with the same instruments, IQ scores are fairly constant from early childhood through adulthood (Sattler, 2008). There is no evidence that males are smarter than females or the converse (Neisser et al., 1997). It is true, although contentious, that males generally score higher on measures of visual-spatial and mathematical skills and that females often perform more successfully on verbal tasks. The etiology for these differences is not well understood. While biology may play a role, some of the differences may be explained by societal expectations and how we raise our children. Perhaps boys *do* play more with blocks. In any event, the essential issue is the functioning of one individual, not of groups of which she or he may be a member.

Beginnings

The question of individual differences in intelligence has occupied great minds since the latter part of the 19th century. Francis Galton was inspired by his blood relation, Charles Darwin, to study variation in human intelligence. He coined the term *nature versus nurture* and founded the field of psychometrics by which we now measure aspects of mental functioning (Bulmer, 2003). In 1904 Charles Spearman published an article in which he described intelligence as a single global entity (*g*) that operated across different intellectual domains. According to Spearman (1904), this pool of intelligence manifested itself differently depending on the task (s). His research demonstrated that mental abilities correlated highly with one another. In other words, if you were verbally adroit, chances were that you were also good at spatial thinking. According to adherents to this theory, no matter what you do, *g* shines through.

The first American intelligence test came on the scene in 1916 with the publication of Lewis Terman's The Measurement of Intelligence: An Explanation of and a Complete Guide for the Use of the Stanford Revision and Extension of the Binet-Simon Intelligence Scale. Terman adapted Alfred Binet's pioneering efforts to identify children with special needs in France to measure the thinking skills of children in America. The Stanford-Binet Intelligence Scales, with a norming sample of over 1,000 children, standardized procedures for administration and scoring, and a classification chart for IQ levels, became the industry standard for the next 50 years.

Wechsler Scales

David Wechsler had a grander view of intelligence. He defined intelligence as ''the *overall* capacity of an individual to understand and cope with the world around him'' (1974, p. 5; emphasis added). In doing so he transformed IQ tests from mere measures of cognitive processes to clinical assessments of the individual as a whole (Kaufman, 2009). The Wechsler Scale subtests were not designed to measure various mental abilities in their pure unadulterated state. The individual subtests were complex, integrating in some cases both verbal and nonverbal skills, capturing how individuals used their many resources to solve specific problems. The Picture Arrangement subtest on the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III; Wechsler, 1997), for example, required individuals to arrange a series of pictures in a logical sequence. This task, however, opened itself to a variety of interpretations ranging from thinking in pictures to verbal narrative skill or even a combination thereof.

Wechsler believed in the importance of a global intelligence (*g*). Despite this view, he was responsible for introducing separate verbal (language-based thinking ability) and nonverbal (''performance,'' or thinking ability with visual material such as pictures and objects) scales. These scales were each represented by their respective IQ scores (now called Indexes on the WISC), a practice that is continued in the Wechsler series of tests today. Much of the discussion of learning styles in the classroom comes from the Wechsler dichotomy of verbal and nonverbal intelligence.

The introduction of multiple IQ or index scores on the Wechsler-Bellevue Intelligence Scale in 1939 opened the door to the world of profile analysis (e.g., Rapaport, Gill, & Schafer, 1945), in which practitioners interpreted patterns of strengths and weaknesses. Kaufman, a leading advocate for profile analysis (e.g., Flanagan & Kaufman, 2009; Kaufman & Kaufman, 1977), argued that *g* had limited use for children with learning difficulty and that it did not necessarily contribute to an understanding of a child's unique profile as a learner. We could, after all, have several children with remarkably different skill sets who all would earn the same IQ score. In the examples shown in Table 8.1 and described next, students have the same Full Scale IQ; they differ considerably in their strengths and weaknesses.

Huey has excellent spatial and graphomotor abilities despite poor expressive vocabulary and verbal thinking skills. Dewey, however, has an excellent command of words and a strong working memory; he struggles with visual-spatial and visual-motor tasks and has poor skill with pencil in hand. Louie is adept at verbal and visual-spatial tasks but has challenges due to what many refer to as weak executive functioning (i.e., deficits in working memory and processing speed). Despite these differences, all three boys have the same Full Scale IQ.

Kaufman's text, *Intelligent Testing with the WISC-R* (1979), provided step-by-step instructions for

Table 8.1 **Comparison of Three Students With the Same Full Scale IQ**

	Huey			Dewey			Louie		
WISC-IV Indexes	**SS**	**%ile**	**S/W**	**SS**	**%ile**	**S/W**	**SS**	**%ile**	**S/W**
Verbal Comprehension Index: Vocabulary and Verbal Reasoning	75	05	↓	110	75	↑	108	70	↑
Perceptual Reasoning Index: Visual-Spatial and Visual-Motor Skill	108	70	↑	79	08	↓	106	66	↑
Working Memory Index: Short-Term and Working Memory	80	09	↓	110	75	↑	80	09	↓
Processing Speed Index: Graphomotor Skill	128	97	↑	83	13	↓	80	09	↓
Full Scale IQ	95	37	↔	95	37	↔	95	37	↔

SS = standard score, %ile = percentile rank, S/W = strength (↑)/weakness (↓)

interpreting an individual's relative strengths and weaknesses. This approach effectively deemphasized global IQs while increasing the interpretive role of the examiner. While many practitioners and researchers found this approach to be empowering, others (e.g., Bijou, 1942) were not so impressed, resulting in the rallying cry ''Just say no subtest analysis'' (McDermott, Fantuzzo, & Glutting, 1990).

Historically, researchers and test designers have placed themselves along a theoretical intelligence spectrum, ranging from those who believe in one global intelligence (e.g., Jensen, 1998) to those who believe in many (e.g., Cattell, 1941; Horn & Cattell, 1966). Willis, Dumont, and Kaufman (2011) characterize these individuals as ''lumpers'' and ''splitters'' using terminology introduced by V. McKusick in 1969. As an evaluator or member of a special education team, it is important to know whether you are of the ''single-minded or fractured-minded persuasion''; your command of theory and research will form the basis for how you select tests, interpret test data, and, in the end, perceive a child's ability to learn.

Cattell-Horn-Carroll Theory

Cattell-Horn-Carroll (CHC) theory, based on the idea that intelligence is composed of abilities that cluster into different groupings, is by and large representative of the most widely accepted view of intelligence today.

Raymond Cattell (1941, 1963), who broadened the study of intelligence to include children, proposed a view of intelligence based on two main types of cognitive abilities: fluid reasoning and crystallized intelligence. Fluid reasoning (*Gf*) was conceptualized as an adaptive nonverbal ability to perceive relationships among novel or unfamiliar stimuli and to use inductive and deductive reasoning. Matrices, paired associations, and figure analyses are all types of fluid reasoning tasks. According to Cattell (1941), fluid intelligence was primarily biological and neurological in nature. (We can only speculate that some innate capacity for on-the-spot problem solving was probably critical to the survival of the species). Some have argued that *Gf* may actually be our best measure of *g* (e.g., J. Gustafson, 1988).

In contrast, crystallized intelligence (*Gc*) reflects skills that are largely dependent on education and environment, such as vocabulary and verbal concept formation. As we become older and more experienced, we expand our repertoire of crystallized skills. At the same time we become less adept at confronting novel problem-solving tasks (*Gf*). The expression ''to become set in our ways'' captures how our problem-solving skills change as we become older.

Cattell together with his doctoral student, John Horn, expanded the *Gf/Gc* dichotomy to include a host of other *g*'s, what we now call *Gf/Gc* theory. In 1965 Horn added four additional abilities, securing a place for visual processing (*Gv*), short-term memory (*Gsm*), long-term storage and retrieval (*Glr*), and speed of processing (*Gs*) in the pantheon of mental abilities. By the 1990s the model had been expanded to accommodate 9 or 10 abilities, with the 10th, reading and writing skills (*Grw*), crossing into the domain of academic achievement (Horn, 1998; Horn & Noll, 1997). Despite what the *Gf/Gc* theory name suggests, *Gf* and *Gc* did not enjoy more prestige in comparison to the other abilities. The new abilities commanded equal stature in all respects.

Gf/Gc theory was soon to be followed by John B. Carroll's unprecedentedly comprehensive analysis of cognitive abilities (1993), in which he proposed the Three Stratum theory. The Three Stratum theory is a hierarchical model of intellectual functioning with Spearman's *g* at its pinnacle, broad abilities at the second stratum, and highly specific, narrow abilities in the third stratum. Broad or primary mental abilities were defined as higher-order constructs that govern how individuals perform within specific domains (e.g., General Memory and Learning, Broad Auditory Perception, and Broad Retrieval Ability). Narrow abilities reflected highly specialized skills that clustered together under the umbrella of a broad ability; General Memory and Learning, for example, includes Memory Span and Working Memory. According to McGrew and Wendling (2010), the broad ability composites offered the best average predictive validity; it is the narrow abilities, however, that warrant the most attention by educators.

According to McGrew (2009b), the Three Stratum theory marked the first time that ''an empirically based taxonomy of human cognitive ability elements was presented in a single organized framework'' (p. 2). McGrew described this work as the psychometric equivalent of Newton's *Mathematical Principles of Natural Philosophy,* a book that advanced the field of physics through the introduction of the mathematical reasoning used in calculus. Horn himself (1998) compared it to Mendeleev's periodic table of the elements. Theoreticians were trying to accomplish what the Structuralists failed to do in the field of linguistics; they were developing a grammar of cognition, in which they defined the elements of thought and the rules by which they were combined.

Cattell and Horn's *Gf/Gc* theory and Carroll's Three Stratum theory, although developed entirely independently, were remarkably similar. In 1997 McGrew presented an integrated model of intelligence based on the collective research by Cattell, Horn, and Carroll. After making some revisions, McGrew and Flanagan (1998) and Flanagan, McGrew, and Ortiz (2000) developed the model that that we now call CHC theory, as shown in Figure 8.1.

Researchers continue to refine our understanding of cognition within the context of CHC theory. Factor-analytic studies, expert consensus studies, and data from the fields of neurocognition and inheritability are all involved. The theory encompasses 10 broad abilities and over 70 narrow abilities, and the list continues to grow. McGrew (2009b), in fact, recommended that we consider the CHC framework not as a capstone but as a ''stepping stone'' (p. 1) in the investigation of human intelligence.

Theory Meets Assessment

According to Kevin McGrew in 2005 (p. 144), a ''fortuitous set of events . . . resulted in the psychometric stars aligning themselves'' making the Woodcock-Johnson Revised (WJ-R; Woodcock & Johnson, 1989) the first instrument linking *Gf-Gc* theory to the assessment conducted by practitioners in educational settings. The Woodcock-Johnson III Tests of Cognitive Abilities (WJ III; Woodcock, McGrew, & Mather, 2001b) became the first instrument based on CHC theory, addressing 9 of the 10 broad abilities in the cognitive and achievement batteries collectively.

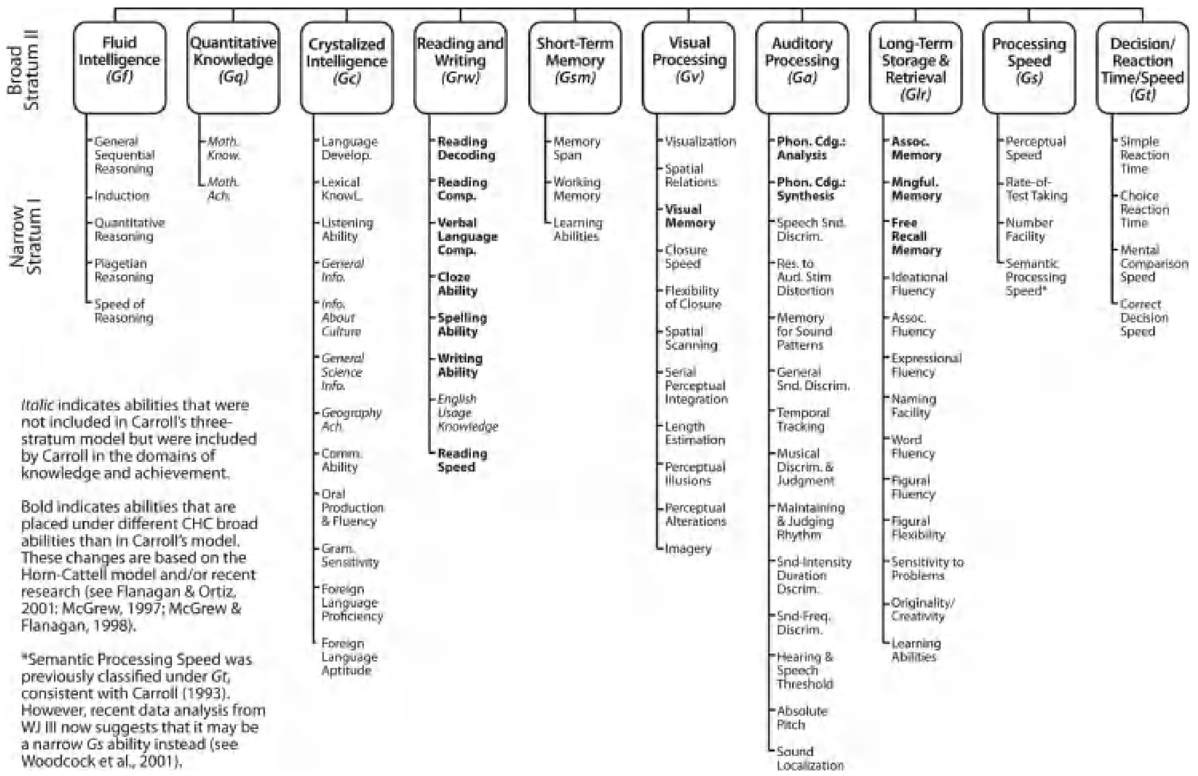

Figure 8.1

Cattell-Horn-Carroll Theory of Cognitive Abilities
Reprinted with permission from *Essentials of Cross-Battery Assessment*, 2nd ed., by D. Flanagan, S. O. Ortiz, and V. C. Alfonso (Hoboken, NJ: Wiley, 2007), p. 276.

CHC theory now serves as a foundation and common language for test development and interpretation; most, though not all, of the major test batteries either use CHC classifications or have been using CHC theory as they revise and update new editions of tests (Flanagan, Ortiz, & Alfonso, 2007).

Cross Battery Assessment

Cross Battery Assessment (XBA) was developed by Kevin McGrew, Dawn Flanagan, Samuel Ortiz, and colleagues to provide evaluators with an empirically based, psychometrically sound framework that would permit school personnel to draw meaningful conclusions about the relationship between cognition and academic performance (Flanagan & McGrew, 1997; McGrew & Flanagan, 1998). The ''cross battery'' of XBA refers to the use of different tests/subtests in order to ensure a comprehensive and yet theoretically defensible evaluation that would be sensitive to specific areas of concern. No longer would evaluators be limited by the theoretical and practical confines of single test batteries; ''sound principles would guide practitioners to design evaluations that would address the abilities relevant to a particular child and particular concerns'' (Flanagan et al., 2007, p. 1).

A full discussion of XBA is beyond the scope of this text; a comprehensive discussion can be found in Flanagan et al. (2007) and on the Cross-Battery Assessment Web site (http://www.crossbattery.com/). Briefly, evaluators using an XBA approach follow a series of four steps:

1. An intelligence test battery is selected with thoughtful consideration of a child's background history, including known strengths and weaknesses and referral concerns. A child with vision or fine-motor difficulties, for example, will likely have trouble with tests involving these skills as prerequisites for success. If we are attempting to measure intelligence, we want to be sure that we are actually measuring intelligence and not weaknesses, such as visual acuity or the ability to control a pencil.
2. The test battery is analyzed to identify the CHC abilities and processes that are represented. Much of this analysis has been documented in Flanagan et al. (2007).
3. Additional tests/subtests are selected to measure pertinent CHC abilities and processes that are not addressed in the primary battery or that are represented with only one test. There are several considerations for test/subtest selection; some have raised concerns critical of XBA practices (e.g., Watkins, Glutting, & Youngstrom, 2002; Watkins, Youngstrom, & Glutting, 2002). XBA enthusiasts (Flanagan et al., 2007) have recommended that tests be classified according to the CHC taxonomy (step 2 above) and that there be a minimum of two different indicators (tests measuring two different narrow abilities) for each stratum 2 ability. The selection of narrow abilities requires knowledge of the different processes and their relative contribution to the domain being tested; narrow abilities are not equal in their predictive values or in their effect. Flanagan et al. (2007) also have recommended limiting the number of test batteries as well as selecting tests normed within a few years of one another in order to reduce issues related to the use of different norming samples.
4. Tests are administered as necessary, and the clusters are interpreted within the context of XBA guidelines.

If you are wiping your brow in contemplation of this effort, we now review reading within the context of CHC cognitive abilities.

Abilities Measured in IQ Tests and How They Relate to Reading

As defined by the CHC taxonomy, Reading/Writing Ability (*Grw*) is a general term that includes basic reading skills (decoding) and reading fluency as well as the understanding and the expression of written language. Experienced evaluators will recognize that the narrow abilities within this broad category, as currently conceptualized, are represented by the various subtests on the WJ III Tests of Achievement. The narrow *Grw* abilities are shown in Table 8.2.

According to Flanagan et al. (2007), educators seeking to assess a child with poor reading skill need to be knowledgeable about reading achievement and how it is supported or compromised at different ages by particular processes or, in the CHC lingo, abilities. While comprehensiveness is lauded as one of the principle benefits of an XBA approach, research also indicates that it is possible to do a more limited evaluation focusing on key abilities that just relate to reading or writing (Floyd, Keith, Taub, & McGrew, 2007).

Flanagan, Ortiz, Alfonso, and Mascolo (2002, 2006) identified Auditory Processing (*Ga*), Crystallized Intelligence (*Gc*), Long-Term Retrieval and Storage (*Glr*), Short-Term Memory (*Gsm*), and Processing Speed (*Gs*) as the abilities playing the largest roles in reading achievement. They stressed that these abilities provide important information for teachers beyond what can be explained by *g* alone. Here we briefly review the relationship between abilities and reading from the CHC perspective. (For an examination of these abilities in greater depth, see Chapters 10, 11, and 12.)

Based on what we now know about the role of language in reading, we should not be surprised that Crystallized Intelligence (*Gc*) plays a

Table 8.2 **Narrow *Grw* Stratum I Ability Definitions**

Narrow Stratum I Name Reading/Writing (*Grw*)	Definition
Reading Decoding (RD)	Ability to recognize and decode words or pseudowords in reading.
Reading Comprehension (RC)	Ability to comprehend connected discourse during reading.
Verbal (printed) Language Comprehension (V)	General development, or the understanding of words, sentences, and paragraphs in native language, as measured by *reading* vocabulary and *reading* comprehension tests.
Close Ability (CZ)	Ability to supply words deleted from prose passages that must be read.
Spelling Ability (SG)	Ability to spell.
Writing Ability (WA)	Ability to write with clarity of thought, organization, and good sentence structure.
English Usage Knowledge (EU)	Knowledge of writing in the English language with respect to capitalization, punctuation, usage, and spelling.
Reading Speed (RS)	Time required to silently read a passage or series of sentences as quickly as possible.

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substantial role beginning in the early years of reading development and continuing into adulthood (McGrew, 1993; McGrew, Flanagan, Keith, & Vanderwood, 1997). Numerous studies have demonstrated the relationship between reading skill and Auditory Processing (*Ga*)—that is, the perception, discrimination, and manipulation of individual speech sounds in spoken words particularly during the early years (e.g., Goswami, 2000; Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997).

The strength or weakness of Short-Term Memory (*Gsm*) also has a significant effect on reading achievement (McGrew, 1993); however, Flanagan et al. (2002, 2006) noted that the majority of the studies focused on measures of the narrow ability of working memory (*Gsm* MW) (holding information in memory, manipulating it, and using it within your thinking) and not necessarily short-term memory per se. However, one study (Floyd et al., 2007) pointed to the importance of memory span (*Gsm* MS) in particular. Long-Term Storage and Retrieval (*Glr*) is largely represented by studies of Rapid Automatic Naming (RAN) (*Glr* NA) (Denckla & Cutting, 1999). Floyd et al. (2007) also noted a relationship between Associative Memory (*Glr* MA) and reading decoding skills in kindergarten and first grade.

In 2001 Evans, Floyd, McGrew, and Leforgee raised the question of whether current models of reading disabilities that focus on phonological processing have restricted our understanding of reading disabilities in total. Processing Speed (*Gs*), for example, has not received the same level of interest as other abilities thought to be related to reading. Despite the lack of attention, there is evidence that processing speed is important in the acquisition of basic skills (Kail, 1991). Children who have not automatized basic operations (due to slower-than-typical processing speed) are forced to divert precious resources, such as working memory, away from important higher-level functions, such as comprehension. Floyd et al. (2007)

speculated that RAN, despite its popularity and prominence in the literature, may actually have little to contribute beyond what processing speed can tell us about variance in reading decoding skills. There are others who disagree (D. Powell, Stainthorp, Stuart, Garwood, & Quinlan, 2007).

Finally, we come to Visual Processing (*Gv*) and Fluid Reasoning (*Gf*), abilities that have not been shown to exert influence on reading *decoding* at any age (Floyd et al., 2007). However, McGrew's study from 1993 reported significant findings for *Gf* with respect to reading *comprehension*, suggesting that deductive and inductive reasoning play a role in the comprehension of higher-level text. Additionally, J. O. Willis (personal communication, April 3, 1998) suggested that nature of the intelligence test subtests used to measure visual processing might limit our understanding of the role that *Gv* actually plays in reading. McGrew and Wendling (2010) agreed, suggesting that the specific narrow abilities within Gv necessary for reading and math are absent from current intellectual batteries.

There are also concerns about orthographic processing involving the ability to visualize how words are spelled in the mind's eye. This poses a particular challenge: Research in this area is limited, and few tests actually measure orthographic processing. Although orthographic processing currently has found a home under *Gv* (Flanagan et al., 2006), Aaron (1995) warned that "orthographic processing ability is not the same as visual memory even though visual memory may play a role in it" (p. 347). As the research on orthographic processing grows, we may come to see it in another light.

CHC theory is a work in progress. There is still much to be learned about global intelligence, specific cognitive abilities, and how they contribute to academic performance. Fiorello and Primerano (2005) noted that CHC-based assessments have the potential to help us make important links between children's profiles as learners and instruction that will support them as readers and writers. Floyd et al. (2007) concurred; they believe that knowledge of CHC broad abilities and narrow abilities is critical for understanding children with reading challenges.

Misunderstandings About Learning Styles

It is not unusual for educators to make comments regarding a student's style of learning. These comments often find their way into individualized education programs in an effort to help teachers meet the unique needs of individual students. The intent is good; teaching methods and strategies should complement how students learn.

Historically, a child's style of learning has been based on his or her performance during intellectual testing as well as, of course, on teacher and parent observations, sometimes involving the use of questionnaires about preferred learning styles. When performance on measures of visual abilities was superior to performance on tasks of verbal abilities, students were described as *visual learners*. These were the children who clearly seemed to work more easily with pictures and designs than with words. Children who were better with words and who struggled with puzzles and directionality were often described as *verbal learners*. A kinesthetic or tactile style of learning was generally reserved for children with low IQs. These children, we were told, needed to learn through real-life experience and by "doing."

While it may have been comforting to identify the apparent key to academic success, the link between so-called global learning styles and instruction has never been established. Dembo and Howard (2007) stated that the majority of claims related to the use of learning styles are unsubstantiated and that there is no evidence that matching instruction to a particular learning style improves learning. Let us discuss these issues.

In the early days of special education, the prescription for remediation was often one of "teaching to the strength." Visual learners were to receive instruction embedded with pictures and movies; verbal learners were to be immersed in words. It was often recommended that visual learners with reading difficulty be prescribed sight word (visual) reading approaches, in which words were presented as wholes or as pictures. These pictures were then to be memorized and etched into memory, a practice that entailed furious sessions of flash card practice in the hopes of passing the test on Friday. Typically, much to the consternation of parents and teachers alike, these words were often forgotten by Monday.

At a practical level, teachers found that it was hard to accommodate different learning styles when teaching academics. There was no doubt that visual aids could supplement and enhance lesson content. There was, unfortunately no getting around the language. Most teachers, even the best of multisensory practitioners, could not find a way to significantly reduce the language content of lessons for visual learners. Words were more efficient, and they permitted teachers to communicate subtleties that did not lend themselves well to pictorial or graphic representations. Beyond the first and second grades, pictorial responses and dioramas were not appropriate as substitutes for essays and discussions. What did it really mean to support different learning styles in the classroom?

The verbal, visual, and kinesthetic labels used for learning styles were also problematic. Many educators assumed that children identified as having a verbal style of learning would have strengths in all aspects of verbal knowledge as well as language usage. What was not clearly understood was that the label *verbal style of learning* was sometimes teacher-speak for weaknesses in nonverbal processing.

Nonverbal processing plays an important role in communication. Language is not a uniquely verbal endeavor; the meaning that is created by virtue of verbal processing alone pales in comparison to the breadth and the depth that nonverbal processing bring to language. Nonverbal processing permits learners to read between the lines, engage in language play, and make jokes. Nonverbal processing permits learners to make connections between facts and concepts and to understand the relationship between the main idea and supporting details (Hale & Fiorello, 2004). Sometimes children with nonverbal processing deficits, our so-called verbal learners, require extra support in language; they may even require speech and language therapy.

The simple truth of the matter is that effective problem solving hinges on the ability to use one's intellectual resources in harmony. That is not to say that diversity in how we think as a population is not good or that all diverse thinkers are actually educationally disabled. A diverse pool of thinkers has potential for solving what ails us as a society. At the same time, however, children with significant learning differences are at risk for academic failure. Contrary to what is written in many reports, children do not prefer one style or another. How they learn is, for the most part, a fixed product of their biology and their experience.

As we learn more about cognitive abilities and how they support academic performance, we will become better at describing children with less common profiles who struggle in school. In the meantime, it is worthwhile to recognize that the use of terminology such as *verbal*, *visual*, or *kinesthetic style of learning* is not helpful to teachers, and it actually may serve to promote stereotypical recommendations for instruction that have no basis in research.

Be wary when ''learning styles'' creep into the conversation. Having a command of vocabulary is not synonymous with having good receptive and expressive language skills. Students identified with ''verbal styles'' actually may experience difficulty expressing themselves with organization, and they may not easily process the many visual aids routinely used in the classroom. Students identified with ''visual styles'' may need to have their hearing tested, and they may require a thorough evaluation of their communication skills. Finally, students who are referred to as ''kinesthetic'' learners probably require the most carefully structured teaching environment; they do not learn easily through words or through pictures. This does not mean, however, that they cannot learn or even that they would not learn best with words or pictures. Most of them will make progress if taught with skill and research-based methodologies.

Recent research in reading reviewed by the National Reading Panel (2000) has taught us one very important truth: All children, regardless of their style of learning, require instruction in the five components of reading: phonological awareness, word recognition, vocabulary, fluency, and comprehension. That is not to say that all children's instruction will look alike; teachers need to design their instruction to meet the individual needs of the learner.

Small Sample of Intelligence Tests

The tests discussed next represent just a few of the more widely used measures of intelligence. Inclusion of a test in this chapter should not be interpreted as a recommendation, and omission from this small list is not a condemnation of a test's potential benefits. Tests are presented in alphabetical order.

Differential Ability Scales, Second Edition

The DAS-II (Elliott, 2007a, 2007b) is an individually administered cognitive battery for individuals from 2 years, 6 months through 17 years, 11 months. The battery is divided into two overlapping age levels (Early Years 2-6 through 8 and School-Age 5 through 17), which permits evaluators to adjust the range of items administered for younger children with higher levels of skills or older children who would be better served by items typically reserved for their younger peers. The Early Years battery is subdivided into a Lower Level and an Upper Level with more subtests.

Although the DAS-II provides a General Conceptual Ability score to satisfy those in need of a global measurement of *g*, it was designed to clarify patterns of strengths and weaknesses in children with learning difficulties. To this end, the DAS-II is structured to provide three composite cluster scores: Verbal Ability (*Gc*), Nonverbal Reasoning Ability (*Gf*), and Spatial Ability (*Gv*). These composite scores are based on core subtests that correlate highly with *g*; these subtests are shown in Table 8.3. A Special Nonverbal Composite score can be calculated using only the Nonverbal Reasoning Ability Cluster and the Spatial Ability Cluster; the Special Nonverbal Composite often serves to highlight the problem-solving abilities of children with significant weaknesses in their verbal abilities. In contrast to many tests, such as the WISC-IV, the DAS-II separates skills that do not correlate well with *g*, placing them under the heading of Diagnostic subtests. These provide additional but no less important measures of memory, processing speed, and other foundational abilities. The School-Age and Upper Early Years batteries use two Verbal, two Nonverbal Reasoning, and two Spatial subtests plus selected Diagnostic subtests. The Lower Early Years battery uses two Verbal subtests and two Nonverbal subtests (one Nonverbal Reasoning and one Spatial for a single Nonverbal Cluster) as well as appropriate Diagnostic subtests. Additional information about the DAS-II is available in Dumont, Willis, and Elliott (2008).

From a CHC perspective, the DAS-II includes measures of Gc, *Gf, Gv, Glr, Gsm*, and *Gs*, and one measure of *Ga*. Unlike many other tests, the DAS-II total score, the General Conceptual Ability, is based only on measures of *Gc, Gf,* and *Gv*. The tests of *Glr, Gsm, Gs,* and *Ga* do not contribute to the total score, so weaknesses in those abilities do not directly depress the total score. (The Reynolds Intellectual Assessment Scales [RIAS; Reynolds & Kamphaus, 2003] also excludes *Glr, Gsm, Gs*, and *Ga* from its total score.) The DAS-II is one of the few cognitive batteries that include measures of rapid naming and phonological processing. Unfortunately, the phonological processing subtest is only for children ages 5 through 12, a lost opportunity for those who wish to examine the phonological skills of older students. Rapid Naming is based on colors, animals, and colored animals; it does not include rapid letter naming, the best predictor for reading. The segmentation part of the Phonological Processing subtest contains an error, and the deletion part of the subtest is not well designed. An important part of phonemic awareness is the discrimination of blends containing /l/ and /r/. On the DAS-II, the way that this task is structured does not require that students actually perceive these sounds.

DAS-II Subtests	Age Range	CHC Broad Abilities	Description
CORE SUBTESTS			
Verbal Ability		*Gc*	
Verbal Comprehension	2-6 through 8	*Gc*	Pointing to pictures or moving objects in response to oral directions
Naming Vocabulary	2-6 through 8	*Gc*	Naming objects and pictures
Word Definitions	5 through 17	*Gc*	Providing oral definitions for words
Verbal Similarities	5 through 17	*Gc*	Categorizing orally presented words
Nonverbal Reasoning Ability		*Gf*	
Picture Similarities	2-6 through 8	*Gf*	Matching pictures with similar features or concepts
Matrices	3-6 through 17	*Gf*	Discerning the rules governing each sequence of designs and applying the rule to select a design appropriate to the sequence
Sequential and Quantitative Reasoning	5 through 17	*Gf*	Completing patterns of pictures or numbers; older children must have a command of their basic math facts
Spatial Ability		*Gv*	
Pattern Construction	2-6 through 17	*Gv*	Copying geometric designs with colored blocks (time limits and bonus points for speed)
Pattern Construction—Alternative	2-6 through 12	*Gv*	Copying geometric designs with colored blocks (time limits, but no bonus points for speed)
Copying	3-6 through 8	*Gv*	Copying drawings with pencil and paper
Recall of Designs	5-0 through 17	*Gv*	Copying geometric designs with pencil and paper from memory
DIAGNOSTIC SUBTESTS			
Matching Letter-Like Forms	4-0 through 8	*Gv*	Identifying similar shapes
Recognition of Pictures	2-6 through 17	*Gv*	Identifying pictures previously viewed
Recall of Objects—Immediate	4-0 through 17	*Glr*	Recalling meaningful pictures presented visually and orally
Recall of Objects—Delayed	4-0 through 17	*Glr*	Recalling the same pictures after a delay without warning

Table 8.3 (*continued*)

DAS-II Subtests	Age Range	CHC Broad Abilities	Description
Recall of Digits Forward	2-6 through 17	*Gsm*	Repeating orally presented numbers in the same sequence
Recall of Digits Backward	5 through 17	*Gsm*	Repeating orally presented numbers in reverse order
Recall of Sequential Order	5 through 17	*Gsm*	Recalling pictorial information in a defined sequence
Speed of Information Processing	5 through 17	*Gs*	Marking the largest number in each row in a series of rows while being timed
Rapid Naming	5 through 17	*Glr/Gs*	Naming colors, familiar objects, and familiar colored objects in series while being timed
Phonological Processing	5 through 12	*Ga*	Rhyming, segmenting, deletion, and segmentation of sounds in spoken words
Early Number Concepts	2-6 through 8	*Gc/Gf*	Answering questions about number, size or numerical concepts

Evaluators wishing to use the DAS-II as part of a comprehensive reading assessment will have to supplement it with more robust measures of phonological awareness and rapid naming. Most cognitive ability tests except for the WJ III (Woodcock, et al., 2001b) do not even attempt to measure those skills.

Leiter International Performance Scale—Revised

The Leiter International Performance Scale—Revised (Leiter-R; Roid & Miller, 1997) is an individually administered nonverbal test of intellectual ability, memory, and attention in individuals ages 2 through 20. It was specifically designed to provide a measure of intelligence that would not be compromised by challenges in verbal communication and motor skills. It is appropriate for children with communication disorders, cognitive delays, English as a second language, hearing impairments, motor impairments, attention-deficit disorder, and certain types of learning disabilities.

The Leiter-R consists of two main batteries: Visualization and Reasoning and Attention and Memory Battery. The Visualization and Reasoning battery has 10 subtests that can be grouped into a Full Scale IQ, a Brief IQ, and Composites in Fluid Reasoning, Spatial Visualization, and Fundamental Visualization depending on the individual's age; the subtests are shown in Table 8.4. There are 4 behavioral-observation rating scales from the perspective of the examiner, the parent, the teacher, and the examinee. The tasks on the Leiter-R are administered by pantomime; examinees respond by moving response cards and manipulatives into slots molded into the easel base. No skill in verbal communication is required. Additional information about administration and use of the Leiter-R can be found in McCallum, Bracken, and Wasserman (2001).

The Leiter-R Visualization and Reasoning Battery permits us to peer into the minds of children with complex profiles who are not able to demonstrate their problem-solving skills through tasks involving verbal instructions, verbal responses, or motor skill. It does not (and it was not intended to) provide measures of Gc, Glr, Ga, Gsm, or Gs. (The Attention and Memory Battery does measure Glr

Table 8.4 **Leiter International Performance Scale—Revised Subtests**

Leiter-R Subtests from the Visualization and Reasoning Battery	Age Range	CHC Broad Abilities	Description
Figure Ground	2–20	*Gv*	Identifying embedded figures or designs within increasingly complex pictures
Design Analogies	6–20	*Gf*	Solving matrix puzzles using geometric shapes
Form Completion	2–20	*Gv*	Recognizing a whole object based on randomly displayed fragments
Matching	2–10	*Gv*	Discriminating and matching visual stimuli (optional for ages 6–10)
Sequential Order	2–20	*Gf*	Ordering figures and pictures
Repeated Patterns	2–20	*Gf*	Recognizing and continuing pictorial and geometric patterns
Picture Context	2–5	*Gf*	Identifying a picture that goes with a larger illustration
Classification	2–5	*Gf*	Identifying pictures that go together
Paper Folding	6–20	*Gv*	Visualizing a folded two-dimensional object
Figure Rotation	11–20	*Gv*	Visualizing a rotated two- or three-dimensional object

and Gsm.) While a nonverbal measure of intelligence may well provide much-needed evidence of the ability to learn without confusing lack of verbal ability with lack of intelligence, the administration of a Leiter-R does not preclude the need to assess language skill.

Candidates for assessment with a Leiter-R may benefit from language assessments that permit students to respond nonverbally through multiple-choice questions. Although phonological awareness traditionally is assessed through the mouth, it can be measured nonverbally through a test such as the Lindamood Auditory Conceptualization Test, Third Edition (LAC-3; Lindamood & Lindamood, 2004). On the LAC-3, students require sufficient motor skill to place colored blocks in a meaningful sequence; they need to have an understanding of basic concepts related to quantity, directionality, and first/last. The Peabody Individual Achievement Test, Revised—Normative Update (Markwardt, 1998a), although dated, permits children to demonstrate some skill in reading comprehension and spelling through a multiple-choice format. Many group-administered achievement tests use a format of matching written words, phrases, or sentence to pictures at lower grade levels. This format can be useful for testing children who cannot speak well or who cannot follow oral directions.

Wechsler Intelligence Scale for Children, Fourth Edition (2003)

The Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV; Wechsler, 2003a) is an individually administered measure of intelligence for children ages 6 through 16. The test consists of 10 core subtests that can be grouped into a Full Scale IQ as well as four index scores (Verbal Comprehension [VCI], Perceptual Reasoning [PRI], Working Memory [WMI], and Processing Speed [PSI]). There are five supplemental subtests. Although the manual suggests that supplemental subtests can be substituted for core subtests when tests are spoiled or acts of God dictate, this is not how the WISC-IV was normed.

Norms are available for a General Ability Index (GAI) score based on only the VCI and PRI subtests (Prifitera, Saklofske, & Weiss, 2005; http://psychcorp.pearsonassessments.com/NR/rdonlyres/1439CDFE-6980-435F-93DA-05888C7CC082/0/80720_WISCIV_Hr_r4.pdf). The Cognitive Proficiency Index (CPI) combines the WMI and PSI scales. The CPI and comparison of GAI and CPI scores are discussed at http://psychcorp.pearsonassessments.com/NR/rdonlyres/E15367FE-D287-46B4-989A-609160D94DA8/0/WISCIVTechReport6.pdf. Additional discussion and CPI norms are provided in Weiss, Saklofske, Prifitera, and Holdnack (2006). The WISC-IV Integrated (Wechsler et al., 2004) offers a wide variety of additional subtests and procedures that diagnosticians may find helpful, but it offers no Phonological Awareness or Rapid Naming.

When the WISC-IV moved away from the Verbal IQ/Performance IQ dichotomy and adopted the four indexes in 2003, it paid limited homage to CHC theory and the idea of abilities. Critics of the Wechsler Scales (Keith, Fine, Taub, Reynolds, & Kranzler, 2006; McGrew, 2005) have been quick to point out that the indexes are contaminated by the inclusion of different abilities, and they recommend regrouping the subtests to better reflect consistent CHC abilities within each index. Subtests within the Perceptual Reasoning Index, such as Picture Concepts and Picture Completion, both involve a degree of language processing. The WISC-IV subtests are the CHC abilities shown in Table 8.5.

From a reading perspective, the WISC-IV offers several subtests that address aspects of skills deemed important for reading: *Gc, Gsm, Gf*, and *Gs.* The WISC-IV, however, should not be regarded as a comprehensive assessment of processes that support the development of reading and spelling. Phonological Awareness and Rapid Naming are noticeably absent. It is possible, in fact, for children with severe reading disabilities to perform well on the WISC-IV without providing evidence of processing deficits related to reading.

Woodcock-Johnson III Tests of Cognitive Abilities, Third Edition

The Woodcock-Johnson III Tests of Cognitive Abilities (WJ III COG; Woodcock et al., 2001b) is an individually administered battery of tests for individuals ages 2 to 90 and above. A Normative Update (WJ III NU; Woodcock, Shrank, McGrew, & Mather, 2007) was released, in which the norms were recalculated based on the U.S. Census data from 2005.

The WJ III COG is unique in its express purpose of measuring abilities in concert with CHC theory (shown in Table 8.6). The WJ III COG consists of 20 subtests that are grouped by factor. Not all 20 subtests have to be administered; in fact, the WJ III COG permits evaluators to focus on areas of interest. The WJ III can be scored only by computer, a practice that some feel limits the transparency of the test (Sattler, 2008; J. O. Willis, personal communication, January 26, 2002). Evaluators can opt to generate a General Intellectual Ability (GIA) score, which is based on a weighted combination of tests selected for their contribution to *g*; the Verbal Comprehension subtest is weighted the highest. There are numerous options for composite scores and potential for discrepancy analyses. The WJ III COG is conormed with the Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) and the Woodcock-Johnson III Diagnostic Supplement (Woodcock, McGrew, Mather, & Schrank, 2003).

Clearly the WJ III reflects the state-of-the-art in terms of CHC theory. Several Assessment Service Bulletins, provided by Riverside (http://riverpub.com/products/wjIIIComplete/resources.html)provide additional technical information to help evaluators and clinicians. Several books discuss the WJ III in depth (e.g., Mather & Jaffe, 2004; Mather, Wendling, & Woodcock, 2001; Schrank & Flanagan, 2003; Schrank, Flanagan, Woodcock, & Mascolo, 2001).

Those who are contemplating a comprehensive reading evaluation should not be shy, however, about supplementing/augmenting the WJ III with additional, measures of oral language,

Table 8.5 **WISC-IV Subtests**

WISC-IV Subtests	CHC Broad Abilities	Description
Verbal Comprehension Index	*Gc*	
Similarities	*Gc*	Identifying how two things or concepts are alike
Vocabulary	*Gc*	Providing oral definitions of words; students 8 years and above are permitted to see the words in print
Comprehension	*Gc*	Answering why questions related to common sense reasoning and higher-level societal functions
Information*	*Gc*	Answering orally presented who, what, when, and where questions
Word Reasoning*	*Gc*	Solving orally presented riddles with one clue presented at a time
Perceptual Reasoning Index	*Gv/Gf (Gc?)*	
Block Design	*Gv*	Copying geometric designs with colored blocks
Picture Concepts	*Gf (Gc?)*	Identifying pictures with common features or themes
Matrix Reasoning	*Gf*	Discerning the rules governing a sequence of designs and applying the rule to select a design appropriate to the sequence
Picture Completion*	*Gv (Gc?)*	Identifying the missing part of a picture by pointing or labeling
Working Memory Index	*Gsm*	
Digit Span	*Gsm*	Repeating orally presented numbers in forward and backward order
Letter-Number Sequencing	*Gsm*	Repeating randomly presented numbers and letters in alphanumeric order
Arithmetic*	*Gq*	Solving orally presented math word problems without pencil or paper
Processing Speed Index		
Coding	*Gs*	Copying a code from a key with pencil in hand while being timed
Symbol Search	*Gs*	Marking symbols as the same or different while being timed
Cancellation*	*Gs*	Making small decisions and marking pictures presented randomly and in rows while being timed

*Indicates supplemental subtest.

phonological awareness, and rapid naming. The utility of the Rapid Picture Naming subtest is limited due to its focus on things instead of alphanumeric symbols. The Phonemic Awareness Cluster consists of two subtests, Sound Blending and Incomplete Words; an additional cluster can be obtained by supplementing these subtests with Sound Awareness from the WJ III ACH battery. It has been my experience that Sound Blending and Incomplete Words often result in high scores in comparison to other measures of phonological awareness. This is a likely consequence of two problems. The phonological awareness tasks selected are more appropriate for young children; they may lack sufficient sensitivity to the processing demands for older students (See Yopp, 1988).

Table 8.6 **WJ III COG Subtests**

WJ III COG Tests	CHC Broad Abilities	Description
Verbal Comprehension	*Gc*	Providing antonyms, synonyms, and completing analogies
Visual-Auditory Learning	*Glr*	Learning and recalling the names of pictographs
Spatial Relations	*Gv*	Selecting the groups of shapes needed to make a whole
Sound Blending	*Ga*	Blending sounds to form words
Concept Formation	*Gf*	Identifying rules governing the categorization of shapes
Visual Matching	*Gs*	Marking two identical numbers in a series of rows while being timed
Numbers Reversed	*Gsm*	Repeating orally presented numbers in reverse order
Incomplete Words	*Ga*	Identifying words with missing speech sounds
Auditory Working Memory	*Gsm*	Repeating orally presented digits and words, first words, then digits
Visual-Auditory Learning-Delayed	*Glr*	Recalling the names of pictographs after a brief delay of 30 minutes to 8 days
General Information	*Gc*	Answering ''what'' and ''where'' questions
Retrieval Fluency	*Glr*	Naming things in a given category as quickly as possible
Picture Recognition	*Gv*	Identifying previously viewed pictures in a larger sample
Auditory Attention	*Ga*	Identifying words presented orally with background knowledge
Analysis-Synthesis	*Gf*	Using deductive reasoning to determine missing components
Decision Speed	*Gs*	Finding and marking pictures in a row that are similar while being timed
Memory for Words	*Gsm*	Repeating a list of orally presented words in order
Rapid Picture Naming	*Gs*	Saying the names of pictured objects in series while being timed
Planning	*Gv/Gf*	Tracing shapes accurately and efficiently
Pair Cancellation	*Gs*	Finding and marking repeated patterns while being timed

In addition, the subtests themselves lack a sufficient number of items to detect changes in raw score points with sufficient sensitivity to be helpful. Sattler (2008) stated that 13 of the 20 cognitive tests were ''too steeply graded'' (p. 700), Sound Blending and Incomplete Words among them.

Conclusion

Reynolds and Shaywitz (2009a) have reminded us that the major purpose of a comprehensive assessment is to develop hypotheses about a child's profile with the goal of then designing complementary and effective interventions. The question of a child's style of learning is not a simple one, and individual differences between learners may be what finally permit us to reduce the number of children who do not respond to our efforts in the classroom.

According to Willis et al. (2011; forthcoming), controversy notwithstanding, many researchers, test designers, and educators have agreed that a well-executed intellectual assessment can provide valuable information about how children learn in the classroom. Individual differences, particularly those that go beyond what *g* has to tell us, have much to offer in terms of ensuring a match between instruction and specific students.

Questions to Ask Evaluators About Cognitive Testing

1. Why are you recommending this particular test? What is your view of intelligence, and how do you believe it should be measured?
2. How will this test contribute to our understanding of this particular student?
3. Given what we know about this student, will this test be a good measure of his or her ability to learn?
4. Is it possible that this student's disability (or suspected disability) will compromise his or her ability to express what he or she knows on this test? If so, are there other ways of measuring those skills?
5. Do we need to supplement this test with other measures in order to obtain a comprehensive picture of this child?
6. Is this test appropriate for students who are learning English as a second language?
7. Is this test appropriate for students with culturally diverse backgrounds?
8. Are these scores a valid measure of this child's performance? If not, why not?
9. What does this test tell us about our student's profile as a learner?
10. What roles do these skills play in learning to read, write, and do math?
11. How does the student's performance on this particular test relate to performance on past measures of cognitive functioning, and what are the implications of any changes?
12. Based on our student's performance, do we need to do any follow-up testing?

Oral Language Assessment

9 Chapter

Introduction

The path to a well-designed reading evaluation is paved with linguistic cobblestones. According to the American Speech-Language-Hearing Association (ASHA) in its 2001 report, knowledge of the structure of language is ''highly relevant'' for remediation of reading challenges. Louisa Moats (1994a) described knowledge of the structure of language as the ''missing foundation of teacher education.''

Oral language skill is at the heart of written communication, and it is well documented that reading comprehension relies heavily on language processing (Catts & Kamhi,1999; Gough & Tunmer, 1986; Snow, Burns, & Griffin, 1998). To complicate matters further, the converse is also true: Reading difficulties play a significant role in language development.

While we might be tempted to think that language is language regardless of its venue, written language taxes and teases the oral language system in ways nature never imagined. The absence of prosodic cues makes it harder for young readers to obtain meaning from text (Mann, Cowin, & Schoenheimer, 1989). There is often no well-defined context; there can be no conversation between author and reader, and without conversation there is no conversational repair. Readers are forced to develop and rely on higher-level thinking skills, such as inferencing and predicting (Perfetti, 1986). With each text read, skilled readers arm themselves with an ever-increasing array of linguistic machinery that permits them to parse and construe meaning of sentences, use their knowledge of style and text structure, and learn how they learn (Westby, 2005). Reading makes you smarter (Stanovich, 1986).

Unfortunately, poor readers do not read as much as their peers. Reading can be hard work; for those with reading disabilities, it is not relaxing and usually it is not rewarding. The language experience of poor readers is often limited to whatever they can acquire through their ears. A diet of oral language is meager in comparison to the hearty fare that written language has to offer. When children do not read, their brains develop without the literary nutrition that comes from the printed word. It was Stanovich (1986) who coined the term *Matthew effects*. According to Stanovich, the ''rich get richer, and the poor get poorer'' applied not only to personal wealth but also to intellectual development. Cain and Oakhill (1999) confirmed this with research suggesting that children with reading disabilities do not attain higher levels of cognitive and linguistic development. Perhaps the Surgeon General needs to provide a warning: Insufficient exposure to text is harmful to your linguistic and intellectual health.

Numerous studies document the strong relationship between speech-language impairments and reading disabilities (Bishop & Adams, 1990; Menyuk et al., 1991; Stark et al., 1984; Tallal, Curtiss, & Kaplan, 1989). According to a study by McArthur, Hogben, Edwards, Heath, and Mengler (2000), 55% of children with a specific reading disability have oral language deficits, and 51% of children with a specific language impairment have reading disabilities. Reading is particularly challenging for children with impairments in syntax and semantics (Tallal et al., 1989). However, articulation disorders, in and of themselves, are not indicative of reading disabilities (Bishop & Adams, 1990). Catts and Kamhi (2005) indicated that children with severe articulation disorders are at greater risk only when they also have weaknesses in general language skills and in phonological awareness.

Assessment of Oral Language

The assessment of oral language skill requires an understanding of typical and atypical language development, expertise in how oral language skill manifests itself in the classroom, and knowledge of best practices for assessment.

According to Owens (2004), there are two main approaches for assessing language: the *psychometric approach* and the *descriptive approach*. The psychometric approach evaluates language skills through standardized, norm-referenced tests. Although these tests provide objective data, they may not sample skills in sufficient detail to determine whether errors are due to chance or whether they are due to difficulty acquiring the rules governing language usage. In addition, not all standardized tests are appropriate for some children with disabilities; norming samples do not always include sufficient numbers of children with low incidence profiles.

The descriptive approach focuses on language as it is used in natural settings. Actual language samples provide the data for assessing skill in communication. According to D. Johnson (1994), at least 75 to 100 utterances from different contexts are needed in order to obtain a representative sample of expressive language skill. In order to obtain the best language samples, the child must be comfortable with the evaluator. The child must also be interested in the topic of discussion. This type of approach is more subjective than using standardized, norm-referenced tests, and it is much more dependent on the expertise of the evaluator. Best practice in language assessment entails both standardized testing and speech-language sampling. It also includes a developmental history, interviews with caregivers and teachers, and observation in different settings. As always, vision and hearing should be tested.

Language assessment is inherently challenging due to the natural variation in how people speak. Cultural, social, and regional considerations all shape language usage, and there are many children who speak a nonstandard form of English that should not be considered in any way disordered. In addition to the aforementioned variations, language usage changes as children age. The skill set that is appropriate for a 4-year-old is not appropriate for a child of 7.

But there is more. Within the group of children with language impairments, diversity reigns. As a result, there is no one test that can address language skills in all their complexity. Careful attention to the developmental history, previous testing, and concerns of teachers and caregivers will help determine how best to evaluate a child's language skill. Always be alert to issues related to cultural and linguistic diversity. (See Chapter 4.) Do not be afraid to consult with your speech and language pathologist and other professionals who may have insight and expertise in your student's strengths and weaknesses.

There are many tests of oral language skill; in fact, the word *plethora* is a favorite in the field for describing the multitude of language tests available. There are screenings that are designed to determine risk status and the need for additional testing. There are tests that are designed to provide an overall measure of language functioning. There are tests for different age groups. Some tests measure receptive language skill; others measure expressive language. Still others measure both. There are even tests that focus on specific skills, such as vocabulary.

Speech and language testing is not immune from concerns regarding test design and interpretation. In 1978 Sommers, Erdige, and Peterson raised the question of whether it was possible to measure specific language skills instead of overall language ability. Although we speak of layers of language, the distinct layers interact dynamically (Perkins, 1971). When a child fails to repeat sentences, it may be due to a fundamental issue with short-term memory or syntax. It may also be a consequence of challenges in semantics, word omissions, morphology, and/or oral-motor skill.

Just what are we measuring when we try to test specific aspects of language? High intercorrelations between overall measures of language and those assessing specific language skills led researchers to conclude that most tests were measuring general language abilities and not specific ones, as often advertised by test publishers. Researchers also raised questions regarding the validity of composites or clusters (i.e., whether the tests actually measure what they purport to measure). The lack of consensus on language structure and how language layers interact has resulted in composites that differ substantially from test to test. The subtests that fall under the ''receptive language'' umbrella on one test may have little in common with ''receptive language'' on another subtest. Beware: Composites with similar names in different tests may not be directly comparable.

Evaluators who venture into the domain of language need to be vigilant in their efforts to understand the theoretical foundations of language and to observe speech and language behaviors. They should follow up on testing when results are potentially ambiguous. When there are concerns regarding the understanding of text, tests of receptive language skills should include word level, sentence level, and discourse level skills. Similarly, difficulties in written expression warrant testing in expressive language skills also at the word level, sentence level, and discourse level. As is true of all testing, it is important to verify that the student understands the language of the test and that failure to perform on specific language measures is not due to a poor grasp of direction words or an inherent difficulty remembering and/or following directions.

Listening Comprehension

According to Moats (1994b), listening comprehension is a term that suffers from a lack of clarity and excessive ambiguity. We use this term primarily because it is one of the areas of a specific learning disability as defined in the Individuals with Disabilities Education Improvement Act of 2004 (IDEA; 20 U.S.C. §§ 1400 et seq.). I use the term *defined* here loosely; listening comprehension means different things to different people in different contexts. It can mean simply following directions: Did you clean your room? Were you listening? It also can refer to a deep understanding of lengthy discourse: What did you think of the president's speech? Moats (1994b) expressed concern that the lack of formal definition of the term makes it difficult for teaching professionals to understand the intent of the law. In practice, rarely are students identified as having a specific learning disability in listening comprehension or oral expression. Many teaching professionals are not sure what such disabilities are and how they might differ (if they do) from speech and language impairments.

For the purpose of this discussion, we limit our focus to tests/subtests that address listening comprehension as a unitary construct (as opposed to tests such as the Clinical Evaluation of Language Fundamentals, Fourth Edition [CELF-4]; Semel, Wiig, & Secord, 2003), which group different subtests into a ''receptive language composite''. According to D. Johnson (1994), listening comprehension tests should be conducted in a manner that does not require a verbal response. Otherwise the task becomes a measure of receptive and expressive language combined, and we would not have an accurate picture of how well a child actually understands language as it is used by others. Some children are not able to express their knowledge in a manner commensurate with their understanding.

Listening Comprehension Advantages

Listening comprehension is currently enjoying increased prominence due to recommendations that it may be of greater value than IQ testing for the purpose of identifying reading disorders. (See the discussion in Chapter 8.) There are several advantages to testing listening comprehension. Listening comprehension tests are potentially easier and less time consuming to administer than tests of intellectual functioning. They also require less expertise and training. Enthusiasm for the use of listening comprehension tests, however, is not new. Forty years ago Durrell (1969) noted that contrasting measures of listening comprehension and reading comprehension had the potential to provide information of value to teachers. After all, weaknesses in one, the other, or both would signal the need for further investigation and possibly additional instruction.

Durrell (1969) proposed the concept of a reading/listening ratio using a scale of 0 to 100 based on raw score comparisons. A nonreader would have a reading/listening ratio of 0; a ratio of 100 would indicate that reading comprehension was equal to listening comprehension. Using such a ratio, Durrell found that listening vocabulary was generally superior to reading vocabulary in grades 1 through 7. It is not until eighth grade that the two became equal. Similarly, Durrell found that listening comprehension of sentences was superior to reading comprehension of sentences until sixth grade.

According to Durrell (1969), the comparison between listening comprehension and reading comprehension is not easily made. We cannot simply pick two tests, one from each domain, and contrast the results. A comparison between measures of reading comprehension and listening can be of value only if the tests are similar. It is certainly helpful when the listening comprehension and the reading comprehension tests are conormed. Both the oral and written passages, however, should also be designed with the same format, directions, and mode(s) of response.

A Few Words on Words

Vocabulary correlates highly with intelligence (Wechsler, 2003b). Vocabulary knowledge is also a strong predictor of reading comprehension (Ouellette, 2006).

So, what is a word? Minimally speaking, a *word* is defined as the smallest form in a language that has meaning and that can stand on its own. When we say ''stand alone,'' we refer to a word's potential to be used in isolation or to be moved about within the context of a sentence.

Words are the building blocks of good thoughts, and prior to discussing vocabulary assessment, we have a little grammatical housekeeping to do. Words in all languages are generally grouped into categories that describe how they function in sentences, the types of affixes they can employ, and, to some extent, their meaning. (See Table 9.1.)

Some words belong to more than one category. We can ''walk in the park'' and we can ''take a walk in the park.'' We can ''read a book'' and we can ''book tickets for a show.'' How do we identify a word's grammatical category? We can use clues that come from the word's meaning, the word's structure, and its context in a sentence.

Word Structure

Words have structure. The smallest part of a word that conveys meaning is a *morpheme*. Some words consist of only one morpheme; the word *cat*, for example, has one morpheme. Although it can be divided into phonemes (individual speech sounds), it cannot be divided into smaller units of sound that preserve its function or intent. When we, however, speak of *cats*, we now have a word that

Table 9.1 **Parts of Speech**

Part of Speech	Examples
Noun (N)	person, place, thing, idea
Verb (V)	listen, think, see, sit
Adjective (A)	white, old, beautiful, one, many
Adverbs (Adv)	quickly, rarely, often, quite
Preposition (P)	in, behind, during, at, up
Determinate (Det)	a, an, the, that, these, no
Conjunction (Con)	and, but, or
Auxiliary Words (Aux): Modal Nonmodal	should, could, would, must, will, shall have, be
Pronoun (Pro)	I, you, he, she, they, me, him, her, us

is made up of two morphemes: the *s* that we have added to our base word has changed the meaning from one to many. A morpheme that can stand on its own is called a *free morpheme* (cat). One that cannot is said to be *bound* (s). How morphemes are classified can be seen in Figure 9.1.

Bound morphemes are assigned to three categories: prefixes, suffixes, and, in some languages, infixes. *Prefixes* are added to the beginning of a word to modify its meaning. We can *undo* what has been done or *redo* something in order to improve

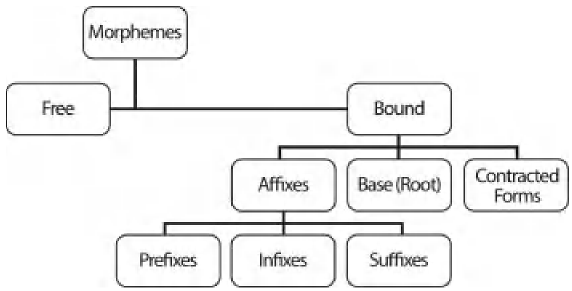

Figure 9.1

Classification of Morphemes

it. *Suffixes* can be added to the end of a word; they have two functions. Some suffixes permit us to make changes in number or tense; others permit us to change the part of speech. (We come back to these suffixes later.) *Infixes* are not found in all languages; in Russian, an infix changes the aspect of a verb from a completed act to an act in process. There is some debate about whether the English language has infixes, the discussion being limited to the field of chemistry and the use of profanity. Both *bloody* and *f---ing* are cited as possible infixes in English. With the former, we get ''absobloodylutely.'' I will leave the latter to your own imagination. Linguists disagree vigorously about whether an infix has to be a bound morpheme or whether it can be a word. At the risk of impugning my own occupation, it is a ''different strokes'' kind of thing.

The term *bound morpheme* also refers to bases or roots that cannot stand on their own as well as contractions. When we say ''I'll do it,'' we have invoked a bound morpheme that says ''will.'' We can also say ''I'd rather not'' or ''They've gone and done it again'' all with the help of bound morphemes.

Inflectional and Derivational Morphemes: Our discussion of morphemes is not yet complete. There are two types of suffixes: inflectional and derivational. *Inflectional morphemes* permit us to signify possession, create plurals, mark tense and voice, make verbs and nouns agree, and form comparatives and superlatives. We accomplish all of these chores without changing the part of speech. A noun remains a noun, a verb a verb, and an adjective an adjective. Figure 9.2 is a table of parts of speech and some permissible inflectional morphemes.

In contrast to inflectional morphemes, *derivational morphemes* permit us to change the part of speech of the base morpheme. Lewis Carroll had the enviable capacity to make new words by adding bound morphemes to base words. In the film of *Alice in Wonderland* directed by Tim Burton (2010), the Mad Hatter tells Alice, ''You used to be much more . . . 'muchier.' You have lost your muchness.'' Although we generally speak with

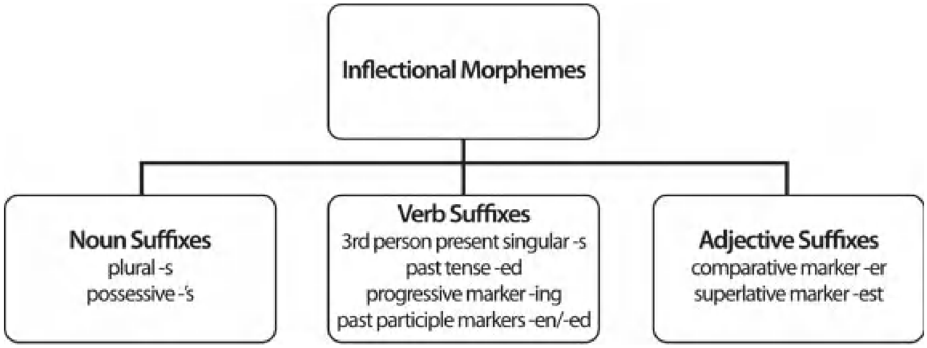

Figure 9.2

Inflectional Morphemes

greater linguistic restraint, we do enjoy altering words to suit our syntactic needs. The adjective *happy* can become a noun, *happiness*, or an adverb, *happily*. The noun *nation* can become an adjective, *national*, or even a verb, *nationalize*. The verb *enjoy* can become a noun, *enjoyment*; it can also become an adjective, *enjoyable*. The verb *teach* can become a noun signifying the one who does, *teacher*. The possibilities are endless, and they permit us to create new words to meet the demands of our changing society. Figure 9.3 presents some examples of derivational morphemes.

To further complicate matters, there are times when words take on multiple affixes. The rule is that we establish the derivation first and the inflection second. It makes sense: We have to establish the type of word before we can think in terms of changing its number or tense. The

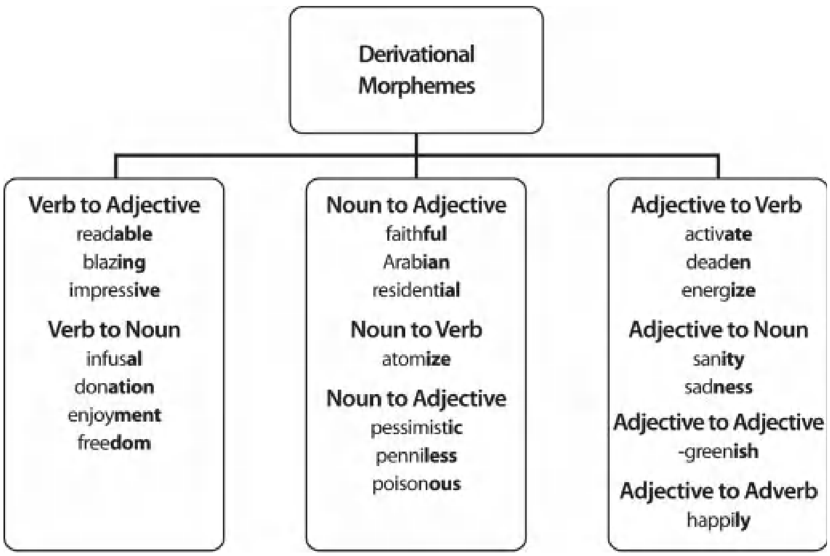

Figure 9.3

Derivational Morphemes

adjective *real* becomes a verb, *realize*, which becomes a singular noun, *realization*, and only then becomes a plural noun, *realizations*. The inflection is the very last piece of the chain.

Once again, however, the story is not yet complete. While it may seem simple, the process by which we make inflections and derivations is fraught with unexpected twists and turns. Not all base words accept all prefixes. We can *reread* a book and *rewrite* a text, but we cannot *resleep* or *renap*. In some cases *re-* is not a prefix at all. It is simply part of the base word, as in *reality*. The prefix *un-* when applied to an adjective means *not*, as in *untrue*, but when applied to a verb, it can mean ''perform the reverse action,'' as in *undress*. We can say ''uncola'' but not ''undrink.'' We can say ''reddish'' but not ''deadish.'' We can say ''whiten'' but not ''bluen.'' The list goes on.

There are many constraints on inflections and derivations. In some cases the base word changes when it is combined with a suffix. There may be changes in stress patterns as well as changes in vowels and consonants. (See Moats, 2010, for a detailed discussion of what happens when we add suffixes to base words.) Suffice it to say that the more we understand about words, their etiologies, their meanings, and their phonological properties, the better equipped we will be to understand how words are formed and how they are read and spelled.

Word Meaning

To get back to basics, we can consider meaning at the word level. Linguists and reading specialists often speak in terms of breadth and depth of word knowledge, a term that appears to go back to Nagy and Herman's 1987 article on vocabulary acquisition and instruction. We know that it is important to know a lot of words; we also know that it is equally important to know words comprehensively, systematically, and even intimately.

There is more to word study, however, than memorizing words in isolation. Words have two main types of meanings: denotative and connotative. *Denotation* refers to the link between the word and its referent, the literal meaning of the word. Strictly speaking, not all words have referents in the real world; the word *leprechaun*, for example, does not have a referent that actually exists. But such is the delight of logisticians.

Connotation refers to the associations that words invoke. While the word *dinosaur* denotes extinct reptiles, it also connotes something (or someone) that is hopelessly outmoded and archaic. It is the job of the poet to use words in novel ways that bring up new and unexpected associations, a process that Russians refer to as ''making strange.''

When we learn about words, we learn not only their respective meanings, we study them with respect to their semantic relations. The more we know about how word meanings relate to each other, the better we understand their usage and the more accurately we can retrieve them on demand. Table 9.2 presents some common semantic relationships.

When we truly know a word in depth, we grasp the word with respect to its structure and spelling, its etiology, examples of usage, as well as its semantic relations. Breadth of vocabulary becomes important for distinguishing between shades of meaning. Did he giggle, chuckle, laugh, or guffaw? Did she look, gaze, stare, or glare? Words with multiple meanings present a particular problem. Do we mean ''ball'' as a child's toy or ''ball'' as a social function? In this case, we rely on our powers of syntax and context in order to figure out the specific word meaning. The sentences ''I withdrew money from the bank'' and ''I sat by the bank of the river'' provide clear contexts for determining which meaning is appropriate. There are cases, however, where word choice leads to interpretations that are ambiguous at best. The word *mol*e has at least three meanings in the sentence, ''We found the mole.''

How Vocabulary Is Assessed

Vocabulary is measured both receptively and expressively. Some tests require students to point to the picture of the orally presented word(s).

Table 9.2 **Semantic Relations**

Term	Description	Examples
Synonymy	Words that have the same meaning in at least some contexts	insect/bug, happy/glad, precise/exact, ask/question, fast/quickly
Antonymy	Words that have the opposite meaning in at least some contexts	happy/sad, black/white, enter/exit, slow/fast
Homophony	These are words with the same pronunciation that have distinctly different meanings; such words are often at the heart of our attempts at humor	Question: Why would Cinderella be a poor football player? Response: Because she ran away from the ball. (Insert groan here.)
Polysemy	Words with multiple meanings that are in some way related	*dull* as in knife or wit; *dig* as in a garden or for information
Hyponymy	Words that have a notion of inclusion	Relatives include mothers, fathers, children, etc. Insects include butterflies, moths, and ants.

Other tests require that students provide a synonym or label a picture; still others ask students to define words. Each method of assessment carries its own linguistic baggage. How children perform on the same task with different modes of response can have important implications for how we treat children with word-level deficits.

Most tests of vocabulary examine breadth but not depth. That is, they can tell us whether children have a basic knowledge of word meanings but not whether children appreciate words in all their linguistic glory. Most tests lack a way to determine whether children are aware of words with multiple meanings; the tests do not provide a means of examining word usage in different contexts or whether children have a mature understanding of word meanings.

Evaluators need to be aware of extralinguistic factors that compromise vocabulary acquisition. D. Johnson (1994) pointed out that perceptual weaknesses and cognitive deficits may make it hard for children to learn language labels. Children with color blindness may not know color words; children with spatial processing challenges may find it difficult to grasp words describing relative position (prepositions). Children on the autistic spectrum may have difficulty language-labeling their feelings. Other children may grasp words in their concrete sense but not in the abstract. Most tests do not address the more highly specialized language learning that is required in a high school biology or history class, and currently there is no test that measures the language of math.

Not all methods of assessing vocabulary are alike, and their differences are important. Tests that require students to define words orally are a linguistic gold mine. We can learn about students' knowledge of word meanings, and we can learn whether they can determine what is important versus what is not. We can learn about word retrieval, sentence formulation, and their ability to organize their thoughts. Look at the next examples.

1. ''A glove is something that you wear on your hand to keep warm.''
2. ''A glove is something . . . is something that you put on your . . . hand.''
3. ''A glove is something you wear. It's made out of yarn. People use all types. We buy them at the store. I have red ones. Some gloves are different colors.''

The first definition is complete; it tells us how we use a glove and what its purpose is. The language is clear and concise. Although we know what this child is talking about, the second definition is vague and does not provide sufficient detail for credit. It is possible that this particular child struggles to retrieve words on demand, and he or she may have to stop to organize thoughts on a sentence level. In contrast, our third definition is full of detail. In fact, we get the impression that this child may have difficulty organizing his or her thoughts and discerning what is important versus what is not.

Comparing Receptive and Expressive Vocabulary: The Peabody Picture Vocabulary Test, Fourth Edition (PPVT-4; Dunn & Dunn, 2007) is an example of a test that requires students to listen to an orally presented word and point to the corresponding picture among four presented. This method provides a measure of vocabulary breadth, providing that children perceive the word correctly and take the time to scan all of the pictures. In contrast, the Expressive Vocabulary Test, Second Edition (EVT-2; Williams, 2007), which was conormed with the PPVT-4, provides a measure of a student's ability to name pictures or provide synonyms to orally presented words. While low scores on this type of test may be the consequence of a limited vocabulary, they can also be evidence of poor word-finding skill.

The results from receptive and expressive vocabulary tests that are conormed can provide important information regarding receptive and expressive language skill. When the score on a receptive vocabulary test is significantly higher than the score on an expressive vocabulary test, and these results are consistent with observational reports, we have strong evidence of a child with word-finding or word-retrieval issues. Challenges with word finding can confound performance on any type of task that requires an on-the-spot brain dump, including but not limited to test performance, math facts, written expression, speaking in class, and speaking conversationally. I was recently involved in the case of a young child who was reported to have difficulty learning his colors and the names of his friends in school. Not surprisingly, his teachers questioned his intellectual ability. Testing with both the PPVT-4 and the EVT-2 revealed that he actually had an exceptional receptive vocabulary but that he struggled with retrieving words on demand.

Sometimes we get the converse situation. There are times when the expressive vocabulary score is significantly higher than the receptive vocabulary score. This situation often elicits a quizzical response of ''How could she possibly use more words than she understands?'' In this case, we may be looking at an attentional deficit or auditory perceptual difficulty that impairs the ability to encode the word in memory. If we cannot store the word in memory, it cannot be useful to us.

A selection of different oral vocabulary tests and subtests is shown in Table 9.3.

Syntax

We cannot begin our discussion of syntax without referring, albeit briefly, back to Noam Chomsky's work on language. Chomsky's biological view of language sent researchers across the world to investigate what he believed was a ''universal grammar.'' According to Chomsky (1980), the universal grammar permitted children, regardless of their native tongue, to transform their thoughts and inclinations into grammatical sentences. We begin our discussion with the phrase, the fundamental unit of sentence structure.

A *phrase* is a group of words in a sentence that functions as a unit. Phrases reflect how we mentally organize information. They are the primary structure, or schema, by which we build our thoughts. When we speak or write, we do not simply reach into our memory for the first word that comes to mind. We access mental templates for phrases that serve as building blocks for the creation of well-formed sentences.

The complexity and lengths of sentences plays an important role in the comprehendability of text. Many readability formulas are based, in part, on sentence length. The longer the sentence, the harder children have to work to chunk words into

Table 9.3 **Oral Vocabulary Tests and Subtests (Gc)**

Tests and Subtests (Gc)	Description	Comments
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: PreK, K, and 1	Receptive Vocabulary: Selecting 1 of 4 pictures best describing an orally presented word. Word Relationships: Identifying how 2 words go together.	The purpose of the ALL is to identify children with language disorders as well as children who are at risk for later reading problems.
Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) Ages: 5–21	Word Structure (ages 5–8 only): Filling in a missing word with the correct affix in an orally presented sentence: Tom has a dog. Tom has two ________. Expressive Vocabulary (ages 5–9): Naming pictures of people, objects, and actions. Word Classes (ages 5–7, 8–21): Selecting 2 words that go together from 3 or 4 words that are presented orally. Identifying how the 2 words go together. Word Definitions (ages 10+): Providing oral definitions of words.	The CELF-4 manual provides unparalleled support for testing and interpretation.
Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk, 1999)	Antonyms (ages 5–21): Providing an opposite to an orally presented word. Single-word responses only. Synonyms (ages 7–21): Listening to a stimulus word and selecting a synonym from 1 of 4 orally presented choices.	The decision not to use pictures permits the assessment of words that are not easily rendered in pictorial form.
Comprehensive Receptive and Expressive Vocabulary Test—Second Edition (CREVT2; Wallace & Hammill, 2002)	Receptive Vocabulary (ages 4–17): Pointing to 1 of 6 pictures best representing an orally presented word. Expressive Vocabulary (ages 5–17): Oral word definitions.	Norming samples are not current; floor and ceiling effects. Two parallel forms.
Expressive One-Word Picture Vocabulary Test—Fourth Edition (EOWPVT-4; Martin & Brownell, 2010a) Ages: 2–80+	Naming pictured objects, actions, and concepts. Single-word responses only.	Conormed with the ROWPVT-4. Spanish bilingual edition published in 2000.
Expressive Vocabulary Test—Second Edition (EVT-2; Williams, 2007) Ages: 2–6 through 90 Grades: K–12	Labeling pictures and providing synonyms for words presented orally with pictures. Single-word responses only.	Can be used as a criterion-referenced test for those not proficient in English. Two parallel forms. Conormed with the PPVT-4.

Table 9.3 (*continued*)

Tests and Subtests (Gc)	Description	Comments
Peabody Picture Vocabulary Test—Fourth Edition (PPVT-4; Dunn & Dunn, 2007) Ages: 2-6 through 90 Grades: K–12	Selecting 1 of 4 pictures that best describes an orally presented word.	No expressive language required. Can be used as a criterion-referenced test for those not proficient in English. Two parallel forms. Conormed with EVT2.
Receptive One-Word Picture Vocabulary Test—Fourth Edition (ROWPVT-4; N. Martin & Brownell, 2010b) Ages: 2–80+	Selecting 1 of 4 pictures that best describes an orally presented word.	No expressive language required. Conormed with the EOWPVT-4. Spanish bilingual edition published in 2000.
Test of Adolescent and Adult Language—Fourth Edition (TOAL-4; Hammill, Brown, Larsen, & Wiederholt, 2007) Ages: 12–24	Word Opposites: Providing antonyms to orally presented words. Word Derivations: Filling in a missing word with the correct affix in an orally presented sentence: Tom has a dog. Tom has two ________. Spoken Analogies: Completing an orally presented analogy. Dogs are to bark as cows are to ________.	One of the few tests that measures oral and written language skill.
Test of Language Development—Fourth Edition: Primary (TOLD-P:4; Newcomer & Hammill, 2008) Ages: 4–8	Picture Vocabulary: Selecting 1 of 4 pictures that best describes an orally presented word. Relational Vocabulary: Identifying how 2 spoken words are alike. Oral Vocabulary: Oral definitions of orally presented commonly used words. Morphological Comprehension: Filling in a missing word with the correct affix in an orally presented sentence: Tom has a dog. Tom has two ________.	Floor effects of previous edition have been reduced. Can be used as source of information for long-term educational goals; subtests are too brief to support development of lesson plans.
Test of Language Development—Fourth Edition: Intermediate (TOLD-I:4; Hammill & Newcomer, 2008) Ages: 8–17	Picture Vocabulary: Selecting 1 of 6 pictures that best describes an orally presented phrase. Relational Vocabulary: Identifying how 3 spoken words are alike. Multiple Meanings: Providing meanings for an orally presented word.	Can be used as a source of information for long-term educational goals; subtests are too brief to support development of lesson plans.

(*continues*)

Table 9.3 (*continued*)

Tests and Subtests (Gc)	Description	Comments
Test of Word Finding—Second Edition (TWF-2; German, 2000) Ages: Preprimary: 4–6 Primary: 6–8 Intermediate: 8–12	Picture Naming: Nouns: Naming a picture or colored part of a picture in <4 seconds. Sentence Completion Naming: Completing an orally presented sentence by naming the missing word in <4 seconds. Picture Naming: Verbs: Naming the progressive form (-ing) of a pictured action. Older students also name the past tense form. Picture Naming: Categories: Naming pictured things and the categories to which they belong in <4 seconds. Comprehension Check: A comprehension check ensures that the child knows the target word that he or she missed.	Provides an analysis of word finding skills and strategies that children use to retrieve words.
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+	Picture Vocabulary: Identifying pictured objects.	Picture vocabulary begins with a few receptive vocabulary items prior to expressive vocabulary tasks.
Woodcock-Johnson III Tests of Cognitive Abilities (WJ III COG; Woodcock, McGrew, & Mather, 2001b) Ages: 2–90+ Grades: K–17+	Verbal Comprehension: Identifying pictured objects, providing synonyms, antonyms, and completing verbal analogies.	Picture vocabulary begins with a few receptive vocabulary items prior to expressive vocabulary tasks.

meaningful units and the higher the readability level. Sentence complexity also plays a role in written expression and how we link thoughts together with logic and precision. While evaluators do not have to be expert grammarians, they do have to be knowledgeable about different types of sentences that children read and write. To do so, we now need to understand clauses.

There are two types of clauses. An *independent clause* has a subject and a predicate, and it can stand on its own. A *dependent clause* is preceded by a subordinator, and it cannot stand on its own. Table 9.4 presents the different types of sentences that we see in oral and written language.

How Syntax Is Assessed

Sentence-level skills can be examined from a variety of perspectives and purposes. We can assess both receptive and expressive abilities. We can examine sentence memory, the ability to formulate certain types of sentence construction, and how well students understand different types of sentences. The fields of morphology and semantics

Table 9.4 **Sentence Types**

Sentence Type	Description	Examples
Simple	An independent clause. Do not confuse a sentence that has a compound subject or compound predicate with a compound sentence.	Bill went to school. Bill and Mary went to school. Bill and Mary went to school after breakfast. Bill and Mary went to school after breakfast to pick up their books. Bill and Mary went to school after breakfast to pick up their books and visit their teacher.
Compound	Two independent clauses connected by a conjunction: and, but, or, nor, for, yet, so, semicolons, and commas.	Bill went to school, and Mary stayed home. Bill went to school, but Mary stayed home. We can go home, or we can go to school. Bill went to school; Mary stayed home.
Complex	One independent clause and one dependent clause that are connected by a subordinator. Subordinators include: Time: when, while, since, after, before, until, once Place: where, wherever Cause: because, as, inasmuch as, since Condition: if, unless Contrast: although, even though, despite, even if, in spite of, while, whereas Relative pronoun: that, which, who, whom, whoever, what, why, how	When Mary went to school, Bill stayed home. After Mary went to school, Bill left for the store. Before Mary went to school, Bill left for the store. Because Mary went to school, Bill had to go to the store. If Mary goes to school, then Bill has to go to the store. Unless Bill goes to the store, Mary will have to stay home. Even though it rained, Bill went to the store. Bill went to the store that Mary liked. Bill understood why Mary liked that store. Bill understood how to get to the store.
Compound-Complex	Two independent clauses and one dependent clause; they have one conjunction and one subordination.	Bill went to the store, and Mary went home because she was tired. Even though we had little money, we went to the store, and we bought apples.
Run-On Sentence	Three or more unrelated independent clauses connected by conjunctions.	Bill went to school and Mary stayed home, and we had a lot of fun.
Fragment	A sentence lacking either a noun phrase or a verb phrase.	Went to school.

also find their way into the study of sentence-level skills. Do students recognize the presence of suffixes that affect sentence meaning, tense, and voice? Do they recall small details? Do they know whether they are to do the third question on the fourth page or the fourth question on the third page? Did they even attend to what we said?

Sentence Memory: Some tests of sentence-level skill focus on memory and the ability to recall and repeat sentences of increasing length. Sentence imitation has a long history in the field of language assessment, and it is recognized as a marker for children with atypical language development (Menyuk, 1964; Menyuk & Looney, 1972). Tests of sentence memory are not as simple as they may seem. The skill of recalling sentences increasingly improves with age; difficulty recalling sentences may reflect the complexity of the sentence, the length of the words used, and the density of the ideas expressed. Students not only have to process the sentence in working memory, they have to be able to chunk words into meaningful units, a skill that places demands on the language system.

Sentence Grammar: Other tests measuring aspects of syntax may focus on whether students can recognize sentences that are grammatical. In this case, students typically are asked to identify whether an orally presented sentence is spoken as it should be in school. They identify errors in a broad range of areas, such as noun–verb agreement, pronouns, tense and verb forms, negation, the passive voice, and the placement of phrases and clauses. According to Sutter and Johnson (1990), children of 6 years of age become more aware of grammar, and they are able to make judgments about what is correct versus what is not. Bowey (1986) determined that the ability to recognize grammatical errors in oral sentences correlated with measures of reading comprehension and comprehension monitoring. Students who are sensitive to unexpected linguistic events and violations of grammatical rules are more likely to be aware of breakdowns in their comprehension when they read.

Many tests require that students perform tasks of sentence completion, sentence combining, and sentence formulation. Sentence combining tasks are often designed to force the use of certain language constructs such as complex sentences. For example:

> *Combine these three sentences into one sentence. Do not use the word ''and.''*
>
> *Pete saw the girl. The girl was running. She was running home.*

Sentence completion tasks, the oral equivalent of cloze procedure frequently used in reading comprehension assessment, require students to analyze the presented sentence and fill in the missing word or words. These tasks exact specific responses from students; only the perfect response will do.

> *After a long day, I went to bed and laid my head on my ________.*

Because fill-in-the-missing word tasks have little wiggle room, they also place a high demand on word-retrieval skills. It is the job of the evaluator to determine whether the incorrect response is due to a poor command of grammar or whether it is a problem with word finding.

Sentence Meaning: Many tests of sentence-level skills delve into the realm of semantics. Semantics, the study of meaning, has suffered from a bad reputation. The expression ''You are playing with semantics'' suggests, in fact, that semantics is simply not worth our time and effort. Chomsky (1964, 1995) did not believe that the field of semantics was separate from syntax, and he felt that much of what was attributed to semantics could actually be explained by underlying rules of syntactic processes.

With all due respect to Chomsky, we sometimes *do* consider meaning apart from syntax. Word order and grammar work together with word meanings in such a way as to create a larger impression than individual words can convey on their own. The meaning generated by words in phrases and clauses is very much a whole-being-greater-than-the-sum-of-its-parts kind of experience.

By way of example, we can go from one extreme to the other. This line from *The Treasure of the Sierra Madre*, directed by John Huston in 1948, despite its poor grammar, has made it into popular usage: ''Badges? We ain't got no badges. We don't need no badges. I don't have to show you any stinkin' badges.'' In contrast, we are also fascinated with sentences that are known for their grammaticality but are reportedly devoid of meaning. Chomsky's famous example of a sentence never before uttered, ''Colorless green ideas sleep furiously (1957, p. 15), is often quoted in linguistic circles.

Tests that focus on semantics may ask students to listen to two sentences that differ in word order, phrase construction, or clause construction and then to identify whether the sentences have the same meaning.

The cat chased the mouse around the room.
The cat was chased around the room by the mouse.

Although we have definitive rules for how we construct sentences in English, languages are distinguished by the infinite variation in the way we humans express ourselves. Listeners have to be able to process and accommodate this variation accurately and efficiently.

Discourse-Level Skills

The 1970s was the setting for a shift in the understanding of language study. No longer would the sentence reign supreme. For the first time, linguists became interested in language as it was actually used. This change in focus meant studying forms of extended language usage including conversation, rhetoric, narratives, and text structures.

An examination of discourse-level skills may potentially include higher-level language skills, such as abstract and figurative language, the use of cohesive devices (anaphora), the ability to make inferences, and knowledge of story structure. Higher-level language skills are marked by a transition from concrete thinking to abstract thought, together with a growing appreciation for language usage and style. Humor, an early manifestation of metacognitive thinking, has been cited by many researchers as a reflection of overall language and cognitive development (McGhee, 1974; Shultz & Horibe, 1974). Children's ability to interpret idioms correctly and to appreciate metaphors all depends on whether they can use context to determine the need to go beyond the words themselves. In the world of Dr. Seuss, it is possible that the heavens would rain cats and dogs.

Same Thing; Different Words: Anaphora is the process by which we refer to the same entity using different words: ''Misha went to the store; he bought bananas.'' In this case, the pronoun replaces the noun. There are also examples in which the relationship may be, from a linguistic perspective, more complex. The sentence ''Sara saw the boy who was sitting with his friend; she spoke to him'' is an example in which the pronoun now stands for an entire dependent clause. Although we, as mature readers, may not think twice about the referent of the pronoun, there are children for whom these associations are not clear and even downright mysterious. It is not unusual for children on the autistic spectrum to struggle with pronouns and their veiled associations.

Inference: Inference is what makes it possible for us to make sense of the language around us. No matter how clear and explicit we may think we are being when we speak, we omit important details. We presume, in fact, that our listeners will be able to fill in the gaps based on common sense and world knowledge. Children fail to make inferences due to two reasons: They either lack sufficient background knowledge, or they do not know how to make a link between what they hear and what they already know. According to Cain and Oakhill (2007), decoding and language skills are not sufficient for reading comprehension; inference skills are critical.

Cain and Oakhill (2007) also cited the importance of understanding text structure. It is text structure that permits readers to establish expectations, make predictions, and understand how ideas relate to each other. Children's ability to understand story structure and generate narratives is thought to be a foundation skill for reading comprehension (Smiley, Oakley, Worthen, Campione, & Brown, 1977). Snyder and Downey (1991) found that the ability to retell stories accounted significantly for the variance in reading comprehension for children between the ages of 8 and 11. Numerous studies have demonstrated that children with language disorders have challenges with narrative structure. Bishop and Adams

(1992) noted challenges recalling important story elements. Garnett's research (1986) spoke to the paucity of detail in children's references to characters and story contexts. Gillam and Johnston (1992) cited overall issues with sentence structure and grammar.

Discourse-Level Skills: How They Are Assessed

There exist limited tools with which to assess oral language skills beyond the sentence level. Whenever lengthy language is assessed, we have to begin to wonder about the role of memory. First and foremost, was a student able to take in what we said as a precursor to actually processing it in working memory?

Tests measuring the understanding of spoken paragraphs may elicit varying degrees of information regarding the processing of multiple sentences. Some passages are read aloud by the examiner; others are administered with the use of a computer. Some tests attempt to capture an indication of general comprehension by requiring students to point to one of several pictures; this type of response ensures that oral language comprehension is not constrained by the student's expressive language skill. Other tests may require verbal responses; the Clinical Evaluation of Language Fundamentals, Fourth Edition Understanding Spoken Paragraphs (CELF-4; Semel, et al. 2003) subtest requires that students respond to questions targeting different types of comprehension, including the main idea, specific details, sequencing, prediction, and inferencing.

On a more grandiose note, the Test of Narrative Language (TNL; Gillam & Pearson, 2004) is a vehicle for assessing how children between the ages of 5 and 12 understand and use narrative language. Children are asked to retell stories presented with and without pictures and answer questions based on the stories. The TNL cautions evaluators, however, to be aware of language or cultural differences that may compromise performance on the TNL. The assessment of language requires examiners to be open-minded and vigilant in their quest to understand language usage.

Pragmatics

Pragmatics occurs at the top of the language pyramid; it is less about grammar and syntax than it is about language style and how we use language strategically to interact with others and achieve our goals. Children who are successful with language pragmatics monitor their own language and its impact on their listeners. They vary their language usage depending on their environment and their audience. They can, at a moment's notice, change tack, content, and style.

At its most basic level, pragmatics involves five major language functions: (1) greeting others, (2) providing information, (3) making requests, (4) making demands, and (5) making promises. As children become more skilled in their use of language, they learn to adapt their language use in terms of what they have learned to be effective and what was not. Society has expectations for how we use language, and pragmatics is about meeting those expectations and becoming part of the social community.

Many of the rules that govern how we function linguistically in a community are not directly taught, and they can be subtle and not easily discerned. Greeting others and performing introductions requires a knowledge of social standing and of language, both informal and formal. We would never say ''What's up, Mr. President?'' in the same way that we would never introduce two preschoolers together with the words ''Please permit me to introduce . . .'' Teenagers with an understanding of language style and social expectations routinely engage in a simple type of ''code-switching'' when they eliminate the use of profanity in the presence of teachers and other adults. On a higher level, they may learn to be more deferential in the presence of a prospective employer or with a date they want to impress.

Children learn how to make requests politely. They find that a little ''please'' and ''thank you'' go a long way. They also learn, however, that it is possible to hint and even manipulate without directly revealing their real motives. Children become adept at discerning falsehoods and exaggerations, and teenagers even learn how to use language to hurt their peers. In addition to the words, however, there are also nonverbal components to social interactions. Eye contact, proximity, facial expression, intonation, phrasing, and gestures work together to enhance and change the meaning of what people say.

As children age, they become more skilled at conversation. They take turns when talking, and they learn to stay on topic. They begin to organize their language in response to the needs of the listener. ''What do I need to tell them first?'' ''How do I create the big picture before I launch into detail?'' ''How do I respond to other people's feelings?'' They begin to understand that the listener has a mind-set of his or her own and that what the listener knows about the topic may be quite different from their own knowledge base and perspective.

All of the skills that permit children to function socially are also important for success in reading and writing. The ability to judge language style is an important part of reading comprehension. Interpreting messages that are not directly stated plays a larger and larger role as reading assignments involve content that is more abstract and perhaps, even symbolic. Understanding character development and the reasons for characters' actions arises, in part, from having skill in social pragmatics. Writing narrative and expository text with coherence and logic presumes the ability to maintain a topic and peer into the mind of the prospective reader.

Pragmatic Skills: How They Are Assessed

A variety of tests purport to measure skill in pragmatics. Most tests of this nature do so by having children explain what their response would be in a real-life situation. Such situations may include introductions, phone etiquette, requests for assistance and information, and consideration of another's point of view or unstated agenda. First and foremost, when testing pragmatics skills, it is important to ensure that children understand the questions being asked; otherwise the task becomes one of receptive language skill in general and not pragmatics in particular. A child who does not respond to ''How would you facilitate introductions between a general practitioner and a new patient?'' may well be able to make introductions providing that he or she understands the vocabulary of the request. It is also important to examine lower-level language skills, such as articulation, word retrieval, grammar, and syntax, any lack of which can make it hard to use language effectively.

Scholastic Language

Although we often think about language with respect to content, we also need to consider the language of instruction itself. The language of the classroom differs from language in the home in many important respects. The ratio of listeners to speakers has now changed dramatically; the interactions devoted to one-on-one conversations with parents, caregivers, and siblings have now been replaced by a new form of interaction, that of teacher–child communication. Communication with teachers offers less conversational repair, less feedback, and fewer opportunities for reassurance and admonishment. Sustained listening becomes the rule; teachers recite narratives, and they provide directions. For the first time, precision becomes important. Does the name go at the top of the page? Do we circle the answer or place a line under it? What assignment gets done first? Do we place it on the top shelf to the right or the middle shelf on the left?

Boehm's research (2000b) offered insight into basic concepts of language that provide us with tools for understanding and describing how people, things, and events relate to each other. According to Boehm, basic concepts are words that describe qualities (big, happy), quantities (few, some, more), spatial relationships (over, under, between), and time (before, after, during). These

Table 9.5 **Tests and Subtests of Oral Language**

	R = Receptive E = Expressive				
Test	**Lexical/Semantic**	**Syntactic**	**Supralinguistic**	**Pragmatic**	**Underlying Processes**
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: PreK–1	Basic Concepts (R) Receptive Vocabulary (R) Word Relationships (E)	Parallel Sentence Production (E)	Listening Comprehension (R/E)		Rhyme Knowledge Sound Categorization Elision Rapid Automatic Naming Word Retrieval
Boehm Test of Basic Concepts—Third Edition (Boehm, 2001a) English & Spanish Norms Grades: K, 1, & 2	Basic Concepts (R)				
Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) Ages: 5–8, 9–12, 13–21 Not all subtests are administered to all age ranges	Word Structure (E) Word Classes (E) (R) Word Definitions (E) Expressive Vocabulary (E) Semantic Relationships (R)	Concepts & Following Directions (R) Recalling Sentences (E) Formulated Sentences (E) Sentence Structure (R) Sentence Assembly (E)	Understanding Spoken Paragraphs (R)	Pragmatics Profile	Phonological Awareness Word Associations Rapid Automatic Naming Number Repetition Familiar Sequences
Comprehensive Assessment of Spoken Language (CASL; Carrow-Woolfolk, 1999)	Comprehension of Basic Concepts (R) Antonyms (E) Synonyms (R) Idiomatic Language (E)	Syntax Construction (E) Paragraph Comprehension of Syntax (R) Grammatical Morphemes (E)	Nonliteral Language (R/E) Meaning from Context (R/E) Inference (R/E) Ambiguous Sentences (R/E)	Pragmatic Judgment	

Ages: 3–6, 7–21 Not all subtests are administered to all age ranges		Sentence Completion (E) Sentence Comprehension of Syntax (R) Grammaticality Judgment (R/E)			
Diagnostic Assessments of Reading—Second Edition (DAR; Roswell, Chall, Curtis, & Kearns, 2005) Grades: 1–2	Word Meaning (E)				
Illinois Test of Psycholinguistic Abilities—Third Edition (ITPA-3; Hammill, Mather, & Roberts, 2001) Ages: 5–12	Spoken Analogies (E) Spoken Vocabulary (E)	Morphological Closure (E) Syntactic Sentences (E)			Sound Deletion Rhyming Sequences
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 4–25+	Listening Comprehension (R) Oral Expression (E)	Listening Comprehension (R) Oral Expression (E)	Listening Comprehension (R) Oral Expression (E)		Associational Fluency Naming Facility
Oral and Written Language Scales—Second Edition (OWLS-II; Carrow-Woolfolk, 2011) Ages: 3–21	Listening Comprehension (R) Oral Expression (E)	Listening Comprehension (R) Oral Expression (E)	Listening Comprehension (R) Oral Expression (E)		

(*continues*)

Table 9.5 (*continued*)

	R = Receptive E = Expressive				
Test	**Lexical/Semantic**	**Syntactic**	**Supralinguistic**	**Pragmatic**	**Underlying Processes**
Preschool Language Scale—Fourth Edition (PLS-4; (Zimmerman, Steiner, & Pond, 2002) Ages: Birth–6	Auditory Comprehension Scale (R) Expressive Communication Scale (E)	Auditory Comprehension Scale (R) Expressive Communication Scale (E)	Auditory Comprehension Scale (R) Expressive Communication Scale (E)		
Test of Adolescent and Adult Language—Fourth Edition (TOAL-4; Hammill, Brown, Larsen, Wiederholt, 2007) Ages: 12–24 This test also measures written language.	Word Opposites (E) Spoken Analogies (E)	Word Derivations (E)			
Test of Auditory Processing Skills—Third Edition (TAPS-3; N. Martin & Brownell, 2005) Ages: 4–18		Sentence Memory (E)	Auditory Comprehension (R/E) Auditory Reasoning (R/E)		Word Discrimination Phonological Segmentation Phonological Blending Number Memory Forward Number Memory Reversed Figure Group Word Memory

Test of Language Competence—Expanded Edition (TLC-E; Wiig & Secord, 1989) Ages: 5–9, 9–18+	Recreating Speech Acts (E)	Recreating Speech Acts (E)	Ambiguous Sentences (R) Listening Comprehension: Making Inferences (R) Figurative Language (R)	Recreating Speech Acts (E)	Remembering Word Pairs
Test of Language Development, Primary—Fourth Edition (TOLD-P:4; Newcomer & Hammill, 2008) Ages: 4–8	Picture Vocabulary (R) Relational Vocabulary (E) Oral Vocabulary (E)	Syntactic Understanding (R) Sentence Imitation (E) Morphological Completion (E)			Phonemic Awareness Word Discrimination Word Articulation
Test of Language Development, Intermediate—Fourth Edition (TOLD-I:4; Hammill & Newcomer, 2008) Ages: 8–17	Picture Vocabulary (R) Relational Vocabulary (E) Multiple Meanings (E)	Morphological Comprehension (R) Word Ordering (E) Sentence Combining (E)			
Test of Narrative Language (TNL; Gillam & Pearson, 2004) Ages: 5–12			Narrative Comprehension (R/E) Oral Narration (E)		
Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009) Ages: 4–19	Listening Comprehension (R/E)	Listening Comprehension (R/E)	Listening Comprehension (R/E)		

(*continues*)

Table 9.5 (*continued*)

	R = Receptive E = Expressive				
Test	**Lexical/Semantic**	**Syntactic**	**Supralinguistic**	**Pragmatic**	**Underlying Processes**
Wide Range Assessment of Memory and Learning—Second Edition (WRAML2; Sheslow & Adams, 2003) Ages: 5–85+	Story Memory (R/E)	Sentence Memory (E) Story Memory (R/E)	Story Memory (R/E)		Verbal Learning
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+	Picture Vocabulary (R/E)	Understanding Directions (R)	Story Recall (R/E) Oral Comprehension (R/E)		Sound Awareness
Woodcock-Johnson III Tests of Cognitive Abilities (WJ III COG, Woodcock, McGrew, & Mather, 2001b) Ages: 2–90+	Verbal Comprehension (R/E)				Sound Blending Incomplete Words Auditory Working Memory Auditory Attention Memory for Words Rapid Picture Naming
Woodcock Reading Mastery Tests—Third Edition (WRMT-III, Woodcock, 2011) Ages: 4–6—79	Listening Comprehension (R)	Listening Comprehension (R)	Listening Comprehension (R)		

terms are critical not only for success in the classroom but also because they are important precepts of cognition. Without them, we understand and describe things and events in isolation and not as part of a world with cause and effect, organization, and purpose.

Although we in the adult world may take these basic concepts for granted, young children may struggle to form internal representations of these words (French & Nelson, 1985). Terms such as *before* and *after* have both physical and temporal meanings. They define events in sequence (Do your homework before you play video games.) and in position (What number comes before 5?). Terms such as *right* and *left* can be particularly challenging; what is on my right could be on your left. Difficulty with these terms also plagues the adult world. How many adults have to think twice when presented with ''stage left'' or ''stage right?'' Basic concepts present a particular challenge to children with learning disabilities, speech and language impairments, and other learning challenges (Kavale, 1982). Sometimes children do poorly on a given test because they do not understand the directions, and not because they lack the skill that is purportedly being measured. The role of basic concepts in test directions needs to be considered carefully; the directions on many widely used intelligence tests presume skill with basic concepts (Kaufman, 1978).

Basic Concepts: How They Are Assessed

Tests measuring basic concepts, such as the Comprehensive Test of Spoken Language (CASL; Carrow-Woolfolk, 1999) use a picture format that illustrates the meaning of the spoken word measured by the test item. Children either point to part of a picture or point to one of four pictures to demonstrate their understanding. A similar format is used on the Boehm Test of Basic Concepts, Third Edition (Boehm, 2000a).

Conclusion

Knowledge of each layer of the language pyramid from phonology to pragmatics permits us to craft evaluations with meaningful, focused recommendations. When children have difficulty understanding what they read, it is important to examine their receptive language skill to determine whether weaknesses in oral language are compromising their ability to interpret language in print. A list of oral language tests and subtests is shown in Table 9.5.

Review Questions

1. What is best practice in testing speech and language skills?
2. How does scholastic language differ from language in the home?
3. You are working with a team that is determining the tests to be administered as part of a reading evaluation. Explain the value of including a listening comprehension test in the test battery.
4. You are working with a child who demonstrates good decoding skills and fluency but poor comprehension. The team has decided to recommend instruction in reading strategies. What else might the team consider?
5. Explain this statement: Most tests of vocabulary measure breadth but not depth.
6. How would knowledge of word structure be helpful to young readers?
7. You are working with a teacher who indicates that she never learned the parts of speech or the different types of sentences. Why does she need to learn about grammar and sentence structure?
8. You are testing a child who has difficulty formulating complex sentences when she speaks. What concerns might you have regarding her skill in reading comprehension and written expression?
9. How could a weakness in pragmatics affect reading comprehension?

Underlying Processes

Chapter 10

Introduction

Oral communication is a finely tuned sequence of events that is executed with split-second timing and precision (Denes & Pinson, 1973). Very briefly, it begins with a vague notion or an idea that arises in our consciousness. Our desire to be heard initiates a complex series of neurological processes governing how our speech organs work to express our thoughts in a series of pressure patterns that are called sound waves. These waves travel through the air to the ears of the listener, who we hope is paying attention.

The listener's job is no less complex. The ears transform the sound waves into a series of neural impulses that travel along the acoustic nerve to the brain. These impulses are mapped into increasingly complex linguistic representations, and, with luck, they will be stored in memory as a foundation for further processing. Being stored in memory is by no means a guarantee that the message will be understood. In order for comprehension to occur, there must be a meeting of the minds. The listener must have a sufficient command of language and background knowledge in order to process the message as it was intended.

Most of us do not have to make a conscious effort to think about how we coordinate our teeth, tongue, lips, breath, and voice to produce speech. By the same token, we are not consciously aware of the mechanisms and processes by which we turn the sounds of speech into meaning. An implicit understanding of the sound patterns permits us to detect differences in accent, monitor what we say, and listen for errors in pronunciation and grammar. While this implicit understanding facilitates oral communication, it is not sufficient to grasp the relationship between oral language and print.

Dyslexia

In my discussions with educators, I have found that the use of the word *dyslexia* solicits a wide range of reactions. There are disbelievers who admonish that if dyslexia exists at all, it is so unusual that we would rarely, if ever, expect to encounter it in our lifetimes. There are the uninformed who conjure up images of reversed letters and mirror writing. They state, ''If there are no reversals, then it can't be dyslexia.'' There are the annoyed who believe that the definition is so vague as to be useless. (In this respect, the definition has much in common with the formal definition of a specific learning disability.) I am even told by some of my graduate students that they have been forbidden to use the word *dyslexia* at team meetings due to the concern that dyslexic students might require some exotic intervention that would exceed the boundaries of public school propriety.

As medical technology becomes more sophisticated, we no longer have to rely on speculation. Functional magnetic resonance imaging studies now have the capacity to measure changes in metabolism and in blood flow that occur when neural systems of the brain are activated. Doubting Thomases might be surprised; there are fundamental neurological differences in the way that good readers and poor readers process print. According to S. Shaywitz (2003), good readers rely heavily on systems located in the back of the brain (the parieto-temporal and the occipito-temporal regions) and to a lesser degree on Broca's area toward the front. Poor or dyslexic readers, however, show a different activation pattern; they overactivate Broca's area in what is an apparent effort to compensate for weak processing in the posterior region (S. Shaywitz et al., 2003).

While the prospect of identifying specific brain signatures for reading disabilities and their subtypes is exciting, it is even more tantalizing to see how good reading instruction actually changes metabolic activity in the brain. Pre- and posttesting in a study by Bennett Shaywitz et al. (2004) found that "the use of an evidence-based phonologic reading intervention [facilitated] the development of those fast-paced neural systems that underlie skilled reading" (p. 931) and that, with instruction, dyslexic brains were able to process print in a manner more closely resembling their more typical peers. Good teaching has the capacity to alter the chemistry of the brain.

According to the International Dyslexia Association (IDA), *dyslexia* is defined formally in this way:

> *Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and/or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge. (Lyon, Shaywitz, & Shaywitz, 2003, p. 2)*

It is true that the definition as provided by the IDA is couched in terms of generality, such as "typically," "often," "may," and "can." The definition, as it currently stands, was written to accommodate the inherent differences in human beings as readers. It also accommodates current controversies being addressed by researchers in a variety of fields related to psychology, cognition, language, and, yes, reading. While the term *dyslexia* may not be common lingo within the school setting even though it is clearly specified in the Individuals with Disabilities Education Improvement Act (IDEA; 20 U.S.C. §§ 1400 et seq.), it is widely used by the popular press and the research community and, as such, can be the pathway to a better understanding of reading problems in general. It is an issue of vocabulary.

In keeping with the definition provided, we will do a little lexical housekeeping and begin with the underlying processes that make decoding possible: phonological processing, rapid automatized naming, and orthographical processing. *Phonological processing* refers to the neurological mechanisms by which we use speech sounds to process oral and written language. The root, *phon*, is the same root as in the word *telephone* meaning speech sound. Phonological processing includes three main skills: phonological awareness, phonological memory, and rapid naming. *Phonological awareness* refers to the conscious awareness of sound patterns in words. *Phonological memory* is the ability to store representations of speech sounds in memory. *Rapid naming*, also known as rapid automatized naming (RAN), refers to the ability to retrieve language labels in series from memory with speed and accuracy. Some disagree that rapid naming is a phonological process (Wolf & Bowers, 1993). We examine this question later in the chapter.

Phonological and Phonemic Awareness

Chall (1983) conceptualized phonological awareness as a transitional stage of language development in which children move from the understanding that words have meaning to a realization that words also have sounds. The first sign of this realization may well be the sparkle in a child's eye. Language play in the form of rhyme and alliteration delights children; they demonstrate their awareness by tapping, clapping, or jumping to words in sentences or syllables in words. Books by Dr. Seuss fill young children's bookshelves; his rhymes and rhythms tease and tickle their brains leading to pleas of ''Read it again!''

Although the term *phonological awareness* is often used interchangeably with *phonemic awareness*, it is not the same. Phonological awareness is a broad term that describes the awareness of sound patterns in oral language: words, syllables, and phonemes inclusive. On a more refined note, phonemic awareness refers to the ability to discriminate, remember, and manipulate *individual* speech sounds in words. Although skill with phonological awareness is necessary for reading and spelling, it is not sufficient. It is phonemic awareness that permits children to understand the alphabetic principle, make sense of rules for sound–symbol correspondence, and even recognize words that are only partially regular (Torgesen & Mathes, 2000).

Although many believe that learning to read begins with phonics, skill with sound–symbol correspondence does not develop without phonemic awareness. The importance of this foundation also hold true for children learning to read in Braille (Greaney & Reason, 1999). Research suggests, in fact, that Braille readers may rely more on phonological processing than typical readers, given that Braille reading is much slower than reading print. Tasks that are executed more slowly place a greater burden on aspects of memory.

According to M. J. Adams (1991), the discovery of the role of phonemic awareness in reading was ''the single most powerful advance in the science and pedagogy of reading this [the twentieth] century'' (p. 392). Children who are strong in phonemic awareness generally learn to read with ease; children who are weak do not (Byrne, Freebody, & Gates, 1992; Stanovich, Cunningham, & Cramer, 1984). Researchers clearly suggest that phonemic awareness is the best predictor that we have of reading skill at the elementary school level. It is a better predictor than measures of IQ, socioeconomic background, language proficiency, and alphabet knowledge (M. J. Adams, 1990; Griffith & Olson, 1992).

Delays in Reading

Phonemic awareness is also a powerful predictor of reading achievement in older students (Juel, 1988; Juel, Griffith, & Gough, 1986; Tunmer & Nesdale, 1985). Research on phonemic awareness has laid waste to the concept of late bloomers in reading. For many years it was feared that prompt intervention for young students with reading delays would interfere with nature's intent and would serve only to stigmatize children and alienate them from their peers (Lyon et al., 2001).

We now know that children who struggle with early reading tasks are not experiencing developmental delays but are demonstrating the first signs of what is most likely a lifelong processing deficit. Contrary to popular wisdom, there is no magic moment of clarity when struggling readers pull it all together and begin to read (Wattenberg, Hansel, Hendricks, & Chang, 2004). Juel's research (1988) confirmed that almost 90% of poor readers who lacked phonemic awareness in first grade remained poor readers in fourth grade. Research by Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1996) found the middle school years provided no relief; children with reading difficulty in grades 1 through 9 did not catch up. The final nail in the coffin was the study by S. Shaywitz et al. (1999) that focused on students through 12th grade. Collectively, the studies confirmed that early reading weakness and lack of phonemic awareness had consequences for lifelong learning that were not ameliorated by the gift of time and delay.

Lest the statistics above be discouraging, the prospects for children with poor phonemic awareness need not be quite so dim. Phonemic awareness, in comparison to other processing deficits, is inherently teachable. M. J. Adams's enthusiasm for ''the single most powerful advance in the science and pedagogy of reading this century'' reflects not just what we can expect for young readers; it reflects the potential for what we can do as educators (1991, p. 392). If we teach it, they respond.

Phonetics

Although individuals with reading difficulty hear, they do not necessarily perceive the constituent elements that make up words. I. Liberman (1973) suggested, in fact, that this is not just an issue that plagues children. A review of the history of writing indicates that an alphabet method of writing based on sound–symbol correspondence is a relatively recent and unique development in comparison to the many syllabaries and logographic systems that have been used for thousands of years. What is it about spoken language that defies our efforts to break it apart into neat little packages?

Coarticulation: Speech is a steady stream of sound that dissipates as quickly as it comes forth. Although we refer to speech sounds, or phones, as if they were distinct entities, speech sounds do not occur in isolation (A. Liberman, 1970; A. Liberman, Cooper, Shankweiler, & Studdert-Kennedy, 1967). Articulation is dynamic. When we speak we move our teeth, tongue, and lips from one position to another. As a result, each sound is affected by the articulatory demands of both the sounds that proceed and the sounds that follow. We say that the sounds are *coarticulated*.

Because speech sounds blend one into the next, individual sounds may not be readily apparent and clear in their identity. Contrary to what is frequently presumed by many teachers in beginning reading classes, the /ă/ in *cat* is different from the /ă/ in *ham*, *hand*, and *hang*. When we speak and blend individual speech sounds together, systematic changes occur that cause those sounds to lose or change aspects of their identity. The study of how speech sounds are actually produced, transmitted, and received is called *phonetics*.

Although we have only one letter *t* in our print system, the English language actually has several distinct /t/ sounds. The spoken word *titillate* [t^{h}ɪɾɨlet], is an example of a word with three different [t] phones, and we can describe those sounds using the International Phonetic Alphabet (IPA) (Farrall, 1994). The first *t*[t^{h}] is aspirated, meaning that it is accompanied by a puff of air. The second *t*[ɾ] is flapped; it is almost *d*-like in quality. The third *t*[t] is unreleased; here the tip of the tongue hesitates on the alveolar ridge without releasing the sound.

Variations in the pronunciation of speech sounds are rule governed and are said to occur in complementary distribution. Some of the rule-governed changes that occur in English include these:

- *Aspiration*. /k/, /p/, and /t/ are accompanied by a puff of air at the beginning of stressed syllables. We say pot [p^{h}αt] and plot [p^{h}lαt] but spot [spαt] and mop [mαp].
- *Nasalization*. Vowels that occur before a /m/, /n/, or /ng/ in the same syllable are colored by the nasal sound. Listen to the difference between "tap/tan," "pet/pen," and "pit/pin."
- *Lengthening*. Vowels are increased in length when they occur before a voiced consonant. Listen carefully as you say these word pairs: "bet/bed," "cap/cab," "pick/pig." In each case, the second vowel is held for a few milliseconds longer. Such is the power of voiced consonants.
- *Raising*. Vowels move higher in the mouth when they precede a /g/. Although we tell our students that short e is /ĕ/, we are stretching the truth. Close your eyes and listen: "bet/beg." If truth be told, the second /ĕ/ sounds more like an /ā/.

But wait; there is more. Sounds and syllables can be reduced or downright deleted; listen carefully when you say "vegetable" or "interest." I refer to this as the "principle of least effort" with apologies to George Zipf (1949), a linguist who said that we sometimes opt for the easy way out even when it is not in our best interest. The fact is that we are constantly engaged in a compromise between ease of speech and ensuring that our content is understandable. Why go to the trouble of speaking clearly when we can mumble and still be understood?

If I have not succeeded in conveying the challenges inherent in discriminating speech sounds, let me continue. The English language has significantly more sounds than the 26 letters of the alphabet would suggest. Depending on the source, vowels and consonant sounds collectively number about 44.

Vowels: Vowel sounds are said to be open and voiced. Open sounds flow freely without physical constriction or blockage. W. E. Francis (1958) stated that vowels are often described in terms of their color. Like the colors of the rainbow, vowels change in tiny increments, affected by differences in the height of the jaw, the rounding of the lips, and the relative position of the sound from front to back. Linguists describe the configuration of vowels in the mouth as circles, triangles, or alternatively, quadrangles. (You may have to use your imagination a little.) See the example of the vowel quadrangle in Figure 10.1.

When we do not fully articulate vowel sounds (as in the case of unstressed syllables), the vowels gravitate toward the mid-central region of the mouth, giving us the all-famous schwa (ə), the linguistic equivalent of ''all roads lead to Rome.'' Given the tiny physical differences between many vowels, they can be easily confused. How do we spell the unstressed syllables in sofa, mitten, bottom, and penal?

Consonants: In contrast to vowels, consonant sounds can be voiced or unvoiced. Consonant sounds are produced by blockages or restrictions in the air flow at different points along the vocal tract. The way in which the air flow is blocked or restricted is referred to as the manner of articulation. The points themselves are referred to as the place of articulation. Places of articulation range from the lips to the vocal folds. Students may confuse sounds due to either parameter. For this reason, it is helpful for evaluators, and sometimes even the students, to understand how speech sounds are produced. The consonants are shown in Table 10.1.

The pronunciation of these sounds also varies depending on several factors that are above and beyond their placement in a word. Differences in the structure of the mouth, such as a cleft palate or missing front teeth, compromise the ability to produce specific speech sounds. Individuals with low tone or with a poor feedback from the tongue itself may have difficulty placing their tongue with the precision and skill that many of us take for granted.

Accents: When pronunciation varies relative to a geographic region, we refer to it as an accent.

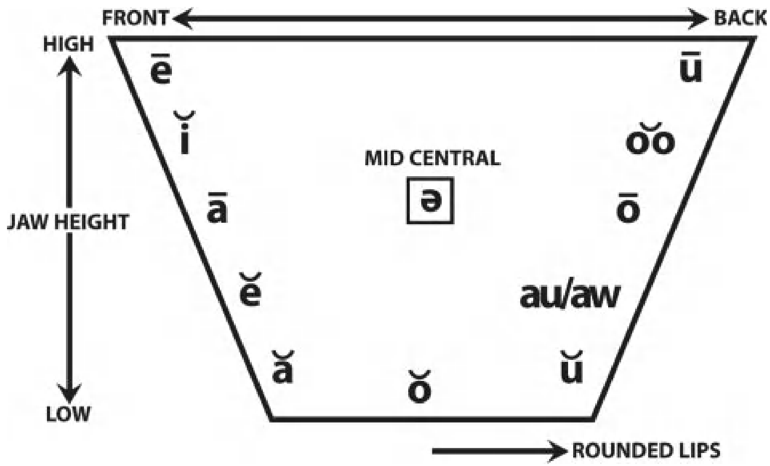

Figure 10.1

Vowel Quadrangle

Sources: Adapted from W. E. Francis (1958); O'Grady, Archibald, Aronoff, & Rees-Miller (2005).

Table 10.1 **Consonants by Place and Manner of Articulation**

Manner of Articulation	Place of Articulation						
	Bilabial	**Labio-dental**	**Inter-dental**	**Alveolar**	**Palatal**	**Velar**	**Glottal**
Note: The convention for consonant pairs is that the unvoiced sound precedes its voiced equivalent.	Two lips	Lips and teeth	Between teeth	Ridge	Roof	Throat	Deep throat
Stop: Air flow is blocked.	p b			t d		k g	ʔ (as in *uh-oh*)
Nasal: Air flow is blocked at the lips, alveolar ridge, or throat. The sound, however, is continuous.	m			n		ng	
Affricate: A stop with a slow release of the tongue.					ch j		
Fricative: A continuous constricted flow of air.		f v	th th	s z	sh zh		
Liquid: A continuous voiced or voiceless sound that varies in quality.				l	r		
Glide: A rapid movement that precedes or follows a vowel.					y	wh w	h

Sources: W. E. Francis (1958); O'Grady, Archibald, Aronoff, & Rees-Miller (2005).

Teaching the vowel system in Massachusetts, for example, leads to numerous discussions regarding the pronunciation of *caught* and *cot* and whether they are the same or different. In New England when we speak, we are accustomed to dropping /r/ only to find it surface unexpectedly where no /r/ has gone before (e.g., ''ideers'' for *ideas*). In Texas /ĕ/ becomes /ĭ/, causing endless confusion over whether we had 10 cups or tin cups. We also alter our speech depending on what is in vogue. Valspeak, a phenomenon of the 1980s and 1990s, popularized vowel lengthening and nasalized vowels. In the statement ''You're like so totally rude,'' the /ōō/ in rude would be greatly increased in length, almost rising to the level of two syllables. Speech has endless potential for individualization.

When we consider the potential for how we speak as individuals, it is not surprising that voice recognition systems did not become truly functional until recently. Only in the past few years has there been sufficient memory and processing speed for computers to do what humans have done for thousands of years.

Phonemics

While phoneticians dedicate themselves to describing speech in all of its linguistic precision, we do not need to discriminate fine differences in sounds in order to understand a spoken message. After all, how many English speakers are aware that *titillate* has three different /t/ phones? Most English speakers, in fact, would swear that the /ă/ in *cat* is the same as the /ă/ in *can*. As listeners, we are designed to distinguish only between the smallest units of sound that actually affect word meaning. In this way, we are able to process language with a high degree of efficiency and accuracy.

Phonemics is the study of speech sounds that distinguish meaning (phonemes) and the rules by which we combine them. Phonological rules govern what sound sequences are permissible in a given language. While we may not think of ourselves as being experts in the phonology of English, we as native speakers have the ability to recognize sound sequences that are permissible and those that are not. In English, for example, /l/ and /r/ are considered consonants, and as such they cannot form the nucleus or core of a stressed syllable. When we as native speakers of English hear the word /vlk/, we know that it cannot be English. In Serbo-Croatian, however, /l/ can function as a vowel, and Serbians or Croats understand the word /vlk/ to be ''wolf,'' a word with a vocalic /l/. Similarly, in English we would reject the sound sequence /mgla/ as hard to pronounce and foreign to the tongue. Russians, however, would have no such difficulty and understand the word to mean ''haze'' or ''gloom.'' They would even go so far as to rhyme it with /t'ma/, meaning ''darkness.''

Given the complexities of speech production, it is not surprising that the description of phonemes in different languages has warranted much time, effort, and, to some degree, controversy.

Link Between Vocabulary and Phonological Awareness

Although we focus on the development of phonological awareness in kindergarten and first grade, the seeds of phonological awareness are sown much earlier. Several studies have found that the size of a preschooler's vocabulary is associated with the later development of phonological awareness (Metsala, 2011; Walley, Metsala, & Garlock, 2003). The theory is described next.

According to Metsala's (2011) lexical restructuring model, increases in vocabulary are accompanied by a gradual restructuring in the way that words are stored in the brain. As children acquire a greater number of words, they develop a need to store words with greater precision so that similar-sounding words are not confused. The more words that a child has, the greater the need to ensure that the internal structure of each word is marked, segment by segment. Children with smaller vocabularies may not have a sufficient store of similar-sounding words in order to prime this process.

In 2007 Lonigan demonstrated that there was a causal link between vocabulary knowledge and growth in phonological awareness. Lonigan's study contrasted two groups of preschoolers. The first group received instruction in phonological awareness, and they improved their awareness of sound patterns in words. The second group, however, received instruction in vocabulary; they improved not only in vocabulary but also in their phonological awareness. The increase in vocabulary is thought to have enhanced or forced the brain to recognize and store words with greater precision according to their internal structure. Once part of the mental lexicon, these sound patterns were then ready and waiting to reveal themselves and become part of a young child's awareness and serve as a foundation for learning to read.

According to Metsala (2011), the vocabulary/phonological awareness link might also speak to the increased risk for reading failure of children with lower socioeconomic status: Smaller vocabularies put children at dual risk not just for comprehension but also for decoding. This research together with research on the interconnectivity of language skills may, in time, lead to a new conceptualization of how we design instruction for young children (Dickinson, McCabe, Anastasopoulos, Peisner-Feinberg, & Poe, 2003).

Developmental Sequence

Children enter school with different degrees of preparedness for reading. Some children are equipped by nature to perceive individual sounds in words with ease (Olson, Forsberg, Wise, & Rack, 1994). Others require direct teaching as a precursor and/or supplement to formal reading instruction (Ball & Blachman, 1988, 1991).

Phonological awareness develops along a continuum that begins with the realization that sentences consist of words and culminates in an explicit knowledge of individual speech sounds (phonemes). Researchers describe this progression of skills in a variety of ways. Stanovich (1992) conceptualized it as movement from shallow to deep awareness; M. J. Adams (1990) referred to it as the depth-chart model.

Yopp's 1988 study categorized tasks of phonological and phonemic awareness in terms of three factors ranging in complexity from auditory discrimination to manipulation of speech sounds. Simple tasks include phoneme segmentation, isolation, blending, and counting. Compound tasks, such as phoneme deletion and cluster segmentation, place a greater demand on memory; they require more steps to complete. According to Yopp, the inclusion of both simple phonemic awareness tasks and compound phonemic awareness tasks increased the predictive validity of the assessment in young children. The third factor (word-to-word matching and rhyming) appears to draw on different underlying abilities, and Yopp cautioned that these skills should not serve as a foundation for decision making.

Syllables: As children become aware of sound patterns in words, they move from larger sound segments, such as words in sentences and syllables in words, to smaller, more refined segments within syllables. Before we look at how phonemic awareness develops, it is helpful to understand a little about syllables.

Syllables are not easily defined, and many of the best authorities disagree about what they are and how to divide them. There is some evidence that speech production is organized in terms of syllables. Slips of the tongue and malapropisms (''I am the sole perpetrator of this business!'') that are based on syllables suggest that syllable structure is important for word retrieval (Fay & Cutler, 1977). We also know that many of the phonological rules, such as nasalization, apply within the context of a syllable; think of the contrast between ''America'' and ''amortize.''

The politics of syllable structure are highly charged, and definitions for syllables are not without their caveats (Goldsmith, 2009; Stetson, 1951). There is general agreement that a syllable is an uninterrupted unit of speech. According to O'Grady (2005), a syllable usually consists of a vowel that is typically preceded by one or more consonants and that is often followed by one or more consonants. (There is more to this discussion, but we will not digress.) We can diagram syllable structure as shown in Figure 10.2.

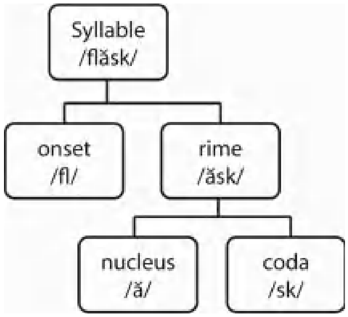

Figure 10.2

Syllable Structure

Although this definition is helpful, it still leaves us wondering. Many of us can count syllables in a word; if you place your hand under your jaw, you will feel your mouth open for each syllable. The word *compete* has two syllables; *complacent* has three. How many syllables, however, are in the words *fire, real,* or *rhythm*? It is even trickier to identify the precise juncture between syllables in words. How do we divide words into syllables? Is it mi.ster, mis.ter, or mist.er?

Syllable structure has important implications for the rules by which we pronounce vowels, combine sounds, and spell. Syllables are described in terms of their vowel (V) and consonant (C) sounds (phonemes).

There are two main types of syllables: open and closed. Open syllables end in a vowel; closed syllables end in a consonant. Closed syllables come in two forms: simple and complex. Simple syllables have only one consonant that precedes or follows the vowel; *cat* and *chip* are both simple syllables. (Digraph *ch* makes one sound so it is represented by one C.) *Heat* is also a simple syllable; even though there are two vowel letters, there is only one vowel sound. Complex syllables have consonant blends (VCC, CCV, CCVCC) and consonant clusters (three consonants).

In its simplest form (no pun intended), a syllable may consist of only one vowel (V), as in the first syllable of *event* and the word *I*; in its most complex form, a closed syllable could be in the form CCCVCCC, as in the word *sprints*.

Now that we know a little about syllables, we are ready to look at how children develop an explicit understanding of sound patterns in words, as shown in Table 10.2.

There is a long-standing presumption that phonological awareness develops through hearing; some studies, however, indicate that some deaf readers are able to access phonological information through nonauditory channels, such as speechreading, cued speech, and articulatory feedback (Leybaert, 1993). As we can imagine, this process is not easy, and there are many questions about the role of phonological awareness instruction and phonics instruction in deaf readers (Trezek, 2002). According to a Gallaudet Research Institute (Traxler, 2000) study of a national sample of deaf students in 2000, 18-year-old deaf students were reading on average at the fourth-grade level.

Assessment of Phonological Awareness

According to Torgesen and Mathes (2000), phonological awareness can be measured by over 20 tasks which fall largely into three groups: sound comparison, phoneme blending, and phoneme segmentation. Most of these tasks appear to measure the same phonological awareness construct (Stanovich et al., 1984). That is not to say, however, that all tasks provide meaningful information for children of all ages. Some tasks are more sensitive than others; some tasks place a larger demand on cognitive processing than others (Yopp, 1988).

The challenge of screening young children for potential reading disabilities is complicated by the developmental progression of skills and the point at which specific tasks become reliable enough to be valid predictors of reading. Most children in kindergarten do not yet have sufficient skill to perform the compound phonemic awareness tasks that are inherently more reliable. With respect to kindergarteners, we typically begin with auditory discrimination and sound comparison tasks; these tasks do not require that children perform an actual operation other than to discriminate sounds and make a judgment. Unfortunately, these tasks have less predictive value.

The research on rhyming is mixed; Badian's research (2001) suggested that rhyming is a valid predictor of reading for kindergartners. Other studies indicated that rhyming in preschool and kindergartners is not (Christensen, 2000). Stanovich et al. (1984) suggested that the lack of predictive power of rhyming may reflect a restricted range of performance, or a *ceiling effect*. In other words, a threshold may be reached where the ability to rhyme is no longer a significant issue with respect to reading. It is also possible that rhyming and auditory discrimination tasks tap into other abilities such as word retrieval, what Yopp identified as a ''third factor'' (Yopp, 1988).

When testing school-age children, it is important that the phonological awareness assessment include both simple and compound tasks. Compound phonemic awareness tasks that place a greater weight on processing abilities, such as working memory, may come closer to mimicking the increased processing demands inherent in linking sounds to symbols.

There are many different ways to assess phonological awareness. Lack of standardization from one test to another may leave educators confused regarding potential differences in scores. In a field where ''small differences can mean a lot'' (J. O. Willis, personal communication, October 23, 2006), concerns regarding the lack of standardization and test design give rise to five potential problems.

1. *Many tests do not provide adequate definition of what constitutes the correct pronunciation of sounds.* Are we to give credit when a child says /kuh + ă + tuh/ instead of /k + ă + t/? What about a child who says /muh/ instead of /m/? The addition of the /uh/ suggests that this child is not segmenting sounds into individual phonemes, a problem that bodes ill for both reading and spelling. Even if the test itself does not recognize such pronunciations are errors, imprecise or incorrect pronunciations need to be noted and addressed.

Table 10.2 **Developmental Sequence of Phonological Awareness Skills**

Yopp's Factor	Grade Level	Skill	Examples
Third Factor (Other)	Beginning kindergarten	Awareness of words	Clap once for each word in the sentence "The boy is here."
Simple Phonemic Awareness		Awareness of syllables	Clap once for each syllable in "teacher."
		Identifying rhyming words	Do these words rhyme: *box* and *sox*?
		Generating rhyming words	Tell me a word that rhymes with *hat.*
	End of kindergarten	Identifying words with the same beginning sounds	Do these words begin with the same sound: big bat? (word-to-word matching)
		Isolating beginning sounds in words	Tell me the beginning sounds in bell.
		Segmenting syllables into onset and rime	/kat/ = /k + at/
		Blending V-C or C-V	/ĭ + t/ = /ĭt/, /g + ō/ = go
	Mid-first grade	Identifying words with the same ending sounds	Do these words end in the same sound: bat/sit?
		Isolating ending sounds in words	Tell me the ending sound in beg.
		Blending CV-C, C-VC, and CC-V segments	/sĭ+ t/, /s + ĭt/, /tr + ē/
	End of first grade	Blending sounds in 4- and 5- phoneme words (CVCC, CCVC, CCVCC)	tips, trip, trips
		Segmenting sounds in 4- and 5- phoneme words (CVCC, CCVC, CCVCC)	Tell me the sounds in *pins*, *spin*, and *spins*.
Compound Phonemic Awareness	Second grade and beyond	Segmenting clusters.	Tell me the sounds in *sprints.*
		Manipulating phonemes: Deleting sounds in the word-initial, word-final, and word-medial positions Reversals Substitutions Pig Latin	Say *melt* without the /t/. Say *melt* without the /l/. Say *pin* backward. Say *tin*. Now say it again and change the /t/ to /m/. I-ay ike-lay ig-pay atin-lay.

Source: Yopp (1988); also Rath in Brody (1994); Torgesen & Mathes (2000) and Treiman & Zukowski (1991).

2. *Many tests do not provide information regarding other aspects of vocal delivery.* Some tests, such as the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) are delivered by computer; presuming that the sound system is of decent quality, we can then be assured that children are being provided with a standard administration. Other tests, such as the Phonological Awareness Test, Second Edition (PAT2; Robertson & Salter, 2007) are delivered by the individual examiner, leaving us to wonder about the examiner's voice, articulation, and timing. Differences in the rate of delivery can have a significant effect on phonological memory testing. When testing phonological processing, do we utter sounds at the rate of one per second? Two per second? We need to know precisely how the test was normed. If the timing is not specified, then we might want to take another look at the interrater reliability. I say, ''3 . . . 4 . . . 5.'' You say, ''3 . . . . . . 4 . . . . . . 5.''
3. *Tests of phonological awareness require different response formats.* We can, for example, tap syllables, clap to syllables, count syllables, or even use markers to identify syllables. Additional research is needed to determine whether different response formats are equally valid. My experience has been that some young children have difficulty coordinating their bodies with what they are saying; we do not want to identify an impairment in phonological awareness when the true culprit is gross motor functioning.
4. *Tests include a diverse selection of phonological awareness tasks.* The Woodcock-Johnson III Phonemic Awareness Cluster consists of two subtests: Incomplete Words and Sound Blending. Sound Blending falls into Yopp's Simple category of phonological awareness tasks; Incomplete Words, in which children identify words that are missing sounds, falls into the realm of auditory discrimination, making us wonder ''Where's the beef?'' In contrast, the CTOPP offers both Simple (Blending Words) and Compound (Elision—deleting sounds in words) tasks, a practice that meets Yopp's recommendation for designing a measure that will be more predictive of reading skill.
5. *Tests of phonological awareness are not immune from concerns regarding reliability and validity.* As such they should be subject to general standards for test development. We need to be sure that tests have an adequate number of items so as to reduce ceiling and floor effects and that the items are well chosen. A test that asks older students to segment only CVC words is not going to provide the same level of sensitivity as a test with CCVCC words. If we do not actually test it, we cannot then make judgments regarding performance. S. E. Morbey (personal communication, April 3, 2011) reminds us, however, that we should never be afraid to test the limits and determine what students are able to do with a little coaching and support.

Phonological Memory

Phonological memory refers to the ability to hold nonmeaningful verbal information in short-term memory. It is the type of memory that we use when we try to remember a phone number; we do not recall the numbers by virtue of a meaningful context, and most of us do not remember them based on pictures in the mind's eye. We attempt to capture and encode each digit in terms of the sounds that we hear (Torgesen, 1996). What we cannot encode, we lose forever.

Children with a weakness in phonological memory may encounter three main challenges. First, it may be difficult for them to learn new words; a newly encountered word that cannot be held in short-term memory will not make its way to a permanent home in the mental lexicon (Gathercole & Baddeley, 1993). Second, words that are not encoded properly in memory are not then available for the subsequent development of phonemic awareness. What we lose is not available for subsequent reflection (Torgesen, 1996). Third, weaknesses in phonological memory make it hard for children to perform any task requiring that they store and process individual sounds in words. By the time they have reached the third or fourth sound in a sequence, it is possible that they may have forgotten the first.

Phonological memory is another area that is marked by questions regarding its true contributions to reading achievement. Although there is evidence that phonological memory correlates with reading skills in the early years (Mann & Liberman, 1984), it does not appear to provide a contribution beyond that of phonemic awareness and rapid naming (Fletcher et al., 1994). After all, both phonological memory and phonological awareness come from the same place. They are indicative of how verbal information is encoded phonologically.

Assessment of Phonological Memory

Phonological memory typically is assessed through repetition of numbers, words, nonsense words, or sentences as they are dictated by an examiner. In laboratory settings, it may also be assessed through speech rate (Muter & Snowling, 1998).

Rathvon (2004) cautioned that poor performance on phonological memory tasks may reflect nonphonological deficits, such as distractibility, anxiety, fatigue, or an understandable lack of interest. Rathvon also noted that differences in the rate of presentation may permit or discourage the use of rehearsal strategies and mnemonics. Concerns over the rate of presentation are not unique to reading; they have also been echoed in the field of cognitive assessment, resulting in different stances on how digit span tasks should be administered. Colin Elliott of the Differential Ability Scales, Second Edition (2007b), for example, believes that a faster rate of presentation offers a purer measure of short-term auditory memory because it prevents children from using verbal rehearsal strategies. It may be that the rate at which the Wechsler Intelligence Scale for Children, Fourth Edition Digit Span subtest is administered (one per second) permits children to better demonstrate their problem-solving skills. Problem solving, after all, was Wechsler's main interest.

Phonological awareness and phonological memory tests and subtests can be found in Table 10.3.

Rapid Naming and the Double Deficit

There is wide consensus that phonological processing deficits lie at the heart of most reading deficits. Eighty to 90% of poor readers have poor phonological processing skills (S. Shaywitz, Escobar, Shaywitz, Fletcher, & Makuch, 1992). There is, however, a body of research that points to a second variable in reading acquisition that is called naming speed and/or rapid automatized naming (RAN) (Wolf & Bowers, 1999).

What Is Rapid Naming?

Rapid naming refers to the ability to access phonological information stored in long-term memory with precision, efficiency, and ease when given a series of things to name as quickly as possible. It is typically assessed through the naming of familiar things, such as letters, numbers, pictures, and colors, or some combination thereof. While rapid naming tasks may seem simple in their execution (how hard can naming colors be?), they are actually quite complex. Some consider rapid naming to be a measure of executive functioning (Denckla & Rudel, 1974, 1976). A sample letter naming test is shown in Figure 10.3.

Denckla and Rudel (1974, 1976) were the first to propose that rapid naming tasks could be used as a means of understanding individual differences in children with reading disabilities. Their work was based on research by Geschwind (1965), who speculated that color naming tasks in which verbal labels were linked to visual stimuli might capture the essence of reading.

k	s	t	c	p	t	k	n	c
p	k	n	t	s	p	c	t	k
s	p	t	c	k	s	c	n	t
c	n	t	p	s	k	n	p	s

Figure 10.3

Sample Letter Naming Test

Table 10.3 Phonological Awareness and Phonological Memory Tests

	Yopp's Third Factor			Yopp's Simple Factor			Yopp's Compound Factor	
Tests/Subtests	**Phonological Memory**	**Discrimination and Matching**	**Rhyming**	**Blending**	**Isolation**	**Segmenting**	**Deletion**	**Substitution**
AIMSweb (Pearson, 2001) Progress Monitoring Benchmark Assessment Grades: K–8						Phoneme Segmentation Fluency		
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: PreK, K, 1		Sound Categorization	Rhyme Knowledge				Elision with and without pictures	
Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) Ages: 5–21	Number Repetition Recalling Sentences Familiar Sequences		Phonological Awareness (criterion-referenced, ages: 5–12)	Phonological Awareness (criterion-referenced, ages: 5–12)	Phonological Awareness (criterion-referenced, ages: 5–12)	Phonological Awareness (criterion-referenced, ages: 5–12)	Phonological Awareness (criterion-referenced, ages: 5–12)	Phonological Awareness (criterion-referenced, ages: 5–12)
Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) Ages: 5–6, 7–24	Memory for Digits Nonword Repetition	Sound Matching		Blending Words and Nonwords		Segmenting Words	Elision	Phoneme Reversal
Diagnostic Assessments of Reading—Second			Phonological Awareness	Phonological Awareness		Phonological Awareness		

(*continues*)

Table 10.3 *(continued)*

	Yopp's Third Factor			Yopp's Simple Factor			Yopp's Compound Factor	
Tests/Subtests	Phonological Memory	Discrimination and Matching	Rhyming	Blending	Isolation	Segmenting	Deletion	Substitution
Edition (DAR; Roswell, Chall, Curtis, & Kearns, 2005) Grades: K–12								
Differential Ability Scales—Second Edition (DAS-II; Elliott, 2007a) Ages: 2–6 through 17	Recall of Digits Forward		Phonological Processing (ages: 5–12)	Phonological Processing (ages: 5–12)		Phonological Processing (ages: 5–12)	Phonological Processing (ages: 5–12)	
Dynamic Inventory of Basic Early Literacy Skills—Next (DIBELS-Next; Good & Kaminski, 2010): Benchmark assessment Grades: K–6					First Sound Fluency	Phoneme Segmenta-tion Fluency		
Gray Diagnostic Reading Tests—Second Edition (GDRT-2; Bryant, Wiederholt, & Bryant, 2004a) Ages: 6–13							Phonological Awareness	
Illinois Test of Psycholinguistic Abilities—Third Edition (ITPA-3; Hammill, Mather, & Roberts, 2001) Ages: 5–12	Rhyming Sequences						Sound Deletion	

Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 4–25 Grades: PreK–12+		Phonological Awareness (Grades: 1–6)	Phonological Awareness (Grades: 1–6)	Phonological Awareness (Grades: 1–6)		Phonological Awareness (Grades: 1–6)	Phonological Awareness (Grades: 1–6)	
Lindamood Auditory Conceptualization Test—Third Edition (LAC-3; Lindamood & Lindamood, 2004) Ages: 5–18		Tracking sound contrasts				Tracking syllables and sounds with colored blocks	Tracking syllables and sounds with colored blocks	Tracking syllables and sounds with colored blocks
Phonological Awareness Literacy Screening (PALS) Grades: PreK: (Invernizzi, Sullivan, Meier, & Swank, 2004) K: (Invernizzi, Juel, Swank, & Meier, 2003–2011) 1–3: (Invernizzi, Meier, & Juel, 2003–2011) Criterion-referenced assessment.		Beginning Sound Awareness (K)	Rhyme Awareness (PreK & K)	Blending (Grades: 1–3)				

(*continues*)

Table 10.3 (*continued*)

Tests/Subtests	Yopp's Third Factor			Yopp's Simple Factor			Yopp's Compound Factor	
	Phonological Memory	Discrimination and Matching	Rhyming	Blending	Isolation	Segmenting	Deletion	Substitution
The Phonological Awareness Test—Second Edition (PAT2; Robertson & Salter, 2007) Ages: 5–9			Rhyming	Blending	Isolation	Segmentation	Deletion	Substitution
Process Assessment of the Learner—Second Edition (PAL-II; Berninger, 2007) Grades: K–6			Rhyming			Syllables	Rimes	
Test of Auditory Processing Skills—Third Edition (TAPS-3; Martin & Brownell, 2005) Ages: 4–18	Number Memory Forward Word Memory Sentence Memory	Word Discrimination		Phonological Blending		Phonological Segmenta-tion		
Test of Language Development: Primary—Fourth Edition (TOLD-P:4; Newcomer & Hammill, 2008) Ages: 4–8	Sentence Imitation	Word Discrimination						

Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009) Ages: 4–19 Grades: PreK–12		Early Reading Skills	Early Reading Skills	Early Reading Skills				
Woodcock-Johnson III Tests of Cognitive Abilities (WJ III COG; Woodcock, McGrew, & Mather, 2001b) Ages: 2–90+ Grades: K–17+	Memory for Words	Incomplete Words Auditory Attention						
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+			Sound Awareness				Sound Awareness	Sound Awareness
Woodcock Reading Mastery Tests—Third Edition (WRMT-III; Woodcock, 2011) Ages: 4–6 through 79 Grades: K–12		First Sound Matching Last Sound Matching	Rhyme Production	Blending			Deletion	

RAN predicts reading ability during the early years (Felton & Brown, 1990; Wolf, 1991). Neuhaus and Swank (2002) found that RAN letter naming tasks were the best predictor of word reading skills in first graders, even outperforming measures of phonological awareness. The predictive value of RAN tasks, however, does not hold as true for students in fourth grade and above (Torgesen, Wagner, Rashotte, Burgess, & Hecht, 1997). Even Wolf and Bowers (1999) have indicated that the relationship between alphanumeric naming speed and word reading ability diminishes over time. Some question RAN's reputation as a specific marker for reading; they believe that RAN tests have potential for detecting risk for a wide range of learning problems (Waber, Wolff, Forbes, & Weiler, 2000). Research linking continuous rapid naming to fluency in language production has resulted in the recommendation that RAN tasks be part of the testing battery for children with language disorders (Wiig, Zureich, & Chan, 2000).

RAN Is Not Without Controversy

Disagreements over RAN are not limited to whether it has a unique and special relationship to reading and what it has to tell us about reading over time. There is also widespread dissent over what processes contribute to RAN (Georgiou, Parrila, Kirby, & Stephenson, 2008). According to Wolf, Bowers, and Biddle (2000):

> *Naming speed is conceptualized as a complex ensemble of attentional, perceptual, conceptual, memory, phonological, semantic, and motoric subprocesses that places heavy emphasis on precise timing requirements within each component and across all components. (p. 395)*

While comprehensiveness is to be lauded, this definition has been criticized for including everything but the kitchen sink, making it difficult to isolate individual mechanisms and how they contribute to early reading ability. If RAN is identified as a deficit that contributes to poor reading, how do we know what to fix?

Many researchers believe that RAN is a phonological processing task and that RAN tasks measure the rate at which phonological information is retrieved from long-term memory (Torgesen, Wagner, & Rashotte, 1994; Torgesen et al., 1997). This point of view is supported by research on reading disabilities in languages such as German (Wimmer, 1993) and Dutch (van den Bos, 1998) that have a clearer mapping of sounds to letters (called *transparency*) and, therefore, fewer demands from an orthographic perspective.

Some researchers point to RAN as a possible indicator of orthographic processing (Bowers & Wolf, 1993; Wolf et al., 2000). Others question whether both orthographic processing and timing are involved (Manis, Seidenberg, & Doi, 1999), and still others view RAN as a reflection of cognitive processing speed (Kail, Hall, & Caskey, 1999). Researchers are interested in learning whether RAN performance increases in adolescence are due to a generalized quickening of our skills (we become older and we do things faster) or whether the increase is due specifically to improved skill in naming digits, letters, colors, and familiar objects.

Double Deficit

In 1999 Wolf and Bowers proposed the possibility that reading impairments could be classified into three subtypes: children with weak phonological awareness, children with weak rapid naming, and those with weaknesses in both areas. Children with double deficits are considered to have the most serious reading impairments. Researchers agree that children with double deficits tend to show slower rates of improvement in comparison to other peers with reading disabilities (Scarborough, 1998b). Some of these children have even been characterized as treatment resistors (Torgesen et al., 1994).

Questions regarding the specific nature of the relationship between phonological processing and RAN and what it means to have a double deficit have not yet been resolved. It is generally accepted that both RAN and phonological awareness involve phonological processing. Schatschneider, Carlson, Francis, Foorman, and Fletcher (2002) questioned whether the greater severity associated with the double deficit could actually be a reflection of what they call a ''statistical artifact'' (p. 245), in which children with both weaknesses are actually reflecting what phonological awareness and rapid naming have in common. If that is the case, then naming deficits would be primarily phonological in nature and not a consequence of poorly understood nonphonological processes.

How RAN Is Assessed

Measures of rapid naming should be included in all reading screening and diagnostic batteries, particularly with younger children and with older children experiencing challenges in decoding and reading fluency. Tests of rapid naming typically include the naming of letters, numbers, colors, and familiar objects. When selecting RAN tests, be aware that numbers and letter naming tasks are better predictors than pictures and colors (Bowey, McGuigan, & Ruschena, 2005).

The strength of number and letter naming for young children lies in the fact that they are learning the number system and the alphabet. It has been well documented that the ability to learn the alphabet is a strong predictor of word reading skill (Bond & Dykstra, 1967). For the weakest readers, the rapid naming of letters and numbers becomes a highly sensitive measure of alphanumeric knowledge. The challenge for young readers is not just whether they know their letter names; it is whether they can access these names without incurring any of the overhead that is associated with inefficiency and excess labor. According to Neuhaus and Swank (2002), the difference between true mastery of letter names and its lack may be a function of mere milliseconds, a measurement that humans—even skilled teachers—are not capable of recognizing. While these tiny hesitations may go unnoticed in the classroom, their cumulative effect may have dire consequences for young readers.

Rapid naming tasks are not the same as confrontational naming tasks where the focus is vocabulary retrieval for individual items presented at one time; do not be tempted to substitute one for the other. On confrontational naming tests, such as the Boston Naming Test, Second Edition (Kaplan, Goodglass, & Weintraub, 2001), examinees are asked to name individual pictured objects within a defined but generous period of time. This test assesses word-retrieval ability. The processing demands of identifying individual pictures do not mirror the multitasking required for serial naming tasks.

Prior to the actual test administration, examinees are asked to name a sample of the items to be used. This seemingly unimportant step ensures that students have the prerequisite skills for the tasks. When students are unable to name the objects or colors in the sample, the test is no longer an evaluation of naming speed; it has devolved into a measure of expressive vocabulary and/or word retrieval. Do not presume that the rules for scoring RAN tests are all the same; different tests have their own way of handling errors. On the CTOPP, for example, the subtest is discontinued if the examinee exceeds a certain threshold for errors.

A list of rapid naming and retrieval fluency tests is provided in Table 10.4.

Orthographic Processing

When we speak of orthography, we immediately visualize letter symbols and how words are spelled. According to Mather, Roberts, Hammill, and Allen (2008b), orthography also includes punctuation, abbreviations, and symbols such as @$#%&! Here my focus is on the specific purpose of each symbol, not what the symbols suggest collectively.

Today orthographic processing is receiving more interest and respect in the quest for underlying skills that contribute to reading and spelling. Some children, despite an adequate understanding of sound patterns in words, still have difficulty with word recognition. Phonological processing does not explain all of the variance among individual readers (Stanovich et al., 1984; Wagner & Torgesen, 1987).

As young learners interact more with print, they develop a sense of what is permissible in English and what is not. They develop a store of word images that facilitate the spelling of irregular words

Table 10.4 **Rapid Naming and Retrieval Fluency Tests**

Tests/Subtests	RAN Task	Retrieval Fluency	Comment
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: PreK, K, 1	Familiar objects only PreK: 4 rows of 6 objects each K and Grade 1: 4 rows of 9 objects each	Word retrieval: semantic only	Two trials are combined to obtain a rapid automatic naming score.
Clinical Evaluation of Language Fundamentals —Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003) Ages: 5–21	Colors, shapes, and colored shapes 3 performance ranges for time (normal, slower than normal, and nonnormal) 3 performance ranges for errors (normal, more than normal, and nonnormal)	Word associations: semantic only	Guidelines are provided for interpretation.
Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgesen, & Rashotte, 1999) Ages: 5–6, 7–24	Separate subtests for colors, objects, letters, and numbers.	No	Two trials for each subtest with discontinue rule for inaccurate naming. Subtests can be combined into a composite.
Differential Ability Scales—Second Edition (DAS-II; Elliott, 2007a) Ages: 5–17	Simple naming: colors and pictures Complex naming: colored pictures	No	The 3 tasks are combined, if appropriate, into a rapid naming score.
Dynamic Inventory of Basic Early Literacy Skills—Next (DIBELS-Next; Good & Kaminski, 2010) Benchmark assessment Grades: K–6	Letter naming fluency	No	Not considered a basic early literacy skill; used for predictive value only.
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 4–6 through 25 Grades: K–12	Naming facility (PreK–K): colors and objects Naming facility (grades 1–12+): colors, objects, and letters	Associational fluency (PreK–K): semantic only, associational fluency (Grades 1–12+): semantic and phonological	If >3 errors on the first 2 trials (objects or colors), naming facility is prorated by doubling the score of the scorable trial.
Process Assessment of the Learner—Second Edition (PAL-II: Berninger, 2007) Grades: K–6	RAN: letters, letter groups, and words RAS: words and digits	No	Offers capacity to measure a Rate Change score by comparing row 4 completion time to row 1 completion time.

Table 10.4 (*continued*)

Tests/Subtests	RAN Task	Retrieval Fluency	Comment
Rapid Automatized Naming and Rapid Alternating Stimulus Tests (RAN/RAS; Wolf & Denckla, 2005) Ages: 5–18	Separate subtests for objects, colors, numbers, letters, 2 set (letters & numbers), and 3 set (letters, numbers, and colors)	No	Self-corrections are not counted as errors.
Woodcock Johnson III Tests of Cognitive Abilities (WJ III COG; Woodcock, McGrew, & Mather, 2001b) Ages: 2–90+ Grades: K–18	Rapid picture naming	No	
Woodcock Reading Mastery Tests—Third Edition (WRMT-III; Woodcock, 2011) Ages: 4–6 through 79 Grades: K–12	PreK: colors and objects K–2: numbers and letters	No	Any task with 4 or more errors cannot be scored.

and homophones (i.e., words that sound alike but are spelled differently) (Berninger, 1996). Children who have difficulty recalling images of how words should be spelled are said to have a deficit in orthographic memory or processing.

Orthographic processing is not immune from the many disputes over the nature of underlying processes and what they tell us about individual differences in reading. Assumptions regarding orthographic processing as a direct, efficient, and mature pathway to word recognition have served to inspire many who believe in a whole-word approach to teaching reading. While the role of orthographic processing cannot be denied, substantial questions regarding its origins and how it is assessed remain.

According to Burt (2006), concerns whether orthographic processing is innate or acquired keep researchers and test designers up at night. Genetic studies have yet to provide evidence of a nonphonological causal skill in reading that is transmitted from generation to generation.

There is also a question of whether orthographic processing has a role in reading that is separate and distinct from print exposure, familiarity with the alphabet, and reading experience. Studies so far have failed to document the existence of a foundational skill in young children that would put them at risk for orthographic failure prior to their actual exposure to print. CHC theory has placed orthographic processing in the cognitive ability category called Visual Processing (*Gv*), yet so far Visual Processing has not been shown to have a relationship with reading acquisition (Vellutino, 1979). Such a finding would help establish validity for the idea that orthography and phonology contribute equally to reading skill.

If we do not believe that visual abilities are foundation skills for orthographic processing, where then do we look? It seems that tasks assessing the correct spelling of words, skill with homophones, and even recognizing permissible letter sequences or patterns all have their roots in reading experience. Perhaps orthographic processing belongs under the CHC category of Long-Term Storage and Retrieval (*Glr*), which is where Reading/Writing (*Grw*) resides.

Assessment of Orthographic Processing

The theoretical uncertainties regarding orthographic processing spill over into the field of assessment. Vellutino, Scanlon, and Chen (1995) asked whether it can be assessed without inadvertently also testing word identification, spelling skills, phonological processing, and reading experience. Not many tests claim to measure orthographic processing, and there is limited research on what different tasks commonly used to measure it have to tell us (Hagiliassis, Pratt, & Johnston, 2006). Is it possible to design tests of orthographic processing that effectively minimize the contributions of phonological processing to word recognition? It is, after all, well documented that readers rely on some degree of phonological processing to recognize irregular words (Share, 1995, 1999). What about punctuation? Most tests assessing skill with punctuation require students to read the passages that they are to edit. For some students, these tasks become, first and foremost, measures of reading skill and understanding of sentence structure and less so measures of skill with punctuation.

One of the latest additions to the arsenal of tests that focus on underlying processes is the Test of Orthographic Competence (TOC; Mather et al. 2008a, 2008b). According to the manual, the TOC can be used to document reading disabilities that are not phonological in nature but rather reflect ''poor knowledge about the English writing system'' (2008b, p. 10). On the TOC, young children identify signs, match symbols, select the correct spelling for homophones, and add punctuation marks. Older students add punctuation, identify abbreviations, unscramble words, and spell homophones.

Testing of orthographic processing has the potential to provide a better understanding of subtypes of dyslexia as well as data regarding an examinee's ability to spell homophones and irregular words. The TOC manual states that students whose scores are significantly lower than those of their peers may warrant instruction in spelling and punctuation. Examiners who decide to include measures of orthographic processing in a test battery also must include measures of phonological processing as well as more traditional decoding/spelling assessments. We cannot simply stop once we have found difficulty with orthography. A comprehensive picture of a child's skill in spelling is imperative in order to determine placement in a sequence of instruction.

A selection of tests and subtests of orthographic processing is shown in Table 10.5.

Suggestions for Assessing Underlying Processes

1. *Find a quiet location for testing.* Testing phonological awareness in a hallway or the back of a classroom is not appropriate. Be sensitive to any background noise (such as the fan on a computer) that may compete with your voice.
2. *Use speakers or headphones as recommended by the directions for administration.* It is possible to buy a y-splitter from your local electronics store that permits you to listen along to what the computer is saying. Ensure that you know how to work with your technology so that you can focus on the child and not on what button must be pressed next.
3. *Make sure that your student cannot see the screen of your computer;* many of the displays are highly distracting.
4. *Pronounce words and sounds in accordance with the directions for test administration.* If the test provides a tape, listen to it. If there is a key, read it. Practice so that you can focus on the child and not on your delivery.
5. *Provide young children with an opportunity to play with any manipulatives such as blocks before testing.* Satisfying this need may decrease off-task behaviors during actual test administration. Once testing begins, however, it is necessary to assume a business-only attitude.
6. *Assess students who are nonverbal and those with severe expressive language impairments with tests of phonological awareness that do not require speech.* Some tests permit students to respond by selecting pictures of words with matching beginning/ending sounds. Others, such as the Lindamood Auditory Conceptualization, Test, Third Edition (LAC-3; Lindamood &

Table 10.5 **Orthographic Processing Tests and Subtests**

Test	Description	Comments
Illinois Test of Psycholinguistic Abilities—Third Edition (ITPA-3; Hammill, Mather, & Roberts, 2001) Ages: 6-6 through 12	Sight Spelling: spelling the irregular component of words	This score can be contrasted to the Sound Spelling subtest which measures skill with phonetically predictable nonsense words.
Peabody Individual Achievement Test—Revised: NU (PIAT-R:NU, Markwardt, Jr., 1998a) Ages: 5–18 Grades: K–12	Spelling: selecting letters in response to dictated names and sounds, and selecting the correct spelling of a dictated word	Although aging, the PIAT-R:NU is one of the few academic tests that does not require speech for most of the subtests.
Process Assessment of the Learner—Second Edition (PAL-II: Berninger, 2007) Grades: K–6	Receptive Coding: deciding whether whole words, single letters, or letter groups are the same as a target word from memory (K–6) Word Choice: identifying the correctly spelled word when provided with 3 possible choices (1–6)	Be aware of ceiling effects on Word Choice.
Test of Irregular Word Reading Efficiency (TIWRE: Reynolds & Kamphaus, 2007a) Ages: 3–94	Reading irregular words in a list format while being timed	The test provides a Reading Efficiency Index as an estimate of reading skill.
Test of Orthographic Competence (TOC; Mather, Roberts, Hammill, & Allen, 2008a) Ages: Version 1: 6–7: individual only Version 2: 8–12: individual or group Version 3: 13–17: individual or group	Signs and Symbols: identifying the meaning of commonly used signs and symbols (Version 1) Grapheme Matching: marking identical symbols with a pencil while being timed (Version1) Homophone Choice: circling the correct spelling of a word to go with a picture (Versions 1 and 2) Punctuation: editing sentences for correct punctuation (All Versions) Abbreviations: writing the meaning of abbreviations (Versions 2 and 3) Letter Choice: writing missing letters in words while being timed (Versions 2 and 3) Word Scramble: rearranging scrambled letters to make words while being timed (Versions 2 and 3) Sight Spelling: filling in missing letters of dictated words (Versions 2 and 3) Word Choice: selecting the correct spelling of a word (Version 3)	Composite scores Version 1: Orthographic ability Versions 2 and 3: Conventions Spelling accuracy Spelling speed Orthographic ability

Lindamood, 2004), permit students to demonstrate their skills by tracking sounds with colored blocks. No speech is required.

7. *Record all responses accurately so that you can do an error analysis.* Note responses that are particularly slow and labored. Be particularly mindful of behaviors related to distractibility, anxiety, and lack of interest. Do not, however, confuse lack of interest with comments like "This is hard, and I am not sure that I want to do this." When a child's response is not audible and it is necessary to request repetition, it is important to assume full blame. We do not want children to think that the response was incorrect and then attempt to revise it. I often say "Could you repeat that? My hearing is not so good."
8. *Listen carefully.* Children who do not speak their sounds clearly may be attempting to mask their confusion. If short vowels all sound like a schwa /ə/ or /ĭ/, children may require direct instruction to help them distinguish sounds with greater accuracy.
9. *Ensure that children understand that the test is a timed activity and that following the directions is important*. I find that showing a little animation when administering RAN tests helps to convey these ideas. If you do not think that a child performed RAN tasks with his or her best effort, do not report the score. (Never report the score when you think that a student did not work with good effort. Do, however, explain that you administered the test and explain what happened.)
10. *Augment phonological awareness testing with a good spelling evaluation*. This is a powerful way of demonstrating how well students perceive sounds in words and how it affects their understanding of sound-symbol correspondence.

Instructional Implications and Recommendations

1. Be mindful that what may appear to be poor phonemic awareness or poor phonological memory may actually be the result of an unidentified hearing loss. Be sure to verify hearing and vision.
2. Work in phonological awareness is not just for young children. It is also for older individuals who lack skill in perceiving sounds in words. Phonological awareness is a necessary foundation for decoding and encoding.
3. Students who are weak in phonological awareness typically respond well to direct instruction that makes the sound patterns of oral language explicit (Ball & Blachman, 1991; Cunningham, 1990). According to the meta-analysis completed by the National Reading Panel (2000), phonemic awareness can be taught through direct instruction that addresses skills sequentially. Such instruction is more effective when combined with the teaching of letter names, letter sounds, and spelling (Hatcher, Hulme, & Ellis, 1994).
4. Not all children have the same needs for phonological awareness instruction. Some children may need to begin with syllables in words; others may be ready for instruction that addresses individual sounds in words. Children who are confused about the identity of individual speech sounds (e.g., those who say "/ĭ/ and /ĕ/ sound alike") require instruction that will help them to differentiate one sound from another. Learning about how sounds are made in the mouth and working with mirrors provides visual and kinesthetic supports for enhancing speech sound discrimination.
5. Do not be afraid to consult your speech and language pathologist when students have extreme difficulty retrieving and blending sounds with accuracy. These students may require support from specialists who are specifically trained to work with oral motor dysfunctions.
6. Some students with poor articulation have good phonemic awareness. Others, however, may not. If the articulation is compromising progress in decoding and/or spelling, it warrants attention. Of course, any time that speech impairs communication or makes a child or those around him or her feel uncomfortable, the problem needs to be addressed.
7. There is no such thing as one size fits all with respect to the amount of instruction required

for a child to make meaningful progress. Researchers vary on the dosage required for instruction to be effective. Hempenstall (in Carmichael & Hempenstall, 2006) cautioned that students may have difficulty remembering newly presented material if lessons are not of sufficient frequency and length. Smaller doses of daily instruction are more effective than one larger dose of instruction once or twice weekly. Follow any recommendations from research-based programs for the amount of instruction required. When students fail to meet benchmark targets, consider options for intensifying instruction and practice. These options may include smaller groups, individual instruction, a faster pace of instruction, or simply more time.

8. Beware of basal programs that offer a ''package'' of the five core elements. They may not provide sufficient direct instruction and practice for typical students, let alone those with skill deficits.
9. Children who are identified as slow namers or as having double deficits may require instruction that is more intensive than those who have diagnosed deficits in phonological processing alone. Students with double deficits not only need to learn their sounds; they also need more practice to perform skills with automaticity. They may need many more reading fluency exercises, for example, to make the same amount of progress achieved by students not having difficulty with rapid naming.
10. No evidence supports that teaching children to perform naming tasks leads to better reading. For this reason, Kaminski, Good, and Knutson identified letter naming as an indicator, and not a ''big idea'' (2007, p. 63). In other words, teaching children to name letters, numbers, objects, and colors will not improve reading fluency. While letter naming per se does not facilitate reading skill, however, it can be indicative of a child's overall challenge with basic alphabet skills. When interpreted together with other signs of difficulty, difficulty with letter naming may suggest that the student requires instruction beginning at the letter/sound level.

Case Study: Joshua

The case study in Table 10.6 illustrates the profile of a student with good oral language skills and weak decoding skills.

Joshua is a 13-year-old student who is currently in the seventh grade. Joshua was initially identified as having a specific learning disability in the spring of first grade due to weaknesses in reading decoding, reading fluency, reading comprehension, spelling, and written expression. Although reading instruction in first grade was not in a research-based program, Joshua's instruction was supplemented with additional work in phonemic awareness, decoding, and spelling. Despite the additional instruction, Joshua had a profound dislike for school, and he avoided tasks relating to reading and writing. Effort in nonprint-based tasks was excellent.

A review of Joshua's background history prior to first grade reflected good health; he had a history of frequent ear infections. Joshua achieved his developmental milestones on schedule. Hearing and vision were reported to be within normal limits. There was a history of reading difficulty in Joshua's family.

Cognitive testing over the years paints the picture of a student with strong verbal and spatial abilities as well as above-average graphomotor skill and working memory. There were no significant weaknesses. Speech and language testing suggested well-developed receptive language skill; word finding difficulties were confirmed by Joshua's parents and several of his teachers; they were not, however, apparent on the Expressive Vocabulary Test, Second Edition. Attention and concentration were good. Given Joshua's

Case Study: Joshua (Continued)

Table 10.6 **Case Study: Joshua**

Tests and Subtests	2007 Age 10-3 Grade 4		2009 Age 11-8 Grade 5		2011 Age 13-8 Grade 7			
	SS/ss	%ile	SS/ss	%ile	SS/ss	%ile	Sta9	95% Conf. Band
Peabody Picture Vocabulary Test—Fourth Edition (PPVT-4)	119	90	113	81	106	66	6	99–113
Expressive Vocabulary Test—Second Edition (EVT-2)	110	75	106	66	103	58	5	97–109
Comprehensive Test of Phonological Processing (CTOPP)								
CTOPP Memory for Digits	9	37	9	37	9	37	4	5–13
CTOPP Nonword Repetition	9	37	8	25	12	75	6	8–16
CTOPP Phonological Memory Composite	93	34	91	27	103	58	5	89–117
CTOPP Elision	5	05	5	05	10	50	5	8–12
CTOPP Blending Words	7	16	9	37	14	91	8	12–16
CTOPP Phonological Awareness Composite	76	05	82	12	112	79	6	102–122
CTOPP Rapid Digit Naming	6	09	5	05	3	01	1	1–5
CTOPP Rapid Letter Naming	7	16	5	05	5	05	2	3–7
CTOPP Rapid Naming Composite	79	08	70	02	64	01	1	54–74
Kaufman Test of Educational Achievement—Second Edition (KTEA-II)								
KTEA-II Listening Comprehension	117	87	114	82	110	75	6	99–121
KTEA-II Letter & Word Recognition	80	09	77	06	99	47	5	94–104
KTEA-II Nonsense Word Decoding	89	23	98	45	113	81	6	106–120
KTEA-II Decoding Composite	83	13	87	19	106	66	6	102–110
KTEA-II Spelling	81	10	78	08	86	18	3	78–94
KTEA-II Written Expression	75	05	83	13	90	25	4	77–103
KTEA-II Written Expression Composite	77	06	79	08	87	19	3	79–95

Case Study: Joshua (Continued)

Table 10.6 (*continued*)

Tests and Subtests	2007 Age 10-3 Grade 4		2009 Age 11-8 Grade 5		2011 Age 13-8 Grade 7			
	SS/ss	%ile	SS/ss	%ile	SS/ss	%ile	Sta9	95% Conf. Band
KTEA-II Word Recognition Fluency	NA	NA	81	10	82	12	3	11
KTEA-II Decoding Fluency	NA	NA	89	23	89	23	4	9
KTEA-II Reading Fluency Composite	NA	NA	84	14	82	12	3	7
KTEA-II Reading Comprehension	75	05	87	19	113	81	6	9
Gray Oral Reading Tests—Fourth Edition (GORT-4)								
GORT-4 Rate	4	02	4	02	5	05	2	3–7
GORT-4 Accuracy	3	01	6	09	6	09	2	4–8
GORT-4 Fluency	2	01	3	01	4	02	1	2–6
GORT-4 Comprehension	9	37	8	25	10	50	5	8–12
GORT-4 Oral Reading Quotient	73	04	81	10	82	12	3	76–88

SS = standard score, ss = scaled score, %ile = percentile rank, sta9 = stanine, conf. band = confidence band, NA = not administered

performance on the KTEA-II Listening Comprehension subtest, we would expect his reading comprehension to fall well above the average range.

Prior to his testing in grade 4, Joshua was provided with direct, systematic, multisensory instruction in phonics and strategies for reading comprehension in the resource room with 8 to 10 other students. Instruction was typically provided for 30 minutes daily. Joshua had the support of a paraprofessional for writing; handwriting, written vocabulary, and syntax were described as poor. Joshua's written expression was distinguished by its brevity, limited repertoire of sentence structures, and poor mechanics. With the exception of math, which was above average, report card grades indicated a need for improvement.

In grade 4 Joshua's profile on the Comprehensive Test of Phonological Processing showed weaknesses in phonological awareness and rapid naming, a profile that is often described as a "dual deficit." Students with dual deficits are thought to be at higher risk for reading failure; they not only have to learn the sound system of the language, they need additional practice in order to develop automaticity in word recognition and reading fluency.

A review of Joshua's performance on the KTEA-II decoding and spelling subtests from grade 4 suggested poor discrimination of speech sounds, coupled with weak phonics skills.

Case Study: Joshua (Continued)

Joshua's dysfluent performance on the Gray Oral Reading Tests, Fourth Edition was consistent with his lack of accuracy and automaticity on the KTEA-II. The GORT-4 Comprehension score (37th percentile rank), although encouraging, was not consistent with his 5th percentile score on the KTEA-II Reading Comprehension subtest. This difference was thought to reflect the inherent ''guessability'' of the GORT-4 multiple-choice questions. Joshua's low score on the KTEA-II Written Expression subtest reflected substantial challenges in handwriting, spelling, syntax, and organization.

Joshua's individualized education program for fifth grade was revised to include additional systematic, multisensory instruction in phonics, spelling, and phonemic awareness (segmenting and blending), reading comprehension, cursive writing, and written expression. Joshua received his reading instruction with another student for 1 hour daily. He was also provided with direct, systematic instruction in written sentence structure and a structured process for writing narrative and expository text.

Evaluation at the end of fifth grade suggested that Joshua essentially maintained his skill levels with respect to his peers. An inventory of his basic phonics skills indicated mastery of CVC patterns but continued difficulty with the remaining five syllable patterns. Benchmark testing with the Dynamic Inventory of Basic Early Literacy Skills placed Joshua in the high-risk category with a median rate of 65 words correct per minute and a median accuracy of 85% on grade-level text. An analysis of his spelling errors suggested persistent difficulty discriminating voiced/unvoiced sounds, nasalized vowels, and blends, culminating in a weak grasp of spelling rules. At this point, Joshua was reported to be unable to complete classroom and homework assignments requiring reading and/or writing without considerable assistance.

The team then decided to implement a more intensive, explicit program for phonemic awareness that would address contrasts between speech sounds as well as a more intensive, explicit program for reading decoding and spelling. This particular program also provided more exercises for practice and review as well as practice with nonsense words. Joshua received 1:1 instruction daily for 90-minute sessions. Vocabulary and comprehension skills were taught using grade-appropriate (or above) text that Joshua accessed through an e-reader. This instruction was supplemented by training in keyboarding and word processing as well as sentence combining, and writing processes for narrative and expository text. Program delivery was verified through monthly fidelity checks. To Joshua's surprise, he enjoyed fantasy and science fiction, and he now looked forward to the day when he would be reading on his own.

At the end of seventh grade, Joshua demonstrated significantly improved skill on subtests within the CTOPP Phonological Awareness Composite; Rapid Naming skills remained poor. Word identification and word attack skills were age appropriate. Automaticity at the word level was still reduced; fluency remained poor. Joshua was reported to be reading grade-level text at an average rate of 90 words correct per minute with an average accuracy of 95 percent.

Joshua's latest comprehension scores need to be considered with caution. At present, he is able to answer comprehension questions based on short passages; he continues to struggle with lengthy text. According to an analysis of Joshua's spelling errors, he is now discriminating sounds

Case Study: Joshua (Continued)

in words with greater accuracy; he is ready for additional instruction in the rules for adding suffixes to base words. Written expression at the sentence level has improved; Joshua is working on elaborating and organizing his thoughts on paper; he now writes at greater length, which he attributes, in part, to improved skill in keyboarding and spelling.

At this point, Joshua is still in need of specialized instruction in reading with the goal of increasing his accuracy, automaticity, and overall fluency. His strong verbal reasoning abilities permit him to participate in classroom discussions; he continues to require access to lengthy text through e-readers, and he benefits from preteaching and previewing as a means of enhancing his text comprehension. His spelling instruction has moved from basic spelling conventions to work in word structure (morphology), and Joshua enjoys using his knowledge of Latin roots and affixes and Greek combining forms to derive word meanings independently. He takes pride in his vocabulary.

Conclusion

The controversies cited in this chapter speak to the highly complex nature of our language system and how underlying processes comingle, work together, and enhance each other to facilitate skilled reading. Although this chapter has focused on individual underlying skills for reading, it is important to view children and their instruction from a comprehensive literacy perspective.

As researchers become more adept at identifying specific factors that contribute to reading, we should be able to design instructional programs that will better respond to all children's needs. For the time being, part of the answer lies in instruction that not only addresses vocabulary and word structure but also teaches our language system phoneme by phoneme—showing how we represent phonemes, syllables, and words with letter symbols.

Given the data that we now have from longitudinal studies, we know that delays in reading are serious. Not only are reading problems not solved by time alone, time can exacerbate the reading difficulty. Comprehensive reading evaluations that determine the underlying processing difficulties can lead the way to effective instruction. By addressing reading concerns promptly, we can ensure that children do not lose out on all-important experiences with print.

Review Questions

1. When Leon is sounding out words, he frequently tags on additional sounds to consonants. When sounding out the word *bat* he says /buh/ + ă + /tuh/. What are your thoughts and recommendations?
2. Kyra is in first grade; she is able to identify and produce rhymes. Her teacher feels that this skill is an indication that Kyra will have no difficulty learning to read. What do you say?
3. Neil demonstrated the following skills on the Anybody-Can-Do-It Reading Test:

EXAMPLE 10.1 PHONEMIC AWARENESS TEST INTERPRETATION

Task	Correct/Incorrect
Say *sunshine* without the sun.	√
Say *camper* without the per.	√
Say repeat without the re.	√
Say *melt* without the /m/.	√
Say *bent* without the /b/.	√
Say *tab* without the /t/.	√
Say *sleep* without the /p/.	√
Say *crash* without the /sh/.	/krăsh/
Say *flit* without the /f/.	/ĭt/
Say *grip* without the /g/.	/ĭp/

Based on this small sample, describe Neil's awareness of speech sounds in words. Is he at the word level, syllable level, or individual sound level? Is Neil ready to work on sounds in the word-initial, word-final, or word-medial position? What other sources of data could you use to confirm your thoughts?

4. Keith is having difficulty mastering the list of sight words that he is required to learn prior to entering first grade. His parents are requesting that he receive extra instruction in sight words. How would you respond to their concerns and request?
5. Samantha is in first grade. She is having difficulty learning the alphabet, and she has performed poorly on measures of phonological awareness. The team feels that Samantha is ''young for her age'' and that she requires additional time to mature. With this time, the team believes that she will begin to read on her own. How do you respond? Cite the relevant research.
6. Eric has been tested by two different evaluators who elected to use different measures of phonological awareness. On one test, he demonstrated scores commensurate with age expectations. On the other test, he demonstrated scores that are significantly low for his age. How do you reconcile the difference?
7. Martha is in seventh grade, and her reading skills are significantly below grade level. Phonological awareness testing indicates a severe lack of awareness; decoding skills suggest confusion over vowel sounds. The team believes instruction in phonological awareness is not age appropriate and that it will be demeaning to her. What are your thoughts?

Decoding

Chapter 11

Introduction

Well-designed reading instruction should accommodate, complement, and work with a learner's strengths and weaknesses. In this chapter we review what current research has to tell us about how we recognize words as well as best practices in the assessment of emergent literacy, decoding, and fluency.

The High Road and the Low Road: The Dual Route Model

For years theorists have posited the existence of a dual route as an explanation for how we turn letters on a page into something meaningful (Castles, 2006; Coltheart, 2007; Smith, 1973). According to dual route models, printed word recognition occurs by virtue of two specialized independent pathways: an orthographic processor and a phonological processor. The orthographic processor is thought to facilitate the recognition of highly familiar words, serving as a visual superhighway to the mental lexicon where the language system is activated. The phonological processor is regarded as an indirect route dedicated to the recognition of unfamiliar words that require sounding out. Adherents of the dual route theory, shown in Figure 11.1, believe that skilled reading is driven primarily by orthographic processing. They begrudgingly accept the phonological route as a necessary means to an end, an inefficient detour that will not be able to support fluent reading.

Dual Route and Dyslexia

According to Castles (2006), the dual route model explained the different types of developmental dyslexia in children as well as dyslexia acquired because of brain injury. Flynn, Goldstein, and Rahbor (1992) found evidence that the two paths in the dual route model could be impaired selectively or together. Children with deep (phonological) dyslexia are said to have difficulty reading nonwords that have to be sounded out; those with surface (orthographic) dyslexia are reported to struggle more with irregular words.

Even though there is long-standing belief that these paths are separate, current research and interpretation of findings strongly suggests otherwise. Those who ponder the dual route model wonder whether these processes are truly independent. Despite the either/or appearance of the two types of dyslexia, they are not distinct from

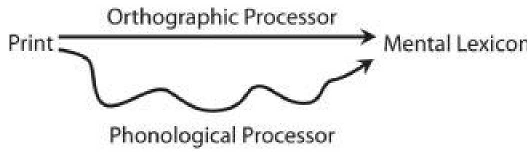

Figure 11.1

Dual Route Model

one another. They fall at the ends of a gradual spectrum of phonological and orthographic tasks (Castles, Datta, Gayan, & Olson, 1999; see Figure 11.2). Many students are diagnosed with a mixed profile.

You Say "Orthographic" and I Say "Phonologic"

Researchers differ in their view of which of the dual routes reigns supreme. Castles and Coltheart (2004) questioned whether phonological awareness is a direct cause of reading impairment or whether it is really just a consequence of poor orthographic processing. According to Castles (2006), poor orthographic processing made it harder to understand how the system of print represents the sound patterns of oral language. This view is consistent with Ehri's (1989) research on the relationship between spelling and phonological awareness. Ehri's work with older struggling readers suggested that severe deficits in phonological awareness may be the result of limited experience with reading and spelling. (See Chapter 2.)

In contrast, there are those who believe that orthographic processing piggybacks on phonological processing, what Frost (2007) called a "strong phonological model" (p. 276). Stanovich, Siegel, and Gottardo (1997) believed that orthographic dyslexia is the consequence of weak phonological processing. As readers become more skilled with print, they become more efficient at converting letter symbols to phonological codes. Increased efficiency leads to the ability to convert larger groups of letter clusters to phonemic clusters—as when young children learn to group consonants into digraphs (*th, sh*), blends (*gl, st, fr*), and syllables (glad-ness, sta-pler, frost-bite), until finally a whole word is instantly recognizable. Increased efficiency also leads to the ability to access word meanings (the lexicon) with less than perfect phonological information. The better we become at this process, the better we are able to handle irregular words. Poor readers, who may be understandably reluctant and unmotivated to read, suffer the added consequence of what limited experience with text brings (i.e., less skill with irregular words).

What Technology Has to Tell Us

Advances in technology are now permitting researchers to go where no man or woman has gone before and view what really happens when humans read. Much of the evidence on these covert internal processes is now being provided by event-related potential (ERP) and eye movement studies. ERP studies provide a measure of brain wave activity and the timing of specific mental processes that would otherwise would be invisible to the observer. Eye movement studies provide a window into how skilled readers process connected text; highly sensitive measures of the eye's response to a text that is manipulated dynamically reveal much about how skilled readers use phonological information in word recognition (Ashby & Rayner, 2012; Rayner, 1998).

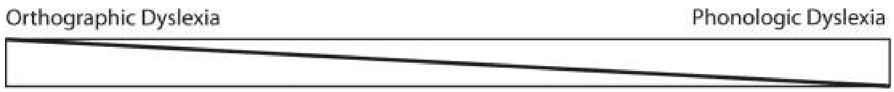

Figure 11.2

Spectrum of Dyslexia

According to a study by Ashby, Sanders, and Kingston (2009), the phonological route is typically activated for *all* words during skilled reading. What is important about this study is the finding that this activation occurs on the way to the mental lexicon and that phonological processing is at the heart of what was previously conceptualized as a predominantly visual process for mature readers. The identification of short familiar words has, at its core, highly specific representations of phonological features such as voicing.

This research culminates a series of studies indicating that adults typically represent lexical stress (Ashby, Rayner, & Clifton, 2005), syllables (Ashby & Rayner, 2004; Ashby & Martin, 2008), and onset rimes (the part of the syllable that precedes the vowel) (Ashby, Treiman, Kessler, & Rayner, 2006) during silent reading. Ashby suggests that this phonological information may well function as part of a *phonological hub* for skilled reading (Ashby, 2006).

Collectively, all of this research contradicts a main premise of dual route theory, which is the subordinate nature of prelexical phonological processes in skilled reading. We now have evidence that phonological and orthographic processes work cooperatively and with the utmost efficiency to facilitate word recognition in skilled readers. This research brings us back to the connectionist model described in M. J. Adams (1990) (see Figure 11.3), in which the orthographic and phonological processors interact to activate potential word meanings, as was proposed by the original Seidenberg and McClelland model (1989).

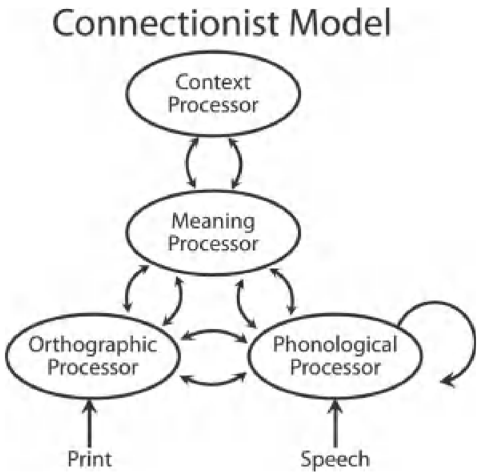

Figure 11.3

Connectionist Model
Reprinted with permission from *Beginning to Read: Thinking and Learning about Print* by Marilyn Jager Adams, Figure 8.1, ''Adding the Phonological Processor,'' Copyright 1990 Massachusetts Institute of Technology, by permission of MIT Press.

Implications for Instruction

Why do we care about the relationship between phonological and orthographic processes? What are the implications for instruction? The joint contributions of both phonological and orthographic processing suggest, at the very least, the need for instruction to embrace the many different phonological *and* orthographic skills that contribute to word recognition as well as the language skills that permit children to make meaning from text. Direct instruction in phonemic awareness, phonics, and spelling, together with the teaching of vocabulary and higher-level language skills, give children the tools needed for skilled reading.

Other researchers affirm the importance of using a more inclusive approach to examine potential causes of reading disorders, including but not limited to articulatory, vocabulary, syntactic, and semantic processes (Hulme, Snowling, Caravolas, & Carroll, 2005). Given the evidence for the detailed nature of the phonological representations formed by skilled readers, Ashby (2006) suggested that effective instruction actually entails a more detailed understanding of phonological processes than most instructors currently command; she suggested that direct, systematic instruction in decoding at the syllable level as well as the phoneme level may be part of the path to improved word recognition skills.

Print Awareness

Print awareness refers to the realization that written language has a special communicative function. According to M.J. Adams (1990), it is the ''basic conceptual backdrop'' against which reading and writing may best be learned (p. 337). We recognize its onset when our children proudly display their efforts to engage in this specialized form of communication and they write on walls, furniture, and precious first editions.

As educators, we hope that children enter our classrooms with an appreciation and enthusiasm for the special role that print will play in their lives. Unfortunately, this is not always the case, and teachers are then faced with the prospect of teaching literacy to children who may view books as something done to them in school and not as an essential part of their culture in the home or community.

Emergent Literacy

Many view print awareness as the first sign of early reading skill, a period of development that is often referred to as emergent literacy. Interestingly, emergent literacy enthusiasts take exception to the view that there is a time of life when children are not literate. Many of them view reading as a natural extension of oral language, and they eschew terminology such as prereading, reading readiness, or precursors to reading. They focus instead on behavioral signs that reflect an interest and understanding of how we use books and the print within (Clay, 1985, 2005).

Print Awareness as a Predictor

There is no doubt that children who have an understanding of the purpose of print and print conventions are better prepared to benefit from formal instruction in school (Justice & Ezell, 2001). Print awareness correlates strongly with reading achievement (Tunmer, Herriman, & Nesdale, 1988). Lomax and McGee (1987) suggested that print awareness may pave the way for the development of phonological and orthographic skills. Research on print awareness, however, has not demonstrated unique predictive potential in comparison to the predictive value from measures of alphabet knowledge and phonemic awareness (Iversen & Tunmer, 1993). Some researchers question whether measures of print awareness provide more information regarding print exposure and literary experience in the home than measures that tap the underlying skills that support reading and writing development (Lonigan, Burgess, & Anthony, 2000).

How Print Awareness Is Assessed

Measures of print awareness include book orientation, knowing how to turn pages from the left to the right, and an understanding that print conveys meaning. Rathvon (2004) expressed concern regarding the reliability of many of these tests. Tests of print awareness are exceedingly brief; this is likely the result of efforts to design tests that would not stress a young child's capacity for attention. The small number of items leaves evaluators to deal with the consequences of steep item gradients, floor effects, and ceiling effects. (See Chapter 5.)

Under no circumstance should an evaluation of print awareness be conducted without an assessment of language and phonological processing. As always, do not forget vision and hearing.

Clay's Observation Survey: The best-known measure of print awareness is the *Observation Survey* by Marie Clay (2005). Clay, who is well recognized for her work with young readers, asked children to demonstrate their knowledge of print within the context of a story that is read to them. As the story is read, children are asked to share their observations relating to how the book is handled, how words are represented on a page, and the use of upper- and lower-case letters and punctuation marks. Evaluators considering use of the *Observation Survey* need to be aware that performance is measured with respect to a norming sample of 796 children in New Zealand in the year 2000 and that it will be necessary to develop local norms in order to ensure the validity of results.

Test of Early Reading Ability, Third Edition: The Test of Early Reading Ability, Third Edition (TERA-3; Reid, Hresko, & Hammill, 2001) focuses on three areas: alphabet knowledge; conventions of print; and the ability to understand the meaning of signs, logos, words in isolation, sentences, and paragraphs. It has the distinction of being one of the few measures of print awareness that require children to read. Some of the higher-level items ask children to distinguish between homophones and identify errors in punctuation. Evaluators who have used previous editions of this test will be relieved to know that they no longer have to make their own materials to assess environmental print such as logos. Assessing skill with logos is not necessarily a proxy for word reading. M. J. Adams (1990), for example, found that children use a variety of visual and contextual cues to recognize logos and that these cues do not necessarily include actually reading the words.

Evaluators should be cautioned that the TERA-3, despite its expressed focus on early reading, suffers from significant floor effects for children below the age of 6 and suffers from serious ceiling effects for older children. The TERA-3 does not provide measures of language skills and/or phonological processing skills that would be essential in recognizing the needs of young developing readers.

Assessment of Literacy and Language: The Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) incorporates a more inclusive view of emergent literacy skills in young children at the prekindergarten, kindergarten, and first-grade levels. Its purpose is to diagnose children with language disorders as well as identify children at risk for reading disabilities due to risk factors associated with environment, heredity, and weaknesses in phonological processing. It measures preliteracy skills, phonological and orthographic processes, and language ability. Despite the more comprehensive nature of this test, the ALL's subtests related to book handling, the concept of a word, and match symbols are painfully short, leaving us with us with too few items to discriminate adequately between children of varying skill levels.

Alphabet Knowledge

During the 1990s many evaluators and researchers became excited about letter-name knowledge. Studies suggested that letter-name knowledge was one of the best predictors of reading skill (Badian, 1995; Scanlon & Vellutino, 1996). Scarborough (1998a) found that letter-name knowledge was a highly efficient and effective means of predicting reading skills in kindergarteners. Scanlon and Vellutino found that letter-name knowledge was the best predictor of reading skills for children in first grade, and the predictive power of letter-name knowledge was found to hold true even for students at the middle school and high school levels (Badian, 1988).

Letter Names and Learning to Read

Notwithstanding these findings, it is important for educators and evaluators to understand that skill with letter names in and of itself does not play a causal role in learning how to read. It could well be, for example, that students who can name letters also have home environments rich with nursery rhymes and stories. Ball and Blachman's study from 1991 found that instruction in letter names and letter sounds alone did not improve the reading or spelling skills of children in kindergarten. This is not to say, however, that it is not important to teach letter names. In the highly complex world of sound–symbol correspondences, letter names are the only constant. While the letter *a* can potentially have nine sounds in English, it has only one name. The letter name becomes essential vocabulary with which we discuss issues related to decoding and encoding.

There is another reason for ensuring that students know letter names. Even in this time of Google searches, knowing letter names and alphabetical order is a critical skill for locating information. Middle school and high school students who do not know alphabetical order (and there are many out there) cannot use an index, a telephone book, or an encyclopedia.

How Letter Names Are Learned

Children typically learn letter names prior to learning sounds (Worden & Boettcher, 1990). While there has been a tacit assumption that children learn letter sounds solely through rote practice and memorization, Treiman, Tincoff, Rodriguez, Mouzaki, and Francis (1998) have found this not to be true. Learnability of sounds is dependent, in part, on whether the sound occurs in the letter name. The sounds for letters *p* and *k*, for example, are easy; those for *w* and *y* are hard. Research also that shows that sounds are more easily learned when they occur at the beginning of the letter name than at the end; the sound for *b* is more easily acquired than the sound for *l* (Treiman, 2000; Treiman et al., 1998). Moats (2010) indicated that many children confuse letter names with their corresponding sounds. If you close your eyes and think about the name of the letter *e*, you might just catch a fleeting /ĭ/.

How Letters Name and Sounds Are Assessed

Letter names and letter sounds are assessed in a variety of formats, including recitation of the alphabet, pointing to letters in response to names and sounds, and providing the names and sounds of target letters. Most standardized tests provide only a very small window into letter names and letter sounds. They sample only a few letters at best, leaving us with a set of data that is sadly incomplete.

Given the importance of accuracy as a foundation for literacy and learning to read, it is essential to conduct a complete inventory of letter names and sounds. In this way, we have a baseline prior to initiating a new reading program. Reciting and singing the alphabet (which many children are happy to do) should not be confused with knowledge of specific letters. Many children think that ''lmnop'' is one letter; there are also those who believe that the last four letters of the alphabet are ''xynz.''

Phonological Awareness Test, Second Edition: The Phonological Awareness Test, Second Edition (PAT2; Robertson & Salter, 2007) provides a small spiral-bound booklet with subtests assessing sound and letter knowledge of consonants, vowels, digraphs, vowel teams, diphthongs, r-controlled vowels, and long vowels (magic e). Unfortunately, the test is normed only through age 9. Additionally, the choice of font does not clearly differentiate between *l* and *i*, and the presentation of letters is problematic because the letters are ordered alphabetically. Some children are delighted to outsmart their evaluators using their knowledge of alphabetical order as a compensatory strategy for letter recognition.

The PAT2 may actually have more to offer as a criterion-referenced test; some of the subtests violate just about every rule there is for floor effects, ceiling effects, and steep item gradients. When using the PAT2, the total scores will be the most reliable; however, total scores often do not speak to gaps in skills that are critical for skilled reading. A child age 6-11 who identifies 35 of 59 graphemes will earn a score at the 25th percentile rank. While this score would appear to suggest adequate skill, a review of the actual skills demonstrated reflects significant gaps in sound–symbol knowledge.

Word Identification and Spelling Test: The Word Identification and Spelling Test (WIST; Wilson & Felton, 2004) has two separate versions, one with norms for students ages 7 through 11 and the other with norms for students ages 12 through 18. The version for older students provides a much needed tool for documenting basic decoding weaknesses that may cripple their efforts to read. The format of the WIST favors children who have been previously exposed to direct, systematic instruction in letter sounds. The WIST asks students to provide the name and ''the sounds that go with each letter or group of letters'' (p. 17). Children who have experience with letter decks would appear to be better able to recite sound–symbol correspondences because they have been trained to do so. Whether this is the case or not, the test format does permit students to demonstrate exactly what they believe to be true in terms of letters and their potential sounds.

When I am aware that children have been receiving instruction in a program that uses keywords (A – apple – ă), I ask them to tell me the keywords. In structured reading programs, keywords serve as a bridge between the letter name and the letter sound; they are often used as cues to prompt responses during phonics instruction. Knowledge of keywords can be an indicator of whether a program is being delivered with fidelity.

Informal Assessment of Letter Names and Sounds: If your reading test does not provide a standardized measure of letter–sound knowledge that is comprehensive do not despair. You can easily create flash cards of your own and complete your own inventory. Be sure that you know how the sounds are pronounced. Also be sure to use a common font. You may want to test both upper- and lower-case letters. Most children master the names of upper-case letters prior to lower-case letters.

Word Recognition

The majority of reading problems occur at the single word level (Rack, Snowling, & Olson, 1992; Stanovich, 1988; Vellutino & Scanlon, 1987); most of these problems occur in concert with deficits in phonological processing (Bradley & Bryant, 1983; Lyon, 1995; Share, 1995; Vellutino & Scanlon, 1987). The overwhelming evidence pointing to the predominance of word recognition challenges does not rule out difficulties with reading comprehension per se but rather speaks to the need to ensure strong, automatic, context-free decoding skills as a foundation for skilled reading.

If we return to our theoretical models of word recognition in Chapter 2, we can see that most models agree. Developing readers move from logographic (reading words as pictures), to alphabetic, and finally to orthographic strategies for word recognition.

How Word Recognition Skills Develop

The movement from logographic to alphabet modes of word recognition shown in Figure 11.4 is driven by phonemic awareness and the realization that letter symbols represent sound patterns in words (M. J. Adams, 1990). With the insight that the alphabetic stage of reading brings, children are able to decode unknown words. That is not to say that this process is initially efficient or fluent, but it is a beginning.

In 1995 Share proposed a self-teaching hypothesis, in which children's successes in decoding unfamiliar words lead them to an ever-growing resource of word-specific orthographic information. As readers decode new words, those patterns are stored in memory for future application, and they facilitate not only the identification of regular words but also those that are irregular. Irregular words may not be as unique as we often think. According to Share and Stanovich (1995), even words that are considered irregular have some degree of predictability that aids in word recognition. Consonants are generally well behaved; it is the vowels that are unruly. The self-teaching hypothesis calls for an emphasis on sound–symbol correspondence, blending and segmenting, and lots of practice.

Children who do not make the shift from a logographic mode of word recognition (otherwise known as sight-reading) to an alphabet mode of word recognition face increasing risks for reading problems as they advance through elementary school. Young readers can make do with a whole word recognition capacity of about 400 words. Bets, however, are all off by the time they reach grade 4. Fourth grade presumes a reading vocabulary of about 4,000 words; by sixth grade children are expected to manage over 70,000 words. Share and Stanovich (1995) called this increase the equivalent of ''an orthographic avalanche'' (p. 17). It is no wonder that fourth grade heralds an increase in the number of children referred for reading assistance (Chall, Jacobs, & Baldwin, 1990).

Figure 11.4

Development of Word Recognition Skill

Five Paths to Word Recognition: Ehri (1998) identified five ways that children identify words:

1. When children *decode,* they sound out words.
2. When children *decode by spelling patterns,* they recognize familiar letter sequences and blend the sounds together.
3. When children engage in *sight-word reading,* they identify words as logographs or pictures.
4. When children *read by analogy,* they recognize words by virtue of their similarity to familiar words.
5. When children read using *context clues* such as pictures, they guess based upon what appears to make sense or what sounds right.

Children who do not become adept at using their knowledge of sound–symbol correspondence try to compensate by relying more on context (Stanovich, 1980). All readers use context, but students who have to take the time to reread and ponder word identification based on context are distracted from the major task at hand, which is comprehension of the text. Far too many well-intentioned teachers miss this crucial point. According to West and Stanovich (1978), guessing based on context is not an effective strategy for word recognition; it is used only by children who cannot read the words. Guessers struggle with impossible odds. Research by Gough and Hillinger (1980) told us that guessers use context to identify words successfully only 1 out of every 4 times. Content words are particularly problematic; they are predictable only 10% of the time (Gough, 1983).

How Word Identification Is Assessed

In the world of standardized, norm-referenced testing, word reading skills typically are assessed by having students read aloud words of increasing difficulty in a list format.

Nature of Word Lists: Words are often selected based on frequency of use, typically from such sources as the Dolch word list (1936) and a variety of graded word lists. There is surprisingly little overlap in the words selected for different tests; the Woodcock-Johnson III Tests of Cognitive Abilities (WJ III, Form A, 2011), the Kaufman Test of Educational Achievement—Second Edition (KTEA-II, Form A, 2004), and the Wechsler Individual Achievement Test—Third Edition (WIAT-III; 2009) have only one word in common. Many test authors are not forthcoming about how word lists are determined.

Word lists include both regular and irregular words. Regular words, sometimes called phonetic words, are those words in which there is a true one-to-one correspondence between letters and the sounds they represent. Irregular words are those words that do not follow the commonly known rules; some even defy our rule system for sound–symbol correspondence (e.g., ''laugh''). Irregular words are especially difficult to recognize if they are not in a student's oral vocabulary (e.g., ''once'').

What Standardized Tests Measure: A study by Shapiro and Derr from 1987 raised the question of whether standardized tests are measuring performance with respect to a particular curriculum or whether they are measuring generalized word recognition skills. The researchers cautioned that test results may be confounded when the list of words assessed has little to do with the words that are actually being taught in the classroom. I suspect that this caution may be of greater concern when students are being taught a sight-word approach to reading; students who can decode should be able to identify predictable words that conform to the rules being taught without much difficulty, whether they have seen them before or not. Students who are receiving direct explicit systematic instruction in a phonics-based program may not show signs of rapid improvement on measures of word identification. Advances in basic phonics skills are not always apparent on measures that require students to read irregular words.

Differences in Word Recognition Tests: In word reading tests, students are not asked to define the words that they read; they are only required to pronounce them. Many tests specify that children not be penalized for articulation errors or regional or dialectical pronunciations. Some tests provide quasi–time limits for responses; many of these time limits, however, are overly generous. As a result, children may receive scores suggestive of adequate word reading skill when, in fact, they had to deliberate and/or make multiple guesses. The WIAT-III Word Reading subtest recommends that evaluators note self-corrections as well as responses that are not automatic (in this case, more than 3 seconds). While consideration of efficiency is certainly important, most would agree that a child who requires 3 seconds to read a word is in serious trouble. The WIAT-III also provides a score for Word Reading Speed that, curiously enough, ''reflects the number of words read in 30 seconds, regardless of accuracy'' (Breaux, p. 46).

Testing Young Children: The assessment of young children's word reading skills can be particularly problematic. Many tests of word reading ability lack a sufficient number of items for those in first or second grade. On some ''word reading'' tests, children may reach a ceiling without actually reading any words; they may only demonstrate skill with phonological awareness and letter names and sounds. On some tests reading only one or two words can potentially result in a score suggesting average performance. On the KTEA-II Letter & Word Recognition subtest (Form A), for example, as shown in Table 11.1, a child age 6-6 will receive a standard score (SS) of 91 (27th percentile rank) for reading one word (as well as for performing a variety of lower-level sound/letter identification tasks).

Record Keeping

When assessing word identification skills, it is important to keep a complete record of the student's efforts so that self-corrections, repetitions, and pauses are documented as well as the traditional miscues of substitutions, omissions, and commission. Willis and Dumont (2002) recommended developing a coding system to mark pauses of varying length, errors in accent or stress, as well as the insertion, omission, and transposition of sounds. Many protocols provide a transcription for word pronunciation so that evaluators can use it to cross out specific errors, and make

Table 11.1 **Comparison of Maximum Standard Scores for Reading One Word at Age 6**

Test/Subtest	Raw Score	SS	Percentile Rank
Gray Diagnostic Reading Test—Second Edition Word Recognition Form A	19	85	16
Kaufman Test of Educational Achievement—Second Edition Letter & Word Recognition Form A	19	91	27
Peabody Individual Achievement Test—Revised (NU) Reading Recognition	17	96	39
Slosson Oral Reading Test—Third Edition (2008)	1	85	16
Wechsler Individual Achievement Test—Third Edition Word Reading	1	85	16
Woodcock-Johnson III Tests of Achievement Letter-Word Identification	15	87	19
Woodcock Reading Mastery Tests—Third Edition Word Identification Form A	1	77	06

SS = standard score

notes of other errors that occur instead of having to rewrite the word while doing this important work. Both the WIAT-III and the KTEA-II provide error analysis assistance. The error inventories can be particularly helpful to evaluators who have a limited command of phonics; the inventories show the elements of word analysis involved with each word and allow evaluators to tabulate the number of errors within each category (e.g., the errors due to problems with long vowels).

Nonsense Words

Nonsense words suffer from a much-maligned reputation. It has been said that the use of nonsense words is not a valid means of assessing phonics skills. Some children reportedly find them offensive and refuse to read them. Others insist on turning them into real words (A. Cunningham, 1990). It is thought that because there is no real word target, readers simply do not know whether they have been successful or should keep trying to sound it out (P. Cunningham, 1976).

Why Nonsense Words Are Important

Despite isolated reports protesting the use of nonsense words, measures of pseudoword decoding are highly sensitive to reading challenges and they permit evaluators to identify students who lack the phonics tools needed to decode unfamiliar words (Chard, Simmons, & Kame'enui, 1998). Even though a nonsense word such as *gafeblex* has several possible pronunciations, the reader clearly needs to have phonetic skill in order to make an attempt at identifying it. Pseudoword decoding is considered a strong measure of phonological processing (Castles et al., 1999), and it is often used in the assessment of phonological dyslexia (Castles & Coltheart, 1993). Despite the wide use of pseudoword decoding, Thomson, Crewther, and Crewther (2006) cautioned that a sole focus on phonological processing or phonological awareness may unduly limit the focus of remediation for young children.

The assessment of pseudoword decoding is particularly important for the assessment of young children who are learning, or who have been taught, to read by sight. The sight-word teaching method involves having students memorize the word by observing it as a whole—thinking of its shape and an immediate association with meaning. Primary school teachers often teach color words this way (*yellow—crayon in yellow*). Young sight readers may give the appearance of skilled reading, and they may perform adequately on early measures of word reading. Their spelling, however, is typically poor, and they are stymied by words that are not in their "sight" vocabularies. Evaluators can be astonished to find students who cannot decode nonsense words such as *dix* or *quob* yet can read text written at a third-grade level. In response to those of you who are now thinking "What is the problem if they are reading?" sight readers do not maintain progress as texts become less predictable and more specialized in their content. These children lack the tools for identifying the more specialized vocabulary that content area studies will bring.

Error Analysis

Evaluators need to analyze all errors to establish skills that are secure and those that are not. However, the sample of skills actually assessed may be too limited to make decisions regarding mastery of specific phonics patterns. Patterns of strengths and weaknesses always present a clearer picture than occasional or sporadic errors, so, in many cases, you will need to look beyond the results of only one test. You can document patterns of performance by examining both decoding skills and spelling skills. Classroom writing samples can be a gold mine of skills that children have and those that they are ready to learn.

The heart of a good evaluation of word reading skill is in the error analysis and in the ability to communicate decoding challenges in a language that is meaningful to other educators. To the untutored eye, the English language may appear to be unpredictable and unwieldy. According to

Hanna, Hanna, Hodges, and Rudorf's research on the English spelling system (1966), only 4% of words in English defy reasonable expectations for spelling. Many of these words are of foreign origin, including Latin and Greek, or from the Anglo-Saxon period of English language history. While a comprehensive review of the history of the English language is beyond the scope of this text, a review of the language of phonics (see Table 11.2) is helpful for understanding and documenting the children's current levels of functioning.

Syllable Patterns

According to Edward Dolch of word list fame (1940), the vast majority of words in the English language are polysyllabic. Children encounter a dramatic increase in polysyllabic words beginning in third grade. Dolch recommended that children be taught how to syllabicate words as part of their reading program. He noted that the common practice of teaching phonograms (word families such as -at, -ant) was cutting across syllable patterns, permitting children to work with only 38.7% of the syllables found in elementary school textbooks (p. 39).

There are six written syllable patterns in the English language. Moats (2010) told us that it is important to distinguish written syllable patterns from those that occur when we speak. Syllable patterns are based on letters, not sounds; it is important not to confuse them with how we identify syllable structure. (See Chapter 10.) Written syllable patterns provide a foundation for understanding many spelling rules. They also permit young readers to become more aware

Table 11.2 **Language of Phonics**

Label	Definition	Example
Vowel	A speech sound that is open and voiced.	a, e, i, o, u, and sometimes y
Consonant	A speech sound that is blocked or partially constricted; it can be voiced or unvoiced.	All the rest, and sometimes y
Grapheme	A single letter or cluster of letters that represents one speech sound.	
Digraph	Two adjacent letters in one syllable that represent one speech sound. There are consonant digraphs and vowel digraphs (sometimes called vowel teams).	See consonant digraph and vowel digraph
Consonant digraph	Two adjacent consonants in one syllable that make one sound.	ch, sh, th (*bath*), $\underline{\text{th}}$(*bathe*), ph, wh, ck, ng, kn, gn, wr
Vowel digraph	Two adjacent vowels in one syllable that make one sound.	ai/ay, au/aw, ee, ea, ew, ie oa, oe, ow (low), oo (*soot/tooth*).
Diphthong	Two adjacent vowels in one syllable where the mouth changes position and the two vowel sounds blend one into another. Authorities disagree on diphthongs; in some cases, the disagreement is based on regional accent.	oi/oy, ou/ow, ue
Trigraph	Three adjacent letters in one syllable that make one sound.	tch, dge, igh
Quadrigraph	Four adjacent letters in one syllable that make one sound.	eigh, ough
Blend	Two or three adjacent consonant sounds in one syllable "without losing the identity of any of the sounds" (Betts, 1946, p. 621). Some use the term *cluster* for three adjacent sounds.	st, qu, tr, bl, sm, spl . . .

of patterns for word recognition and spelling. For most words, the syllable type dictates the vowel sound, so once the kind of syllable is identified, the reader can apply the appropriate vowel sound for the syllable. According to Betts (1946), syllable patterns should not be studied in isolation; they are ''inextricably linked to phonics, auditory perception, accent, and other items'' (p. 648).

Most programs that teach structural analysis skills present the six syllable patterns as part of a structured sequential path to polysyllabic words. The names and techniques for marking syllables (called coding) vary from program to program, but the structures remain the same.

Brody (1987) identified the six patterns as shown in Table 11.3.

Nonsense Word List and Performance of Three Students

Now that we have some tools, let us take a look at the performance of three students on the Anybody-Can-Do-It Reading Test. (See Table 11.4.)

Based on this small sample, it appears that Wilma has not yet mastered her short vowels, and it is possible that she does not discriminate vowel sounds that are close in their articulation. She identified two words on this list, possibly through analogy. She has not yet mastered the VCe, VV, or VR patterns, and she certainly does not have the foundation skills needed to unlock multisyllable words.

In contrast, Fred appears to have mastered VC, VCe, and VR patterns. He is ready for additional instruction in VV and Cle patterns. Barney works hard, making multiple efforts to sound out words. He requires additional practice in *b/d* and *qu*. He requires additional practice in blends and in VCe, VV, VR, and Cle patterns.

In all cases, it would be helpful to have a larger sample of word attack skills as well as writing/spelling samples, teacher input, and phonological awareness/rapid naming testing.

Table 11.3 **Six Syllable Patterns of English**

Pattern	Description	Examples
VC	A closed syllable has a single vowel that is followed by one or more consonants. Closed syllables are the most common syllables in the English language. The vowel sound of a closed syllable is short.	bat, let, sit, hot, sun
VR	An *r*-controlled syllable has a single vowel that is followed by the consonant *r*. These syllables can be particularly problematic because the /r/ colors the vowel. Moats (2010) called this a vowel-*r* syllable to help students remember the spelling.	car, fir/fur/re*fer*, or
V	An open syllable has a single long vowel that ends the syllable. The vowel sound is long.	he, go, I
VV	A vowel team refers to two adjacent vowels that give one vowel sound. One vowel team may have multiple sounds.	goat, feel
VCe	This pattern is often referred to as magic e. It has a single vowel followed by a consonant and silent *e*. The vowel sound is long.	bake, home
Cle	A final stable syllable has a single consonant that is followed by the letter *l* and silent *e*. This syllable is unaccented and the vowel sound is schwa.	table, uncle

V = vowel, C = consonant, R = *r*

Table 11.4 **Performance of Three Students**

Word List	Pattern	Wilma	Fred	Barney
ep	VC	ĭp	√	√
nog	CVC	nŭg	√	. . . √
vit	CVC	Vĕt	√	√
blut	CCVC	b-l-ŭlt	√	. . . dlŭt
mand	CVCC	√	√	. . . manbŭh
hape	CVCe	hăpē	√	. . . hăpē . . . √
teek	CVVC	√	√	. . . tĕck . . . tĕck . . . √
huke	CVCe	hŭcky	√	. . . hŭck . . . .√
poin	CVVC	p-ŏ-ĭ-n	pŏn	. . . pō . . . pō . . . √
roat	CVVC	r-ŏ-a-t	rŏt	√
tounds	CVVCCC	tŭnd	tŭnds	toun . . . tound . . . s . . . √
quirp	CCVRC	quit	√	. . . kirp
larn	CVRC	learn	√	. . . la..la . . . √
spiffle	CCVCCle	spĭ—	spĭfflē	spŭh . . . spĭf . . . spĭffŭllĕh
mipling	CVCCVC	DK	mĭppling	. . . I give up
gumfrop	CVCCCVC	DK	√	I give up
semford	CVCCVRC	sĭm–	√	DK

V = vowel, C = consonant, R = *r*, DK = don't know

Quick Lesson in Syllable Division

SYLLABLE DIVISION LESSON RULES ACCORDING TO BRODY (1987)

Moving from left to right, identify the first vowel. Put a V under the vowel. Identify whether the letter after the vowel is a vowel (V), a consonant (C), or an *r* (R). Repeat for the second syllable.

hectic	farmer	omit	Season	mistake	able
VC VC	VR VR	VC VC	VV VC	VC VCe	VCle

(continued)

Count and mark the consonants (C) between the vowels (or vowel pairs).

hectic	farmer	omit	season	mistake	able
VCCVC	CVRCVR	VCVC	VVCVC	VCCVCe	VCle

Determine where to divide the syllables in multisyllable words:

Divide VCCV patterns between the consonants. Beware: Consonant blends and digraphs are usually not divided and they will usually cling to the syllable that follows (rab/bit, but fla/grant).

The VCV pattern is trickier, but we can play the odds. Most words will divide after the vowel, making the vowel long, as in o/pen. If that does not work, try dividing after the consonant; it will close the syllable and make the vowel short, as in riv/er. Brody advised students to try one, and if unsuccessful then try the other.

The letter *r* generally clings to the preceding vowel as in mur/der.

Hectic	farmer	omit	season	mistake	able
VC/CVC	CV/CVR	V/CVC	VV/CVC	VC/CVCe	V/Cle

Code the vowels as long with a macron (¯) or short with a breve (˘), using the kind of syllable to guide you. (The kind of syllable dictates the vowel sound, although there are exceptions to learn as well). In the system used by Brody, the VR pattern is coded with a breve. Many teachers bristle at this labeling system; r-controlled vowels are typically handled separately from short vowels. Give yourself 2 brownie points if you knew the names for these diacritic marks.

Read each syllable. Read again and adjust syllable division (and stress) if the resulting word does not sound right.

hĕctĭc	fărmĕr	ōmĭt	sēasŏn	mĭstāk**e**	āble

Beyond the Six Syllable Patterns

Reading in English would be much less complex if all words could be analyzed with these six patterns. Unfortunately, that is not the case. Conventions for orthography in English sometimes mimic syllable patterns; although the verb *to live*, for example, looks like a VCe pattern, it is not. In English the letter *v* in a word-final position must be followed by an *e*. In addition, there are other considerations. As we have stated previously, the English language is morphophonemic; sometimes it opts to preserve meaning over sound. We say backed, bagged, and batted because our spelling system preserves the past tense morpheme *ed*.

We build words with Latin-based prefixes, roots, and suffixes (logo-graph-ic, dys-lex-ia); sometimes we build them with Greek-combining forms (graphomotor/biographer/graphology). Some vowels are unstressed, making the spelling difficult to discern (insp**i**ration; opp**o**sition). The more we know about word structure—that is, the meaningful parts of words—and the better we are informed about the layers of the English language, the better equipped we are to make recommendations to improve the reading and spelling of our students. If we understand, for example, that *inspiration* and *opposition* are derived from *inspire* and *oppose*, we then know how to spell the unstressed vowels. The more knowledgeable we are as evaluators, the more explicit we can be in our analysis and in our recommendations.

A list of word recognition and decoding tests and subtests can be found in Table 11.5.

Table 11.5 **Word Recognition and Decoding Tests and Subtests**

	Print Awareness	Alphabet	Word Identification	Nonsense Words	Comments
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005). Grades: PreK, K, and 1	Book Handling: identifying book parts and conventions (PreK–1). Concept of Words: identifying blocks of letters as words and pointing to words (Grade 1). Matching Symbols: pointing to matching letters, letter sequences, and 4-letter words (PreK–1)	Letter Knowledge: pointing to named letters, identifying letter sounds, and writing letters (PreK, K). Phonics Knowledge: identifying sounds for letters, letter groups, and 4 nonsense words (K Spring and 1).	Sight Word Recognition: 20 items. (K Spring and 1)	Phonics Knowledge: top end of subtest has 4 nonsense words (K Spring and 1).	Grade 1: Insufficient top for Phonics. Knowledge and Sight Word Recognition. K Spring: Insufficient top for Letter Knowledge.
Diagnostic Assessments of Reading—Second Edition (DAR; Roswell, Chall, Curtis, & Kearns, 2005). Grades: 1–12	Print Awareness: knowledge of book conventions (6 items only) (K Fall–Grade 1)	Letters and Sounds : naming upper and lower case letters, matching letters and words, and writing words (Fall–Grade 1).	Word Recognition: Grade levels 1 through 11/12; 10 words per list. Word Analysis: identifying sounds of consonants, reading words with blends, short V, VCe, VV, diphthongs, and VR patterns, as well as 2-syllable words and multisyllable words (ungraded).		Determines mastery levels and provides percentile ranks. Trial Teaching Strategies (TTS) provide a teaching component to this assessment.

(*continues*)

Table 11.5 *(continued)*

	Print Awareness	Alphabet	Word Identification	Nonsense Words	Comments
Gray Diagnostic Reading Tests—Second Edition (GDRT-2; Bryant, Wiederholt, & Bryant, 2004a) Ages: 6–13	Letter-Word Recognition (Level A; age 6) identifying letter and word forms. 4 items.	Letter-Word Recognition (Level B; age 7) identifying letters. 14 items.	Letter-Word Recognition (Level C; age 8) identifying words. 58 items.	Phonetic Analysis consists of Letter-Sound Association and Pseudoword Reading. 43 items.	Two forms
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 4–6 through 25 Grades: PreK–12+			Letter and Word Recognition: identifying small selection of letters by name and by sound, pointing to letters in response to sound. Identifying words that are predominantly irregular. 99 items.	Nonsense Word Decoding 50 items. (Grades 1–12+ only)	Error analysis system for predictable letter and letter combinations. CD provided for pronunciation. Two forms.
Peabody Individual Achievement Test—Revised: NU (PIAT-R:NU; Markwardt, 1998a) Ages: 5–21 Grades: K–12			Reading Recognition: recognizing sounds of letters and reading words in a list format. 100 items.		One of 2 subtests on this battery requiring speech.

Phonics-Based Reading Test (PRT; Brownell, 2002a) Ages: 6–12		Decoding; includes identifying 5 letters by name and 5 letters by sound.		Decoding: 5 nonsense words per skill: short V, long V, C digraphs, VR, VV, diphthongs, silent letters, spelling patterns, inflections multiple syllables, and ''difficult words.''	The manual notes that these skills are typically taught to children in K to grade 3. For older students, the test is ''most appropriately used for identifying the presence or absence of reading difficulties'' (Brownell, 2002b, p. 10).
Phonological Awareness Literacy Screening (PALS; Invernizzi, Sullivan, Meier, & Swank, 2004) Criterion-referenced assessment Grades: PreK	Print and Word Awareness: 10 items	Alphabet Knowledge: identifying selection of lower-case letters by name and by sound.			Pronunciation Guide is provided for basic sounds.
Phonological Awareness Literacy Screening (PALS; Invernizzi, Juel, Swank, & Meier, 2003–2011) Criterion-referenced assessment Grades: K	Concept of Word: pointing to words as they are read	Alphabet Knowledge: identifying selection of lower-case letters by name. Letter Sounds: identifying selection of upper-case letters by sound.	Word Recognition in Isolation: 60 word list. Word list developed from frequently used basal readers as well as graded word lists from informal reading inventories.		Pronunciation Guide is provided for basic sounds.
Phonological Awareness Literacy Screening (PALS; Invernizzi, Meier, & Juel, 2003–2011) Criterion-referenced assessment Grades: 1–3	Concept of Word: ''Reading'' a memorized rhyme and pointing to words.	Alphabet Knowledge: identifying selection of lower-case letters by name. Letter Sounds: identifying selection of upper-case letters by sound.	Word Recognition in Isolation: 20 words per grade level list.		Pronunciation Guide is provided for basic sounds.

(*continues*)

Table 11.5 *(continued)*

	Print Awareness	Alphabet	Word Identification	Nonsense Words	Comments
Phonological Awareness Test—Second Edition (PAT2; Robertson & Salter, 2007) Ages: 5–9		Graphemes: Identifying sounds of letter symbols.		Decoding: An inventory organized by skill, i.e. VC, CVC, CVCe, etc. 10 items per skill.	Clinical judgment required for scoring. Individual Grapheme subtests suffer from too few items. Total Grapheme score is best.
Process Assessment of the Learner—Second Edition (PAL; Berninger, 2007) Benchmark assessment Grades: K–6				Pseudoword Decoding with 3-second limit. 55 items of Anglo-Saxon and Latin origins.	Fluency Total can be derived based on 60-second performance. CD Guide for pronunciation.
Slosson Oral Reading Test, Revised: Third Edition (SORT-3; Slosson & Nicholson, 2008) Ages: 5–65+ Grades: 1–12			9 grade-level lists of 20 words per list.		Screening only. 5-second limit.
Test of Early Reading Ability—Third Edition (TERA-3; Reid, Hresko, & Hammill, 2001) Ages: 3–6 through 8–6	Conventions: demonstrate awareness of book conventions	Alphabet: pointing and identifying small sample of letters and words, and counting syllables in printed words.			Ceiling effects at the upper end of the age range; floor effects at lower end. No measure of phonological awareness or rapid naming. Two forms.
Test of Orthographic Competence (TOC; Mather, Roberts, Hammill, & Allen, 2008a) Version 1 Ages: 6–7 Version 2 Ages: 8–12 Version 3 Ages: 13–17			Homophone Choice: circling the correct spelling of a word to go with a picture (1, 2). Word Choice: selecting the correct spelling of a word (3).		Group administration permitted for Versions 2 and 3

Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009) Ages: 4–50 Grades: 1–12		Word Reading: 75 items. Attempts >3 seconds and self-corrections are noted. Word Reading Speed score can be derived from first 30 seconds of reading.	Pseudoword Decoding: 52 items. Speed score can be derived from first 30 seconds of reading.	CD provided for pronunciation.
Wide Range Achievement Test—Fourth Edition (WRAT-4; Wilkinson & Robertson, 2006) Ages: 5–94+ Grades: K–12	Letter Reading is part of Word Reading for students ages 7 or younger; 15 letters	Word Reading: 55 words.		Two forms.
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+		Letter-Word Identification: identifying a small selection of letters by name and reading words in a list format. 76 items.	Word Attack: identifying 2 letters by sound and reading nonsense words in a list format. 32 items.	
Woodcock Reading Mastery Tests—Third Edition (WRMT-III; Woodcock, 2011) Ages: 6–79	Letter Identification: naming a total of 17 letters	Word Identification: 46 items. 5-second time limit.	Word Attack: 26 items. 5-second time limit.	Word Attack has an Insufficient floor for age 6 and an insufficient ceiling for adults.
Word Identification and Spelling Test (WIST; Wilson & Felton, 2004) Elementary Version (E): Ages: 7–11 Grades: 2–5 Secondary Version Ages: 11–18 Grades: 6–12	Letter Sounds (both versions): Identifying letters names and possible sounds for comprehensive inventory of C, V, digraphs/trigraphs, and additional patterns.	Read Regular Words (different versions for E and S): 100 items. Read Irregular words (different versions for E and S): 30 items.	Pseudowords (both versions): 50 items.	Color Coding permits rapid identification of syllable types. Limited sample of less commonly used syllable types. 5-second time limit on all items.

Eye Movements and Tracking

It would be irresponsible to launch into a discussion of fluency without spending a little time on eye movements. The term *fluency* might make us think that our eyes move smoothly from one side of the page to the other. Appearances, however, are deceiving.

Perceptual Span

We move our eyes to take in our surroundings and scan elements of interest. How exactly we move our eyes is nature's way of compensating for limitations in the design of the retina, the part of the eye that transforms light into neural signals (Rayner, 2009). Our perceptual span is divided into three regions: *foveal*, *parafoveal*, and *peripheral*. (See Figure 11.5.) The *foveal region* occupies the 2 degrees in the center of our vision. The *parafoveal region* extends about 5 degrees on either side of the *fixation* (when the eyes stop momentarily on a single location to take in new information), and the *peripheral region* is everything beyond. Acuity is at its best in the foveal region and at its worst in the periphery. We rely on our peripheral system to detect the gist of a situation or motion. We then move our eyes to bring the focus of our attention into optimal view; this is sometimes referred to a line of sight.

In about third grade, the perceptual span develops an asymmetry to the right of the point of fixation for readers of English (which is read from left to right) and to the left of the point of fixation for readers of Hebrew (which is read from right to left). According to Rayner, Pollatsek, Ashby, and Clifton (2012), the perceptual span varies depending on the printed orientation of the language; bilingual readers, they note, alter their perceptual spans in response to the demands of the particular language being read at the time.

Eye Movements

Eye movements consist of three major components: saccades, fixations, and regressions (Rayner, 1998). The actual movement of the eye from one place to another along a line of text is called a *saccade*. The word comes to us from the French (*saquer*), meaning pull or draw, signifying

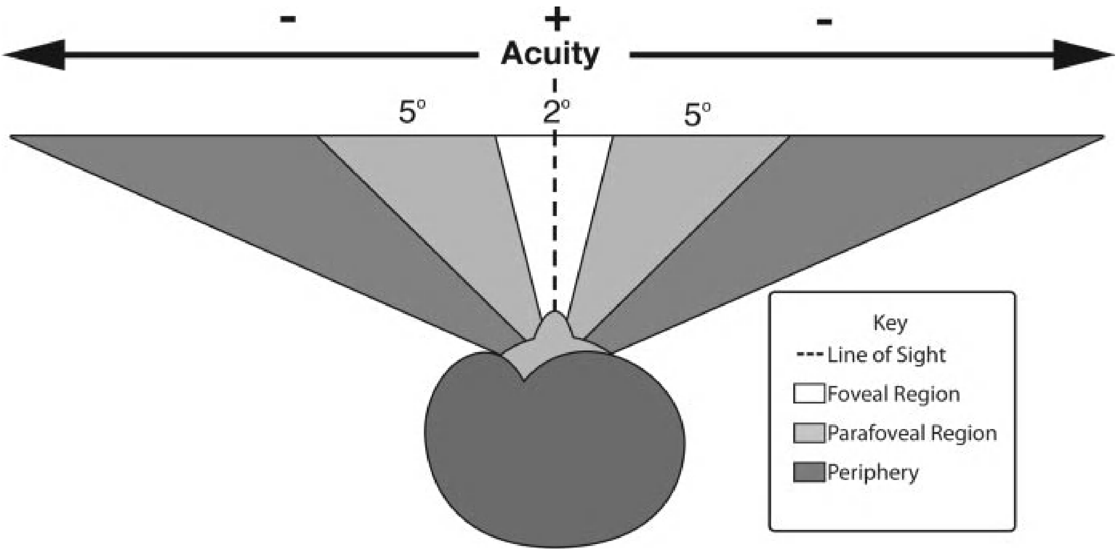

Figure 11.5
Perceptual Span

a movement that is both rapid and jerky. Skilled readers typically move seven to nine letters with each saccade, and most vision is suppressed while the eyes are moving. Saccades are bound, if you will, by pauses called *fixations*. *Fixations* are measured in milliseconds; the fixations of a skilled reader last about 200 to 250 milliseconds. Psychologists commonly liken the process of taking in new visual information to viewing a slide show, although this is clearly not our conscious perception of how we view the world. Typically, the eyes move to sample new information in a scene or text. *Regressions* provide a means by which we can recapture information viewed previously; in skilled readers regressions occur about 10% to 15% of the time.

Eye Movements During Reading

Despite similarities in neural circuitry that control eye movements in some tasks (scene perception and search), eye movements in reading are unique. Eye movements during reading are linguistically driven, and as such, they have the potential to reveal much about word recognition processes in skilled and unskilled readers (Rayner, 2009).

According to Rayner (1998), several factors influence the length of the saccade, the duration of the fixation, and the frequency of regressions. When readers encounter difficult text, saccades become shorter, fixations longer, and the number of regressions increase. We are all familiar with the need to go back and reread complex text; the speed and continuity of our eye movements, however, is nature's way of ensuring that we extract new information accurately prior to moving on (Rayner, Liversedge, White, & Vergilino-Perez, 2003). When new information is unfamiliar or discordant, eye movements serve as an automatic throttle, slowing us down to focus on potential problems.

From a developmental perspective, young readers have shorter saccades and longer fixations than older skilled readers. By fourth grade, saccade lengths and fixation duration stabilize in typical readers who are able to handle the demands of age-appropriate text, and regressions become fewer (Rayner, 1986). Despite classroom concerns that impaired eye movements or tracking are the cause of some reading problems, the eye movement literature consistently indicates that aberrant eye movements are more likely to be a result of reading problems than a cause. Eye movements reflect the difficulties that readers encounter when it is hard for them to decode text and understand text content (Rayner, 1998, 2009).

Fluency

Not long ago reading fluency was largely absent from discussions of skilled reading, and concerns over a lack of fluency were typically met with accommodations of additional time rather than instruction (Allington, 1983). I can recall meetings where teams dismissed oral fluency testing with the admonishment that high school students did not read aloud. Much, however, has changed since then.

In 1998 the National Research Council (Snow, Burns, & Griffin) recommended that reading fluency be monitored in the classroom as an indicator of problems with reading comprehension. In 2000 the National Reading Panel named reading fluency as one of the five major components of good reading instruction. Most reading batteries developed since that time now include some measure of fluency in their arsenal. Reading fluency is no longer a wallflower; it has become the belle of the ball.

Fluency Versus Automaticity

In its review of the research, the National Reading Panel (2000) observed that the general understanding of fluency has changed over the years. The changes have been so profound that Kame'enui and Simmons (2001) complained that the term was now "so broad and unsatisfactory in meaning that little insight and understanding are gained beyond the mere use of the term" (p. 204).

There is confusion and overlap regarding the use of the terms *fluency* and *automaticity*. Automatic behaviors are best thought of as those that are executed without conscious effort or intent and that do not take away from other processes that are competing for the same cognitive resources (Logan, 1997). Of paramount importance to this understanding is that automaticity can be achieved only through ''extensive practice under consistent conditions, which are typical skill acquisition situations'' (Ackerman, 1987, p. 4). Before we can play a fugue, we have to practice and master our scales.

The interest in automaticity at the word level is due to its importance as a prerequisite for reading fluency (L. Fuchs, Fuchs, Hosp, & Jenkins, 2001). We can see from the discussion of eye movement studies that poor readers struggle with shorter saccades, longer fixations, and more frequent regressions, all in response to words that exceed or tax their decoding skills. A few milliseconds here or there may not seem important in nature's grand scheme, but the effects are strong. Efficient word reading skills stand as the gateway to reading for meaning (Chall, 1983; Stanovich, 1985).

Definitions of *Fluency*

Most definitions of *reading fluency* have a common understanding of the need for skilled readers to execute lower-level word recognition tasks without diverting the cognitive resources that would be better allocated to comprehension (LaBerge & Samuels, 1974; Logan, 1997). Some definitions focus on speed and accuracy (L. Fuchs et al., 2001). Other studies have focused on word-reading accuracy (National Assessment Governing Board, 2002). The definition by Kuhn, Schwanenflugel, and Meisinger (2010) emphasized fluency in the context of comprehension:

> *Fluency combines accuracy, automaticity, and oral reading prosody, which, taken together, facilitate the reader's construction of meaning. It is demonstrated during oral reading through ease of word recognition, appropriate pacing, phrasing, and intonation. It is a factor in both oral and silent reading that can limit or support comprehension. (p. 240)*

In what is perhaps the most comprehensive of definitions, Wolf and Katzir-Cohen (2001) described reading fluency as the culmination of all reading-related processes. Their list of reading-related skills is truly awe-inspiring:

> *lower level attention and visual perception, orthographic (letter-pattern) representation and identification, auditory perception, phonological representation and phoneme awareness, short-term and long-term memory, lexical access and retrieval, semantic representation, decoding and word identification, morphosyntactic and prosodic knowledge, and connected-text knowledge and comprehension. (p. 220)*

Dysfluent reading may reflect dysfunction in one or several of the reading-related skills: It can be a dysfunction within a particular process or in how two or more processes interact. While this particular definition may seem to be overwhelming, it stresses the complexity of reading fluency and the need to remediate the specific offending processing problem. We cannot simply improve reading by telling Johnny to read faster.

Word Callers

As we come to the close of this discussion, we need to address the question of so-called word callers who reportedly read fluently but without understanding. Those who frequently raise the question of word calling do so in the context of what they deem to be an inappropriate focus on phonics (Goodman, 1968; Smith, 1982). However, according to Nathan and Stanovich (1991), there is no evidence that children decode words without extracting meaning provided that the word meaning is already established in memory. Meisinger, Bradley, Schwanenflugel, and Kuhn (2010) agreed that word callers are relatively rare and that they are overidentified by teachers. Their research suggested, however, that this atypical phenomenon increases as children progress to late elementary school. They cautioned that an emphasis on speed and accuracy without adequate attention to comprehension does not serve young readers well. An emphasis on reading fluency may shift focus away from meaning and lead to children who believe that faster is always better (Samuels, 2007).

How Fluency Is Assessed

There is extensive evidence that oral reading fluency is a powerful indicator of skilled reading (Torgesen, 1986). A study by Fuchs et al. (2001) demonstrated that the correlation between oral reading fluency and a criterion measure of reading comprehension was ''significantly higher'' than the correlations among three direct measures of reading comprehension (question answering, passage recall, and cloze procedure) for children with reading disabilities.

Reading fluency develops gradually, with students in the primary grades experiencing the largest rates of growth; these rates decline as students enter middle school and high school when the focus shifts to the comprehension of narrative and expository text.

Many test publishers use the terms *automaticity* and *fluency* interchangeably. For our purposes, we reserve the use of the terms *fluency* for text and *automaticity* for word lists. Automaticity at the word level is easily assessed through the reading of words and nonsense words in a list format. Reading words in a list format, however, presents a highly constrained view of reading skill. It does not assess the contributions of other reading subcomponents, such as the ability to chunk words into meaningful units, to make linkages between sentences, and to use background knowledge as a foundation for inferences, all of which could potentially interfere with reading fluency and comprehension.

Fluency is assessed through oral and silent reading. When assessing fluency, the focus should never be on speed. Research indicates that students who are asked to read quickly will commit more errors than those who are simply asked to read aloud or silently (Colón & Kranzler, 2006). Silent reading leaves us wondering about questions related to accuracy, phrasing, and intonation. We are forced to rely on a child's word for just when the passage was finished, and we must apply our own judgment about whether all the words were actually read. The most valid conclusions come from thoughtful interpretation of multiple results from both formal and informal testing of reading fluency.

Example of Slasher Test

I/SEE/MY/HOUSE/DOWN/THE/STREET

Figure 11.6

Example of Slasher Test

Slasher Tests: We have recently seen the development of ''slasher'' tests, in which children demonstrate their timed reading skills by identifying and slashing word boundaries in text printed without spaces between words. Although it may seem to be a crude way to measure reading speed, we can surmise that our students have actually recognized a group of letters as a word. Slasher tests, as shown in Figure 11.6, can potentially tell us more about silent word-reading speed, but they are not for everyone. These tests should not be used with individuals who have difficulty controlling their pencils.

Slasher tests have apparently met with the same degree of enthusiasm as slasher movies, such as *A Nightmare on Elm Street*, and the market has responded accordingly. Test publishers have now brought us slasher tests that address word-reading skill, such as Test of Silent Word Reading Fluency (TOSWRF; Mather, Hammill, Allen, & Roberts, 2004) and the Test of Irregular Word Reading Efficiency (TIWRE; Reynolds & Kamphaus, 2007a). According to the authors of the TIWRE, the use of irregular words increases the likelihood that a word is part of an individual's oral vocabulary, thereby making it a better ''proxy for reading comprehension'' (2007b, p. 1). The Test of Silent Contextual Reading Fluency (TOSCRF; Hammill, Wiederholt, & Allen, 2006) increases the ante; students recognize and mark word boundaries between words in passages that are written with increasingly complex vocabulary, grammar, and content. According to Hammill and his fellow authors, the TOSCRF may be the only measure of silent reading that incorporates elements of word identification, word meaning and structure, syntax, and comprehension.

Slasher tests may leave us just a little bit hungry for a test that also takes comprehension into account. The Woodcock-Johnson III Reading Fluency subtest requires students to read a series of sentences and mark them as true or false (yes or no). This particular test, however, is highly contrived. Since the vocabulary and syntax of the individual items are young and simple in their presentation, this measure probably does not capture reading fluency as a culmination of sublexical, word, sentence, and higher-level conceptual skills. The Test of Silent Reading Efficiency and Comprehension (TOSREC; Wagner, Torgesen, Rashotte, & Pearson, 2010), which is administered by grade level, has an advantage in its potential for group administration. Denton et al. (2011) believed that tests such as the TOSREC that incorporate sentence verification tasks have particular promise for middle school students.

Do not give in to the temptation to assess reading fluency solely through silent measures. No child should exit a formal reading evaluation without having demonstrated his or her ability to read connected text aloud. Both the Dynamic Inventory of Basic Early Literacy Skills (DIBELS) Next and AIMSweb provide measures of oral reading rate and accuracy for progress monitoring and benchmark purposes.

Gray Oral Reading Tests, Fifth Edition: The Gray Oral Reading Tests, Fifth Edition (GORT-5; Wiederholt & Bryant, 2012a) provide a standardized measure of reading rate, accuracy, and fluency. The previous edition had been severely criticized for multiple-choice comprehension questions that were not text dependent, and that could easily be guessed (Keenan & Betjemann, 2006). The GORT-5 has replaced the multiple-choice questions with open-ended questions that are reportedly now text dependent. Some evaluators continue to have qualms about the way errors are tracked and scored; on the GORT-5, students do not receive credit for self-corrections, and they lose points for repetitions. The GORT-5 also permits evaluators to supply as many as 20% of the words in a text; truth in advertising would then suggest that obtained scores be viewed as the product of a combined effort between evaluator and examinee. The GORT-5 does not permit students to look back at the text, and as such the results may be confounded by the role of memory.

WIAT-III Oral Reading Fluency Subtest: Evaluators who find the GORT-5 troublesome may take comfort in the WIAT-III Oral Reading Fluency subtest (Pearson, 2009). The WIAT-III subtests for students in grades 1 through 12 provide 16 passages that are scored for speed and accuracy. Each story has one comprehension question that is not scored. Its purpose is to keep students honest and ensure that they are reading for meaning. In contrast to the GORT-5, self-corrections, contractions, repetitions, and skipped lines are not counted as errors. The WIAT-III provides a prosody scale (monotone, choppy, variable, appropriate); the protocol, however, provides little guidance in how to determine the appropriate rating, saying "The student does not need to exhibit all features within a category" (Breaux, 2009a, p. 45). Scoring on this subtest should not be accepted on face value; students who do not meet the basal criteria drop back to read passages that are typically administered to younger students so the score reflects the ability to read below-grade-level passages and not passages that are on grade level.

I find it helpful to have multiple samples of reading fluency. Multiple samples and careful notes can lead to sound conclusions. There is no reason why standardized testing cannot be supplemented with fluency data from classroom materials.

Recording Oral Reading Performance

Different tests will offer varying systems for documenting students' oral reading. It does not matter what system you are using as long as you are consistent and your records can be understood by others. I typically use the system shown in Table 11.6.

Table 11.6 **Recording Oral Reading Errors**

Error	Symbol	Error	Symbol
Incorrect word	Slash	Repeated word(s)	Arrow ←
Omitted word(s)	Circle	Transposed words	~
Inserted words	ˆ	Corrected word(s)	Arrow ↘
Words provided by examiner	Slash/P		

Measuring Reading Fluency in the Classroom

Betts (1946) provides a list of steps that are helpful in measuring reading fluency with classroom materials:

- Select the passage to be read. Determine the readability of the text using one or more of the readability formulas. (See the discussion in Chapter 13.)
- Time the student reading for 1 minute. Record any errors, including misread words, omitted words, inserted words, and substituted words. Words not read within 3 seconds are counted as errors; provide the word and gesture for the student to continue reading. When a line is skipped, penalize for each word missed. Do not penalize for repeated words or for words that are corrected within three seconds. Subtract the number of errors from the total number of words read, and you will have words correct per minute.

If you prefer to have students read complete passages, you can also do this:

- Time the student reading the passage and record all errors. Stop timing when the student reads the last word of the passage. To determine the percentage of accuracy, divide the number of words read correctly by the total number of words read. Then calculate words correct per minute with this formula:

$$\text{WCPM} = \frac{\text{Number of words read correctly} \times 60}{\text{Total time read in seconds}}$$

Hasbrouck and Tindal (2006) provide norms data for students in grades 1 through 8, as shown in Table 11.7. At this point, there are no norms for students at the high school level; we typically refer back to the norms for eighth-grade students. At the high school level—for high school level text—there are widely varying reading rates due to varying levels of background knowledge. Everyone must slow down when material is challenging. However, high school readers should be able to read eighth-grade-level material at least as fast as students in the eighth grade who provided the norms for the Hasbrouck and Tindal data.

Prosody

Educators believe that reading with expression is important. We know that we can hear it when children read aloud. Recent research indicates that prosodic reading is indicative of reading comprehension (Kuhn & Stahl, 2000). Despite this correlation-based evidence, there is little research on prosody's actual role in reading and even less research on how to measure it. Typical reading assessments focus on rate and accuracy. This focus is not necessarily because we think that rate and accuracy are more important than prosody; it is just that they are easier to measure. A stopwatch, skill in counting, and the ability to judge words read correctly are all that is needed to measure words correct per minute.

What is prosody? *Prosody* is a term in linguistics that refers to the nonverbal aspects of speech: its rhythm, intonation, stress, and duration. According to O'Grady, Archibald, Aronoff, and Rees-Miller (2005), prosody is an aspect of language structure that is the culmination of sound patterns and sentence structure. When we speak, we adjust rhythm and pitch to clarify how we combine words to create meaning; we emphasize the parts of utterances that we wish to stand out.

Table 11.7 **Hasbrouck and Tindal Oral Reading Fluency Data**

Jan Hasbrouck and Gerald Tindal have completed an extensive study of oral reading fluency. The results of their study were published in a technical report entitled, "Oral Reading Fleuncy: 90 Years of Measurement," which is available on the University of Oregon's website, **brt.uoregon.edu/tech_reports.htm**, and in *The Reading Teacher* in 2006 (Hasbrouck, J. & Tindal, G. A. (2006). Oral reading influency norms: A valuable assessment tool for reading teachers. *The Reading Teacher*. 59(7), 636-644.).

The Table below shows the mean oral reading fluency of students in grades 1 through 8 as determined by Hasbrouck and Tindal's data.

You can use the information in this table to draw conclusions and make decisions about the oral reading fluency of your students. **Students scoring 10 or more words below the 50th percentile using the average score of two unpracticed readings from grade-level materials need a fluency-building program.** In addition, teachers can use the table to set the long-term fluency goals for their struggling readers.

Average weekly improvement is the average words per week growth you can expect from a student. It was calculated by subtracting the fall score from the spring score and dividing the difference by 32, the typical number of weeks between the fall and spring assessments. For grade 1, since there is no fall assessment, the average weekly improvement was calculated by subtracting the winter score from the spring score and dividing the difference by 16, the typical number of weeks between the winter and spring assessments.

Grade	Percentile	Fall WCPM*	Winter WCPM*	Spring WCPM*	Avg. Weekly Improvement
1	90		81	111	1.9
	75		47	82	2.2
	50		23	53	1.9
	25		12	28	1.0
	10		6	15	0.6
2	90	106	125	142	1.1
	75	79	100	117	1.2
	50	51	72	89	1.2
	25	25	42	61	1.1
	10	11	18	31	0.6
3	90	128	146	162	1.1
	75	99	120	137	1.2
	50	71	92	107	1.1
	25	44	62	78	1.1
	10	21	36	48	0.8
4	90	145	166	180	1.1
	75	119	139	152	1.0
	50	94	112	123	0.9
	25	68	87	98	0.9
	10	45	61	72	0.8
5	90	166	182	194	0.9
	75	139	156	168	0.9
	50	110	127	139	0.9
	25	85	99	109	0.8
	10	61	74	83	0.7
6	90	177	195	204	0.8
	75	153	167	177	0.8
	50	127	140	150	0.7
	25	98	111	122	0.8
	10	68	82	93	0.8
7	90	180	192	202	0.7
	75	156	165	177	0.7
	50	128	136	150	0.7
	25	102	109	123	0.7
	10	79	88	98	0.6
8	90	185	199	199	0.4
	75	161	173	177	0.5
	50	133	146	151	0.6
	25	106	115	124	0.6
	10	77	84	97	0.6

*WCPM = Words Correct Per Minute

**Average words per week growth

Source: Reprinted with permission from ''Oral Reading Fluency Norms: A Valuable Assessment Tool for Reading Teachers'' by J. Hasbrouck and G. Tindal, 2006, *Reading Teacher*, *59*(7), p. 639. Copyright @ [2006] by the International Reading Association (www.reading.org).

Prosody and Language Processing

Prosody plays an important role in how young children acquire language, and mothers who engage in highly exaggerated prosody may increase the responsiveness of young children (Santarcangelo & Dyer, 1988). According to Kuhn et al. (2010), prosody provides a ''cognitive skeleton that allows one to hold an auditory sequence in working memory'' (p. 235). It permits listeners to interpret sentences that are ambiguous and to interpret the feelings of the speaker. It also provides information about topic shifts in discourse.

Prosody's Role in Reading

It has been suggested that the lack of prosodic cues in written text makes it hard for some children to become fluent readers (Schreiber, 1987). According to Dowhower (1987, 1991) prosody's role in reading was not well understood, and she questioned whether the ability to read with prosody is a prerequisite for reading comprehension or whether it is a manifestation of reading comprehension. She also pondered the link between prosody and written expression. When the voices in our heads tell us what to do, do they influence what we write?

I suspect that when we refer to an *author's voice*, we are probably speaking of more than just point of view. Fodor (2002) suggested that when we read silently, we read with prosody; Ashby's research (2006) indicates that we record highly specific information regarding syllable stress (an aspect of prosody) during silent reading. Many misunderstandings with e-mail messages appear to involve difficulty interpreting the intended prosody of the sender and provide us with evidence of the all-too-important role in communication (S. O. Morbey, personal communication, May 22, 2011). Text codes (smiley faces, etc.) are an attempt to provide these cues.

How Prosody Is Assessed

According to Hudson, Lane, and Pullen (2005), prosody can be assessed only through observation of oral reading with connected text. Kuhn et al. (2010) used spectrographic measures (instruments that gauge radiative energy related to wavelength and frequency), but they acknowledged that these tools are beyond the reach of most educators. While many tests include aspects of rate and accuracy in their scoring, few tests give more than a nod to characteristics associated with prosodic reading. Zutell and Rasinski (1991) have created a multidimensional fluency scale that addresses phrasing, smoothness, and pace, and they suggest that teachers can become good judges of fluency if provided with training and opportunities for discussion. The important words here are ''training and opportunities for discussion.''

A less complex although widely used measure of prosody is the Oral Reading Fluency Scale from *Listening to Children Read Aloud* (Pinnell, et al., 1995) in Table 11.8 which describes reading behaviors, beginning with ''word by word'' and including skill with ''larger, meaningful phrase groups'' (p. 15).

Recommendations for Instruction

According to the National Reading Panel (2000), effective reading instruction focuses on the five core elements of reading: (1) phonemic awareness, (2) decoding, (3) fluency, (4) vocabulary, and (5) comprehension. In this chapter we have

Table 11.8 **NAEP's Oral Reading Fluency Scale**

Level	Description
4	Reads primarily in larger, meaningful phrase groups. Although some regressions, repetitions, and deviations from text may be present, these do not appear to detract from the overall structure of the story. Preservation of the author's syntax is consistent. Some or most of the story is read with expressive interpretation.
3	Reads primarily in three- or four-word phrase groups. Some smaller groupings may be present. However, the majority of phrasing seems appropriate and preserves the syntax of the author. Little or no expressive interpretation is present.
2	Reads primarily in two-word phrases with some three- or four-word groupings. Some word-by-word reading may be present. Word groupings may seem awkward and unrelated to larger context of sentence or passage.
1	Reads primarily word by word. Occasional two-word or three-word phrases may occur, but these are infrequent and/or they do not preserve meaningful syntax.

Source: Pinnell, G., Pikulski, J., Wixson, K., Campbell, J., Gough, P., & Beatty, A. (1995). *Listening to children read aloud: Data from NAEP's integrated reading performance record (IRPR) at Grade 4*. OERI Report No. 23-FR-04. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

focused on instruction that specifically addresses issues related to decoding and fluency. The next 12 recommendations may be useful for students having trouble in these areas.

1. Students with reading problems require multisensory instruction that is *explicit, systematic, sequential,* and *cumulative.* Instructional programs must be research based; they need to be delivered with fidelity, and they must be presented with appropriate intensity or dosage.
   a. *Explicit* instruction leaves nothing to the imagination. Important linkages between sounds and letters are directly taught and modeled. Students are provided with opportunities for guided practice.
   b. *Systematic* instruction addresses all letter–sound correspondences comprehensively from simple sound–symbol correspondence to higher-level structural analysis skills. No knowledge or expertise is presumed. If students already know a particular concept being taught, the effective teacher will check for consistency and then move on without wasting time on mastered materials.
   c. When instruction is *sequential* and *cumulative*, it presents high-frequency, foundational, sound–symbol associations and rules prior to teaching less frequently encountered letter combinations. This permits students to read as many words as possible within a short period of time.
2. *Students who are diverse in their reading profiles require instruction that is individualized to meet their needs; there is no one reading program for all students*. Reading programs differ in their explicitness, in the structure of the lesson plan, and in their approach to teaching phonics. *Synthetic* phonics teaches children to convert letter symbols to sounds and then blend the sounds together. *Analytic* phonics approaches decoding from the opposite perspective; students begin with the word as a whole and then break it down into letter–sound correspondences. Some programs teach decoding by *analogy* in which students use onsets and rimes from familiar words to decipher unknown words with similar parts. Others teach skills as they arise in context; this approach, referred to as embedded phonics, is neither systematic nor sequential.

   Programs may focus on one approach or use a combination of approaches. They may vary in their scope and sequence, the use of discovery-learning versus direct teaching, the pace at which new skills are introduced, and the explicitness of each rule or concept to be taught. Some programs, for example, might teach suffix –*s* as one concept; others will teach suffix –*s* as three concepts: after an unvoiced consonant (backs), after a voiced consonant (bags), and after *s* (houses).

   Programs will also vary in their use of real and nonsense words, handwriting instruction, the role of spelling and dictation, and the types of texts provided for practice. Spelling instruction that is coordinated with decoding instruction not only improves skill with written language, it also strengthens reading performance (Ehri, 1989; Felton, 1993). Students who also struggle with poor handwriting may benefit from handwriting instruction that complements the decoding and spelling skills being taught (Berninger et al., 1997). Students need to be able to read print and cursive writing.
3. *Students may need instruction in controlled text in order to transition from word-level decoding to decoding connected text.* Controlled text uses a vocabulary that is consistent with the decoding skills that are being taught or that have been taught. While there is little research on controlled text, Torgesen (2006) suggested that text engineered to provide additional practice of specific skills may be necessary for older poor readers due to the cumulative effects of limited exposure to print. Controlled text is not intended to be a substitute for reading good literature. Students who cannot read good literature need to be exposed to it via digital sources.
4. *Poor decoders and dysfluent readers need access to text-to-speech software.* While there is much to be said about the benefits of being read to, students need to have access to text content without having to rely on parents, teachers, or other

students. This ensures that their language skills and background knowledge will continue to develop even though they cannot read grade-level text for themselves.

5. *Given the complexity of reading instruction, educators must resist the temptation to design their own ''eclectic'' programs unless they have the training, experience, and research base to do so.* Each component of a structured reading program is there for a reason; when components, such as daily review of at least some if not all previously mastered skills, are dropped, the program loses its integrity. What is deemed to be unimportant (or boring) to the untrained eye may have important consequences in the long term.
6. *Even though fluency should always be addressed as part of a comprehensive reading program, reading with fluency is not a goal in and of itself.* Although we do not have word count per minute for readers at the high school level, reading fluency is nonetheless important for secondary-level students. Reading rate should not be reported without consideration of accuracy.

   Fluency training is about practice—that is, reading words repeatedly so that skills become automatic to free up attentional resources for higher-level skills (LaBerge & Samuels, 1974). Fluency training is easier for younger students than older students. Young students work with a smaller corpus of words, and there is more overlap (and therefore more practice) between texts. One of the greater challenges with older students is that the vocabulary at the middle school and high school levels is more specialized and that this vocabulary occurs with less frequency. How often do you see the word *axiom* in print?

   Repeated readings remain one of the main techniques for improving reading fluency (Kuhn & Stahl, 2000; M. Meyer & Felton, 1999). Essentially children read passages that are determined to be at their instructional level (95%–100% accuracy) for a prescribed number of times until they reach a specific criterion for speed. Most of the gains occur between the third and the fifth repetition (Rawson & Middleton, 2009).

   Students can read chorally or with a partner. Repeated readings are best done with some form of assistance and feedback (Kuhn & Stahl, 2000; National Reading Panel, 2000). Heckelman (1969) first proposed the neurological impress method for improving reading rate; according to this method, teachers and students read simultaneously from the same text with the teacher taking the lead, modeling prosody and essentially paving the way for the student to read at a faster pace. Hudson et al. (2005) recommended repeated readings based on a recorded model, a practice that requires less teacher assistance; they noted that recorded books designed for listening are not appropriate for this purpose because they are read at too fast a pace. LeVasseur, Macaruso, and Shankweiler (2008) have demonstrated that marking clause boundaries in text as a support for sentence structure can help promote prosody in oral reading; marking clause boundaries makes sentence structure explicit.
7. *When assessing a student's progress with respect to a particular type of reading program, it is helpful to have a copy of the scope and sequence of that program in order to check that the level of demonstrated skill matches his or her reported placement within it.* Verify that the criteria for mastery in the reading program are being observed. Reductions in criteria for mastery will undermine long-term progress; students who cannot decode CVC patterns with accuracy, for example, will have difficulty reading closed syllables in multisyllable words.
8. *When there is concern that students are not responding to their decoding instruction:*
   a. Verify that the directly taught, multisensory, structured, systematic reading program is being delivered with fidelity and that criteria for mastery are being observed.
   b. Consider whether the student has sufficient phonemic awareness to support progress in reading decoding. It may be that the phonemic awareness component of the program needs to be strengthened or that a program with more explicit instruction for phonemic awareness needs to be adopted.

c. Consider how much instruction the student is receiving. Some students can benefit from instruction 4 days a week; others require it daily. Most structured reading programs that focus on decoding and encoding require a minimum of 45 minutes to complete a lesson plan. This does not include work in vocabulary and comprehension. Older students require significantly more instruction than younger students (Torgesen, 2006).
d. Consider the size and the composition of group reading instruction. Students with diverse profiles will progress at different rates. Students with rapid naming deficits will likely require significantly more practice than their peers. In some cases it may be appropriate to consider providing technology-based instruction as a means of increasing the amount of practice. Currently no technology can replace a teacher for reading instruction.
e. Consider whether the present program is sufficiently explicit and whether the scope and sequence permits sufficient practice of new skills prior to moving on. Some children who have learned to read by sight benefit from practicing with nonsense words as a part of their instruction in order to get them used to the word-analysis approach. Others may benefit from increased practice with handwriting and spelling. Research by Gustafson, Ferreira, and Rönnberg (2007) suggested that children with pronounced orthographic deficits benefit from instruction that incorporates a large dose of spelling instruction.

9. *Students with intellectual disabilities (IQs less than 70) also benefit from reading instruction that emphasizes grapheme–phoneme correspondences and the sounding out of words.* According to a study by Conners, Rosenquist, Sligh, Atwell, and Kiser (2006), instruction benefited children with weak phonemic awareness and speech articulation; children with better language skills, however, experienced a higher degree of success. A more recent study by Allor, Mathes, Roberts, Cheatham, and Champlin (2010) also found that students with intellectual disabilities could acquire basic reading skills when provided with consistent, explicit, and comprehensive reading instruction "across an extended period of time" (p. 445). Both studies stressed the need for intense instruction; the latter study emphasized the need for long-term intervention, noting that students in the study required 3 years of instruction to meet "minimum levels for ending first grade" (p. 445).
10. *Students who cannot read are not candidates for technology that involves the use of print*. Voice recognition software for written expression, for example, still requires that students read what they write. Assistance (together with reading instruction) is needed whenever this is recommended.
11. *Students identified with reading problems need to have their writing skills assessed*. Most students with reading challenges also have difficulty with written expression.
12. *Be mindful that no child enters kindergarten or first grade who does not want to learn how to read.* Lack of interest in reading ("It is boring") is the only way that young children have of telling us that their instruction does not make sense to them. Poor readers are at a profound disadvantage throughout the school day. They may not be able to read their textbooks, the writing on classroom visual aids, or the notes on the board. They may not be able to read the directions on worksheets or their own spelling lists. Because children with poor reading skills do not spontaneously learn how to read, sometimes we have to ask what we are going to do that is new and different and that has a solid research base? We sometimes have to think out of the box.

A list of fluency and automaticity tests and subtests can be found in Table 11.9.

Table 11.9 **Fluency and Automaticity Tests and Subtests**

Test/Subtest	Mode	Word List	Nonsense Word List	Sentences and Passages	Accuracy	Comprehension	Comment
Assessment of Literacy and Language Sight Word Recognition Subtest (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: K Spring and I	Oral	Yes	No	No	No	No	Reading a list of 20 commonly used irregular or ''sight'' words.
Diagnostic Assessments of Reading—Second Edition (DAS-2; Roswell, Chall, Curtis, & Kearns, 2005) Grades: 1–11/12				Passages		No	One passage per grade level. Yes/No fluency rating; self-corrections, errors in word ending, and errors in proper nouns are not counted as errors. Provides mastery level and percentile ranks.
Gray Oral Reading Tests—Fifth Edition (GORT-5; Wiederholt & Bryant, 2012a) Ages: 6–23	Oral	No	No	Passages	Yes	Open-ended questions that are read by the examiner	Words not attempted in 5 seconds are provided by the examiner up to a maximum of 20% of total words. Even though these words are marked as errors, they may permit students to earn higher Comprehension scores than they would on their own. Miscue analysis. Two forms.
Kaufman Test of Educational Achievement—Second Edition Word Recognition Fluency and Decoding Fluency Subtests (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 8–25 Grades: 3–12+	Oral	Yes	Yes	No	No	Separate subtest	KTEA-II subtests can be combined into a Reading Fluency Composite. Two forms.

(*continues*)

Table 11.9 *(continued)*

Test/Subtest	Mode	Word List	Nonsense Word List	Sentences and Passages	Accuracy	Comprehension	Comment
Process Assessment of the Learner—Second Edition Morphological Decoding Fluency Subtest (PAL; Berninger, 2007) Grades: 1–6	Oral	Yes	No	No	Yes	No	Identifying base words modified by different suffixes. Accuracy score lacks sufficient top and bottom for students at either end of the grade range.
Process Assessment of the Learner—Second Edition Sentence Sense Subtest (PAL; Berninger, 2007) Grades: 1–6	Oral	No	No	Sentences	No	Yes	Reading groups of 3 sentences and identifying the one that does not make sense. Measures ''the ability to coordinate silent word-recognition and sentence comprehension processes when reading for meaning'' (Berninger, 2007, p. 4). Accuracy score lacks sufficient top and bottom for students at either end of the grade range.
Phonics-Based Reading Test (PRT; Brownell, 2002a) Ages: 6–10	Oral			Passages	Yes	Multiple-choice questions are not text dependent	Passages are controlled for basic phonics skills. Words not attempted in 5 seconds are provided by the examiner and marked as errors.
Test of Irregular Word Reading Efficiency (TIWRE; Reynolds & Kamphaus, 2007a) Ages: 3–94 Grades: K–17+	Oral	Yes	No	No	No	No	Irregular words only. Rapid screening for reading difficulties. Three test forms. Children younger than 5 begin with letter naming section.

Test of Silent Contextual Reading Fluency (TOSCRF; Hammill, Wiederholt, & Allen, 2006) Ages: 7–18	Silent	No	No	Sentences and Passages	No	No	Appropriate for screening. Students mark word boundaries with a pencil. Individual and group administration. Four forms for measuring progress.
Test of Silent Reading Efficiency and Comprehension (TOSREC; Wagner, Torgesen, Rashotte, & Pearson, 2010) Grades: 1–10+	Silent	No	No	Sentences	No	Sentences are marked as true or false	Appropriate for screening and progress monitoring. Similar to the WJ-III Reading Fluency subtest. Three forms for each grade level season (fall, winter, and spring). Individual and group administration.
Test of Silent Word Reading Fluency (TOSWRF; Mather, Hammill, Allen, & Roberts, 2004) Ages: 6-6 through 17	Silent	No	No	No	No	No	Rapid screening for reading difficulties. Students mark word boundaries with a pencil. Two forms.
Test of Word Reading Efficiency, Second Edition (TOWRE2; Torgesen, Wagner, & Rashotte, 2012) Ages: 6–24 Grades: 1–12	Oral	Yes	Yes	No	No	No	Two subtests: Sight Word Efficiency and Phonemic Decoding Efficiency Four forms.
Test of Reading Comprehension—Fourth Edition Contextual Fluency (TORC-4; Brown, Wiederholt, & Hammill, 2009a) Ages: 7–17	Silent	No	No	Sentences and passages	No	Separate subtest	Students mark word boundaries with a pencil.

(*continues*)

Table 11.9 (*continued*)

Test/Subtest	Mode	Word List	Nonsense Word List	Sentences and Passages	Accuracy	Comprehension	Comment
Wechsler Individual Achievement Test—Third Edition Oral Reading Fluency (WIAT-III; Pearson, 2009) Ages: 6–19 Grades: 1–12	Oral	No	No	Passages	Yes	Oral response to questions read by the examiner	Caution; Interpret out-of-level item set performance with utmost care; results describe performance on below-grade-level tasks. Comprehension questions are not scored. 4-point prosody scale. Fluency calculated as the average number of words read correctly per minute.
Woodcock-Johnson III Tests of Achievement Reading Fluency (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+	Silent	No	No	Sentences	No	Sentences are marked as true or false	Primarily simple sentences, 4 to 10 words in length. Beginning items start at primer level (0.2); higher-level items are written at Flesch Kincaid Index of 5.2.
Woodcock Reading Mastery Tests—Third Edition Oral Reading Fluency (WRMT-3; Woodcock, 2011) Ages: 6–79 Grades: 1–12	Oral	No	No	Passages	No	No	Rating scale for expression, phrasing, and smoothness.

Case Study: Misha

Misha, age 7 years, 8 months, was referred for evaluation when he was in first grade in order to document his current levels of functioning and obtain recommendations for instruction. His scores on different tests of cognition, language, and skills related to reading can be found in Table 11.10.

A review of Misha's background history revealed that his speech milestones were delayed; he began to receive speech and language therapy when he was 3 years of age. Misha found preschool and kindergarten to be challenging; he had difficulty attending and following directions during circle time. Misha enjoyed outdoor activities and doing puzzles. He was retained in kindergarten as part of an effort to give him more time to mature.

Speech and language testing at the beginning of first grade suggested age-appropriate functioning. In first grade, however, Misha struggled to learn his alphabet. His handwriting was labored. His individualized education program provided numerous accommodations including but not limited to preferential seating, small-group instruction, review and reinforcement, and a structured classroom setting. Reading goals focused on letter identification, high-frequency words, and CVC words. Writing goals focused on copying and writing simple sentences. There were no objectives for spelling. Misha received combined instruction in reading and writing for four 30-minute sessions weekly.

Although Misha began first grade with what were deemed to be grade-appropriate academic skills, he failed to maintain progress as the school year progressed. His reading instruction focused primarily on story comprehension and vocabulary. Phonics was embedded into reading lessons. Instruction in sound–symbol correspondence was provided during the course of teachable moments. Misha's journal writing reflected difficulty with medial and final sounds; handwriting was remarkable for poor letter formation. Sentence structure was poor. Teacher comments recommended that Misha socialize less during writing time and focus more on his work.

Misha was referred for testing in the spring of first grade. Cognitive testing reflected age-appropriate verbal and spatial abilities with weaknesses in working memory and processing speed. This profile is often interpreted as evidence of weak executive functioning skills (i.e., the part of the brain that governs how we take in, store, and retrieve new learning). Misha's oral language testing suggested adequate listening comprehension, receptive vocabulary, and expressive language skills.

Misha's profile on the CTOPP reflected good phonological memory and rapid naming, and poor phonemic awareness. Misha blended three speech sounds with consistency; he said words without sounds in the initial position, a skill level that was consistent with the spelling in his journal. Misha's performance on the CTOPP Phonological Awareness Composite (SS 79) was consistent with his reduced score on the LAC-3 (SS 87). On the LAC-3 Misha counted syllables in words; he had great difficulty tracking changes in speech sounds and changes in syllables.

At the time of testing, Misha knew his letter names; he did not write the alphabet in sequence. Misha had not mastered his letter sounds; many of them were mispronounced (/b/, for example was pronounced as /buh/). Misha's poor performance on the KTEA-II Letter & Word Recognition (SS 77) suggested that he had developed a small sight vocabulary; Nonsense Word Decoding (SS 64) reflected a pronounced weakness in basic rules for sound–symbol correspondence. Misha did not identify CVC words with consistency. This challenge was also noted on the Phonological Awareness Test, Second Edition (SS 81).

Spelling on the KTEA-II (SS 70) was consistent with Misha's poor phonemic awareness and lack of decoding skill; Misha attempted to spell words based on a limited understanding of what his mouth was doing. Medial sounds were weak. Handwriting was poor. Misha wrote

Case Study: Misha (Continued)

Table 11.10 **Misha, Age 7 years, 8 months**

Tests and Subtests	SS/ss	%ile	Sta9	95% Conf. Band
Wechsler Intelligence Scale for Children—Fourth Edition				
WISC-IV Verbal Comprehension Index	96	39	4	89–103
WISC-IV Perceptual Reasoning Index	96	39	4	89–104
WISC-IV Working Memory Index	83	13	3	77–92
WISC-IV Processing Speed	80	09	2	73–91
WISC-IV Full Scale IQ	–	–	–	NP
Oral and Written Language Scales				
OWLS Listening Comprehension	96	37	4	82–108
OWLS Oral Expression Scale	90	25	4	81–99
Peabody Picture Vocabulary Test—Fourth Edition	103	58	5	96–110
Expressive Vocabulary Test—Second Edition	92	30	4	86–98
Comprehensive Test of Phonological Processing				
CTOPP Memory for Digits	11	63	6	9–13
CTOPP Nonword Repetition	11	63	6	9–13
CTOPP Phonological Memory Composite	106	66	6	94–118
CTOPP Elision	4	02	1	2–6
CTOPP Blending Words	9	37	4	7–11
CTOPP Phonological Awareness Composite	79	08	2	73–85
CTOPP Rapid Digit Naming	8	25	4	6–10
CTOPP Rapid Letter Naming	9	37	4	5–13
CTOPP Rapid Naming Composite	91	27	4	81–101
Lindamood Auditory Conceptualization Test—Third Edition	87	19	3	83–81
Kaufman Test of Educational Achievement—Second Edition				
KTEA-II Listening Comprehension	95	37	4	87–103
KTEA-II Letter & Word Recognition	77	06	2	74–80
KTEA-II Nonsense Word Decoding	64	01	1	58–70
KTEA-II Decoding Composite	57	01	1	53–61

Case Study: Misha (Continued)

Table 11.10 (*continued*)

Tests and Subtests	SS/ss	%ile	Sta9	95% Conf. Band
PAT2 Graphemes Composite	78	08	2	76–80*
KTEA-II Reading Comprehension	68	02	1	64–72
KTEA-II Written Expression	72	03	1	64–80
KTEA-II Spelling	70	02	1	65–75
KTEA-II Written Expression Composite	70	02	1	65–75
Phonological Awareness Test—Second Edition				
PAT2 VC words	93	33	4	91–95*
PAT2 CVC Words	81	10	2	79–83*

SS = standard score, %ile = percentile rank, sta9 = stanine, conf. band = confidence band, NP = not provided
*Rounded values

only 12 letters of the alphabet in sequence, at which point he became confused over ''lmno,'' which he pronounced as one word. Many of Misha's letters were formed from the bottom up; they were poorly oriented in space. Writing was a clearly a nonpreferred activity (SS 72). The evaluator noted that Misha's face fell every time he was asked to produce a writing sample; Misha wrote in sentence fragments with poor mechanics. The team questioned whether Misha's lack of graphomotor skill had also contributed to his weakness in sound–symbol correspondence; his reluctance to write had reduced his experience with print.

Misha's poor reading and writing skills at the end of first grade were taken as indicators of a high-risk status for print-related tasks and not as a developmental delay. The team decided to revise Misha's reading and writing program with the goal of implementing an integrated research-based program featuring direct instruction and multisensory teaching techniques for handwriting, reading, and spelling. (It was decided that the original reading goals for Misha were not aggressive enough.) The coordination of Misha's reading and spelling instruction was viewed as an important vehicle for maximizing the teaching of sound–symbol relationships and for ensuring instruction that would be truly multisensory. Misha was also provided with direct instruction in phonemic awareness focusing on medial sounds, final sounds, and blends; he was taught to pronounce his sounds correctly. (Misha's teacher, it turned out, had been mispronouncing many of the sounds herself; and she was provided with training in phonology.) Misha's parents were provided with phonemic awareness activities that they could do at home; they were also encouraged to read to Misha as much as possible.

A speech and language consult was provided to Misha's teachers in order to address ongoing concerns with written sentence structure. All specialized instruction was scheduled so that Misha could still participate in the classroom-based instruction for vocabulary and comprehension; Misha received 45 minutes daily of this supplementary instruction. Progress monitoring with DIBELS was implemented, and Misha is now monitored on a bimonthly basis; the data will be used to adjust Misha's instruction with the goal of meeting the benchmarks for second grade.

Case Study: Misha (Continued)

Misha's performance on the WISC-IV suggests that he will be vulnerable to challenges with organization and meeting the demands of classroom instruction. The team cautioned that Misha could easily be overwhelmed by many classroom assignments. The weaknesses in both working memory and processing speed often aggravate each other. Children who execute tasks more slowly are forced to rely more on their memory; when that memory is weak, tasks may be executed with less consistency, accuracy, and with reduced speed.

The team cited the need for a high degree of external and clearly defined routines in all aspects of Misha's school day. It was recommended that classroom instruction focus not just on content but on organization. Misha would need to know as much about information structures as he did about the content itself. In this way he could be supported to store new learning in organized schemas as a foundation for retrieval. It was stressed that lower-levels skills should be taught to automaticity (i.e., handwriting, decoding, spelling, math facts) to reduce the demand on memory and not force Misha to divert important cognitive resources away from higher-level learning.

Given Misha's history of speech and language involvement and his profile on the WISC-IV, his progress will be monitored for challenges both in decoding and comprehension (see Scarborough, 2001). Misha's response to handwriting instruction will also be monitored; should he continue to experience reduced automaticity in pencil-and-paper tasks, he will be evaluated for assistive technology (i.e., keyboarding and possibly a voice recognition system).

Conclusion

Understanding the skills that contribute to decoding and fluent reading will help you to make sound recommendations for students with reading challenges. While some children will benefit from fluency training per se, others will require direct, systematic instruction that addresses weaknesses in the subskills that make fluent reading possible. Some students will require additional work in vocabulary and syntax; others will warrant instruction in word recognition, word attack, and possibly even sound–symbol correspondence. The cardinal rule is: accuracy first, then automaticity and fluency. We cannot teach someone to do something faster until he or she is able to perform the skill with consistency.

Effective recommendations are based on a thorough knowledge of a student's profile as a reader. This thorough knowledge is not found in test performance alone. It is also found in a student's background history, including the instructional history, and by observing how the student performs from day to day.

In some cases, test scores mask the problem. Tests are not always optimally designed, leaving us with a quandary of scores that do not appear to match concerns expressed in a referral. Always be prepared to look beyond the test scores at the actual test data and classroom performance. It is true that not all errors are consequential, and we do not want to focus unduly on sporadic mistakes and small inconsistencies. (We all make mistakes sometimes.) Thorough testing, together with an analysis of performance that goes beyond test scores, can reveal crucial gaps and misunderstandings that stand as barriers to skilled reading.

Review Questions

1. How was the dual route model used to justify sight-word instruction?
2. What do eye movement studies have to tell us, and what are the implications for instruction?
3. Why are some letters of the alphabet harder to learn than others?
4. Compare and contrast the reading performance of the two children described in

Table 11.11 **Practice Analysis of Decoding Skills**

Word	Harry	Kate
et	ĭ . . . ĭt . . . ēt	√
mol	măl	√
nup	√	√
cag	√	√
blump	bl . . . ŭmp . . . blŭmps	bl . . . ŭmp . . . blŭm . . . √
seef	sē . . . sē . . . sēf	sĕlf
dite	dītē	√
floam	fl . . . ŏ . . . ăm..flŏ . . . ăm	flăm
voil	vōl	vŏl
perkle	‘‘pickle’’	‘‘prickle’’
mintrob	m . . . mĕn..dk	mĭ . . . trŏb . . . mĭntrŏb
fepmut	f..ĭp . . . m..ū..fĭpm . . . ūt . . . I give up.	fĕp . . . mŏt

Table 11.11. What has each child mastered, and what is each ready to learn?

5. Code these syllable patterns:

Word	Pattern
nostalgic	
vacant	
devise	
steeple	
imposter	
inopportune	
leader	
harborside	
inspection	
complete	
vacation	
department	

6. Aaron, age 6-6, has been referred for evaluation by his teacher due to concerns that he has not mastered the alphabet and that he is not acquiring reading skills in a manner commensurate with his classmates. He says that reading is ‘‘boring.’’ He earned an age-appropriate score on the Anybody-Can-Do-It Basic Reading Cluster (Word Identification and Nonsense Word Decoding), and the evaluator says that there is no problem. What thoughts do you have on the difference of opinion between the teacher and the evaluator?
7. Alyssa is in third grade and she has a well-documented weakness in reading fluency. Progress monitoring data show that she is inaccurate and that she is not responding to fluency training (i.e., repeated readings). What suggestions do you have?
8. Chuck is in fourth grade; he has been receiving specialized reading instruction for 2 years in a small-group setting. His progress has been minimal. The team has asked for your opinion; they question whether this child can be taught to read. What do you need to know?
9. Tony is in the 10th grade; he is failing in school because he cannot complete reading assignments in a timely fashion and he has poor recall of what he reads. The team is going to discuss what can be done, and they want to know whether his reading fluency can be improved. What data would you like to have and what are your thoughts?

Comprehension

Chapter 12

Introduction

When students demonstrate average or above-average skill on reading comprehension tests, teachers and parents are generally happy. When students do poorly, there is typically a discussion about how to address the problem. An all-too-often response to perceived comprehension problems is to recommend instruction that focuses on the main idea and relevant supporting details. The reality is much more complicated.

As we have come to understand, poor readers are a diverse group; the terms *specific learning disability* and *dyslexia* refer to students with a variety of strengths and weaknesses. It is no accident that reading comprehension has not yet been introduced in this text—there has been much to discuss. We have looked at how phonological and orthographic processes support the development of skilled reading. We have examined the role of oral language. We are now ready to focus on how students obtain meaning from text, presuming, of course, that poor decoding skills or lack of fluency do not stand in the way.

According to Cain and Oakhill (2007), about 10% of school-age children struggle with true comprehension deficits—deficits that do not have their origins in word recognition, decoding, or reading fluency. These children often go unnoticed by their teachers. They do not stumble over words, and they do not read with painstaking effort. However, their responses to questions based on text may be superficial and fragmented, and they may also have difficulty formulating a well-organized summary or narrative (Cain, 2009).

This chapter addresses what happens to children as they move from learning to read to reading to learn (Chall, 1983), issues related to text comprehension, and the Kintsch construction-integration model by which we use our inferential thinking skills to make meaning. We look at the role of background knowledge and vocabulary as well as the structural demands of narrative and expository text. We also examine how reading comprehension is assessed and how we can use this information to fashion recommendations for reading instruction for comprehenders, rich and poor.

Fourth-Grade Slump

In 1990 Chall, Jacobs, and Baldwin published their classic study, *The Reading Crisis: Why Poor Children Fall Behind*. The study focused on the progress of children in second, fourth, and sixth grades from low-income homes over the course of two years; it found that fourth grade marked the beginning of a precipitous decline in vocabulary growth. The decrease in the growth of vocabulary was soon accompanied by diminished skill in word recognition and spelling, culminating in reduced oral and silent reading comprehension at the sixth- and seventh-grade levels.

Chall and her fellow researchers (1990) believed that students in the early grades were able to compensate for their limited vocabularies and word recognition skill by relying heavily on context. Upon reaching the sixth and seventh grades, many students, much to their consternation, found that context was no longer helpful. Mature literature and technical texts had too many unfamiliar words, and these words acted as a barrier to text content. Without some degree of understanding there could be no context, and without context there was no way for students to use their deductive powers to determine the meaning of unfamiliar words. A follow-up study of these children in grades 7, 9, and 11 (Snow, Barns, Chandler, Hemphill, & Goodman, 1991) confirmed that the negative trend continued; by high school the majority of these students lacked the language and word recognition skills to meet the demands of content area studies and age-appropriate literature.

Chall and her fellow researchers (1990) were careful to point out that the initial vocabulary scores of these children were commensurate with the scores of children in the general population, leaving us to wonder what happened. According to Hirsch (2003), research by Hart and Risley (1995) provided much-needed data on children's early language development; there was no doubt that many of these children entered school already behind in their vocabulary development. Hirsch suggested that the unexpected onset of reading comprehension difficulties in fourth grade might actually reflect issues related to how we test early reading skills.

Hirsch (2003) believed that the tests used in the earlier grades were more focused on decoding than on vocabulary and comprehension. Of course, it is also possible that the timing of the fourth-grade slump reflects curriculum factors; in the United States, we defer instruction in expository text until the fourth grade (Chall et al., 1990). Some believe that deferring instruction in expository text to the later grades is hazardous to intellectual development (Duke, 2000). As a result, students entering fourth grade are unprepared to cope with the more specialized vocabulary, conceptual knowledge, and text structures due to experiences that have largely been absent from their education.

While this text is not the venue for investigating factors contributing to the fourth-grade slump, Hirsch's (2003) comments serve to remind us of how our knowledge of students may be affected by the instruments we use to take data. There is no doubt that reading comprehension depends on a myriad of processes, skills, and knowledge; there should also be no doubt that there is no perfect reading test and that we need to think carefully about the instruments we select.

Kintsch Model of Reading Comprehension

Reading comprehension stands apart from oral language processing; text requires readers to understand language that has been stripped of its context, prosody, and potential for clarification. As readers we have no access to facial expressions and nods that might signal understanding and a meeting of the minds. We have two hopes: that the author has anticipated our needs as readers and that we are equipped with the linguistic tools and background knowledge needed to move us from simply decoding alphabetic symbols to experiencing a full range of emotions, including the delight of learning something new.

A full picture of reading comprehension does not emerge without consideration of both the text and the reader. In a perfect Orwellian world, a reader would understand what was printed on the page, no more, no less. Fortunately, this is not the case. In 1988 Kintsch proposed a construction-integration model of reading comprehension to describe how readers work with the text to make meaning. Kintsch's study has a vocabulary all of its own that draws heavily from the fields of logic and linguistics, and so we spend a little time reviewing the vocabulary and concepts that are important.

The Textbase and the Situation Model

The construction-integration model consists of two major components: the text as it was written (the textbase) and the understanding that results when we use our cognitive resources to think deeply about that text (the situation model), shown in Figure 12.1. The textbase consists of a microstructure and a macrostructure. The *microstructure* refers to content at the sentence level; the *macrostructure* refers to the global organization of the text. Both the microstructure and the macrostructure have, as their basic units, kernels of thought or idea units called propositions.

It is the reader's job to make inferences and integrate propositions in the textbase with knowledge stored in long-term memory in order to create a coherent situation model. When we write a good summary, we are essentially capturing the macrostructure of a text. While inferencing plays a role in the construction of a textbase, these inferences are designed primarily to ensure cohesion within the text. We have not yet moved outside the realm of the text itself.

Each new proposition or kernel of thought serves to help readers fine-tune their understanding, make their own inferences based on their vast store of experience and knowledge, and create a situation model. The situation model that you create may not be the same as the one that I make. It is a highly personalized understanding that develops on the wings of language competence, cultural knowledge, social norms and interactions, personal experience, ideas, imagery, factual data, and anything else that we, as human beings, bring to the table.

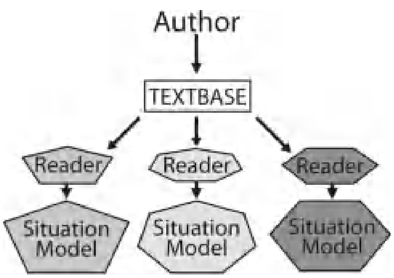

Figure 12.1

Textbase/Situation Model

The skill with which readers create situation models also depends on the nature and the quality of the text itself. Expository text is more difficult than texts that tell a tale (Duke, 2000); most children come to school with some understanding of *once upon a time* and *happily ever after*. Some texts are not well written. The textbase itself, whether it is expository or narrative, may have parts that are correct, incorrect, or sadly incomplete. The structure of the content (the macrostructure) may be stated explicitly or just implied.

Armbruster (1984) wrote of the dilemma of inconsiderate text and how readers could be befuddled by texts that were not clear in their organization and structure. A study by Kintsch and Yarborough (1982) found that readers like to know what they are going to learn and how they are going to learn it. In their study, students performed more successfully on questions related to topic and main idea when rhetorical schemas (classification, illustration, compare and contrast, and procedural) were explicitly stated than when readers were left to figure them out on their own. Along the same lines, Lorch, Lorch, and Inman (1993) found that signaling devices (*next, for example*, etc.) improved recall of both content and organization.

Text Is Almost Never Fully Explicit

While the quality of the textbase is not to be underestimated, it is the reader who must actively engage and think deeply about the text content. Although writers try to be clear when they write, texts (or conversations, for that matter) can never be fully explicit (Kintsch & Rawson, 2007). We would, in fact, drive ourselves crazy if we tried to construct a text that did not presume at least some ability on the part of the reader to draw conclusions and think critically.

The prospect of writing a fully explicit text is so daunting that many go to law school to learn a style of writing that leaves nothing to the readers' interpretive powers. When we hire an attorney to dispute a legal agreement, we want one who is not only well versed in the law, but also has the potential to read between the lines and find inferences (in this case, loopholes) not previously considered. Of course, legal documents are frequently written in a vocabulary that is not part of conversational language or even the language of popular novels, which leaves most of us to struggling to develop a coherent situation model and understand what it is we are signing.

Inferential Thinking

Inferential thinking is the heart and soul of reading comprehension. As can be seen from the earlier discussion, inferential thinking is difficult to separate from oral language skill. In fact, many speech and language experts would argue that inferential thinking (which is based on an individual's background knowledge) is, first and foremost, a language skill. Cognitive theorists, in contrast, would view inferential thinking as part of their domain, in which readers construct mental models of the world.

Role of Experience

The truth is that both fields have a lot to offer the study of inferential thinking. When children enter our classrooms, we hope that they have had a wide range of experiences and that they have been given words with which to label those experiences. Crawling, arranging toys on shelves, and playing in the neighborhood lead to the development of location words and prepositional phrases. Story time cultivates vocabularies that are precise and expressive. For example, did Hansel and Gretel live in a hovel or a cottage? The difference is important if we are to understand their abject poverty and hunger. Listening to stories also promotes a basic understanding of sequence, cause and effect, and narrative structure. We know that evil witches die and that virtuous princesses are rewarded with a kiss. Our knowledge of western narrative structure tells us so.

In addition to building a foundation of language and literary plot devices, experience provides children with knowledge of their society and culture, history, and the sciences. We all have memories of the kitchen science experiment that went wrong (states of matter) and of Grandmother's tales of her trip to Paris (geography). These events, facts, and concepts are stored in long-term memory, and they become the tools with which we interpret all new experience. Experience, coupled with rich opportunities for language input, provides children with words, facts, concepts, and knowledge of structure that enables them to interact and process the world about them.

Authorities in the field of reading comprehension often use the terms *background knowledge* and *prior knowledge* interchangeably. For the purpose of our discussion, it is helpful to distinguish between the two. Brody's distinction is a good one (1994): *Prior knowledge* refers to an individual's accumulated store of information, both correct and incorrect. *Background knowledge* refers specifically to the knowledge required to understand a particular text. By definition, background knowledge is knowledge that is correct.

Levels of Inferential Thinking

It is not surprising that inferential thinking is tightly intertwined with oral language. According to Kintsch, Patel, and Ericsson (1999), we store and structure much of our world knowledge through language. Even experiences that are nonlinguistic in their nature, such as raw emotion and sensations, are encoded with language; we find words to explain our emotional states.

Inferential thinking at its most primitive level involves making connections that are inherently linguistic in nature. It functions at the sentence level when readers are forced to make connections between different words that are used to refer to the same thing or concept (known as coreferents). The sentences

Bob bought flowers. *The* roses *were beautiful.*

presume that we are able to identify a rose as part of the broader category of flowers; we then infer that it was Bob who bought roses. The example

Bob was late. His wife left without him.

presumes that we understand the link between Bob, the possessive adjective (his), and the pronoun (him). In both of these cases, our inferential skill is dependent on our knowledge of grammar and verbal categories. Although we may think that everyone readily grasps the relationship between a pronoun and its referent, it is not always the case. Yuill and Oakhill (1988, 1991) found that poor comprehenders had a poor grasp of anaphoric devices and, as a result, were not able to maintain a coherent understanding of the text. It is impossible to connect the dots if one cannot follow the trail of coreferents.

We make many inferences within a text; higher-order inferential thinking entails making connections between the textbase and our background knowledge. Good readers draw conclusions and make predictions by actively linking new learning to the contents of long-term memory (often referred to as long-term *storage*). Most of the time, this process occurs automatically. Kintsch et al. (1999) described this process as something akin to a flashlight that focuses on and illuminates what it happens to shine on. When background knowledge is rich and deep, the flashlight illuminates more than a relevant fact or concept; it illuminates an entire network of information structures that complement and enrich understanding. At least, that is what we hope.

All children find it easier to make inferences based on anaphora than on their background knowledge (Bowyer-Crane & Snowling, 2005). However, children with comprehension difficulties do not readily make connections between text content and past experience (Yuill & Oakhill, 1991). This challenge is often exacerbated by poor decoding skills (Bowyer-Crane & Snowling, 2005). Without thorough testing, it is difficult to distinguish between the two problems. The end result for both types of learners may be the same: They are dazed and confused.

Working Memory and Comprehension

According to Levine and Reed (1999), working memory is the ''workspace of thinking'' (p. 73). It supports proximal and distal planning, the execution of multistep tasks, and the elaboration of ideas. It serves as the all-important bridge between short-term memory and long-term memory.

How Working Memory Supports Comprehension

Many studies link working memory capacity to reading comprehension (Crain & Shankweiler, 1988; Perfetti & Lesgold, 1977). Working memory is the biological equivalent of a 19th-century salon, a social gathering designed to facilitate the exchange of news and ideas between society's literati and individuals of distinction. It is the hub of comprehension; it is where the new and unfamiliar encounter all that we have learned and believe to be true. When working memory is limited or compromised, or when the demand is greater than the supply, readers become confused, overloaded, bored, or forgetful; the potential for developing a good situation model is seriously curtailed.

It is not just the size of working memory, however, that limits or supports reading comprehension. According to Ericsson and Kintsch's model of working memory (1995), working memory consists of two parts: short-term working memory, which is exceedingly limited in its capacity, and long-term working memory, which is available only for tasks that are highly practiced and familiar.

Role of Practice

Practice permits us to consolidate new skills and apply them with greater efficiency. It leads to expertise and a network of knowledge that becomes available in long-term working memory on demand. The classic study on the role of expertise in working memory came from deGroot (1978) who examined how chess masters used their experience and vast store of plausible move sequences to defeat their opponents. Because of their extensive experience, chess experts were able to retrieve and consider multiple possible responses as a foundation for strategic planning. G. Miller (1956) referred to this process as *chunking*. According to Kintsch and Rawson (2007), practice in retrieving and applying background knowledge (what they call information structures) from long-term memory is critical for reading comprehension. It is the ''rich get richer'' part of Stanovich's (1986) Matthew effects.

The information structures held in long-term memory are activated by cues from whatever is held in short-term working memory at any given moment (Kintsch et al., 1999). Readers with little background knowledge, at least in the domain of a particular text, do not have many information structures, and therefore, there is less for the flashlight to illuminate. As a result, they are forced to fall back on the limited contents of their short-term memories. They have access to only what they are reading at the moment; the big picture is lost. Without substantial support from teachers and specialists, the situation model will be fragmented, corrupt, and of little use.

Background Knowledge

It is part of human nature to resist information that conflicts with what we believe to be true. We want to be right even when presented with evidence to the contrary. This quirk of human nature also applies to reading. When a reader's prior knowledge is inaccurate, it will override what is in the text, and a whale will remain a fish instead of a mammal (Wilson & Anderson, 1986). While we like to think of ourselves as inherently fair and noble, our biology works against us. From a biological perspective, the mistaken belief becomes encoded in the form of neurological networks in the brain. These networks have mass and they take up space. Once activated, the response is automatic. It does not matter what the text says, we like what we think better. It is part of us.

Activation

Many teachers work hard to activate background knowledge as part of their introduction to a new text, the theory being that activation leads to better reading comprehension. Kintsch's research (1998) raised the question of whether this knowledge actually requires activation and whether the classroom-based practice of activating prior knowledge really results in improved understanding. A study by Brody (1991) showed that students who participated in discussions designed to activate what they knew performed no better than those who read without such preparation. Another study by Dole, Valencia, Greer, and Wardrop (1991) confirmed Brody's findings. Simply activating what students already knew was no better than no prereading instruction at all. What was effective was the teaching of pertinent and important background concepts that were specifically related to the text (Brody, 1994).

Cycle of Learning

There is a cyclical relationship among background knowledge, inferential thinking, and comprehension, as shown in Figure 12.2. Background knowledge improves recall of text content (Recht & Leslie, 1988). It facilitates inferential thinking and

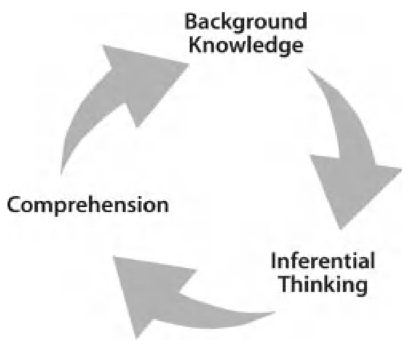

Figure 12.2
Cycle of Learning

a deeper understanding of text. A deeper understanding of text leads to increased background knowledge, and the cycle continues.

Individuals who engage in extensive reading not only increase their vocabularies and their world knowledge, they also increase their expertise with text structures—that is, how facts and concepts are organized into cohesive ''chunks'' of thought such as antecedent/consequence, comparison/contrast, description, response, and time order (B. Meyer, 1982). Adept learners are fluent in their command of text structures; they recognize signal words (*in addition*, *furthermore*, *in contrast*, etc.), and they mentally prepare themselves to store new learning with structure and organization. A thoughtful balance of structure and content permits learners to use their knowledge well. (See Figure 12.3.) They have a systematic database that permits them to recall and apply what they know with sequence and logic.

Vocabulary

In what is a highly contentious field, there is little dispute about the central role that vocabulary plays in reading comprehension. Reading comprehension and vocabulary knowledge enjoy a mutually beneficial relationship, each enhancing the other (Stanovich, 1986).

Vocabulary and Word Recognition

Vocabulary also plays a role in word recognition. In Chapter 10 we saw that vocabulary breadth plays a significant role in the development of phonemic awareness (Metsala, 2011). The larger the vocabulary, the more refined the mechanisms by which children store words in memory; the internal structure of each word is marked, awaiting only to be discovered by children in their language play.

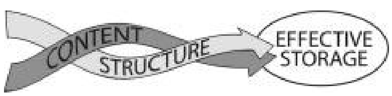

Figure 12.3

Effective Storage in Memory

Expressive vocabulary also plays an important role in visual word recognition (Ouellette, 2006). This role is consistent with Harm and Seidenberg's triangle model of reading (2004), which views word recognition as the product of interactive phonological, orthographic, and semantic processes. Recognition of irregular words is not just a function of phonological processes; it is also a function of our capacity to represent words semantically. The larger our expressive vocabulary, the better we are able to recognize irregular words.

Vocabulary Breadth and Depth

Numerous studies have attempted to quantify vocabulary breadth, or how many words we know (Baumann, Kame'enui, & Ash, 2003; Beck & McKeown, 1991). As discussed in Chapter 9, it is harder to quantify vocabulary depth (*dog* means an animal but also can be used as a verb meaning to follow persistently—dog tired, hotdog etc.). Most tests do not reach into children's brains to identify the many information structures that are associated with a given word. Research by Ouellette (2006) showed a clear relationship not only between the size of an individual's vocabulary and reading comprehension, but also between vocabulary depth and reading comprehension. Kintsch (1998) would agree. The flashlight illuminates so much more when information structures are deep and rich.

Vocabulary and Academic Success

Research abounds on the relationship between vocabulary and academic success (Baumann et al., 2003). Beck and McKeown (1991) estimated that students in first grade present with vocabularies ranging from 2,500 to 26,000 words; college graduate students may have a range of 19,000 to 200,000 words. Beck and McKeown reported on a study by Smith in 1941 who documented a startling fact: High-achieving high school seniors had more than four times as many words at their disposal as their less successful classmates. Smith also reported that low-achieving seniors were attempting to meet grade-level requirements with a vocabulary that was similar to high-achieving third graders.

According to Hirsch (2003), 12th-grade students who perform well on the verbal portion of the SAT know between 60,000 and 100,000 words, a level of achievement that would require students to learn about 15 words per day. If you are thinking back to your various language arts classes and wondering how you acquired so many words in so little time, you may want to consider research by Stahl and Fairbanks (1986) which suggested that about 400 words can be taught in a year, a number that leaves us significantly shy of 15 words per day. (I will let you do the math.) The question then becomes: How is it that students build their vocabularies? It turns out that vocabulary acquisition is a full-time vocation. According to the National Reading Panel (2000), students develop their vocabularies through immersion in an environment that is rich in oral language and in print.

There is a caveat to this conclusion. While no one would deny the importance of oral language as part of this process, it is not sufficient. When most of us speak, we rely on a subset of our total vocabularies, using words that we encounter on a daily basis; common words for common events. In order for children to acquire the type of vocabulary that will be needed for academic success, they need a vocabulary that is more substantial—words that are more specialized and that permit the expression of ideas with greater exactitude, subtlety, and feeling.

By their very nature, these words are encountered less frequently. Not only that, they are generally encountered only in print. According to Hayes and Ahrens (1988), the conversations of college graduates reflect only 17.3 rare words per 1,000, a level that is similar to what children hear on their favorite television shows (20.2 rare words per 1,000). In contrast, the vocabulary found in children's literature (30.9 rare words per 1,000) and adult books (52.7 rare words per 1,000) has the potential to go well beyond what our meager oral fare has to offer.

The more words that we know, the better we are at learning words. Many researchers agree that students at the elementary-grade levels acquire approximately 3,000 words per year (Baumann & Kame'enui, 1991; Beck & McKeown, 1991). They also note that vocabulary growth is related to socioeconomic status so much so that Moats (2001) used the term *word poverty* to describe students who enter school with insufficient verbal experience and knowledge. Research by Hart and Risley (1995) has shown us how important it is to get an early start on vocabulary development. Researchers are still working on how to enrich the vocabularies of students who enter school delayed in their language development. It is not easy to reverse the consequences of Stanovich's (1986) Matthew effects.

Readers have to know more than 90% of the words in a text in order for comprehension to occur (Nagy & Scott, 2000). A thorough knowledge of word meanings permits readers to grasp the gist of the text and then use their inferential thinking skills to discern the meaning of unfamiliar words. Children who are poor comprehenders will have difficulty inferring the meanings of unfamiliar words from context (Cain, Oakhill, & Lemmon, 2004). Readers with limited vocabularies and/or poor decoding skills are at a dual disadvantage; not only will they not understand the text in question, but they lose an opportunity to learn more words. These lost opportunities are soon followed by a loss of self-esteem, confidence, and self-proclaimed indifference to print.

Learning New Vocabulary

Of course, not all words are known with the same depth and precision. Anderson and Nagy (1991) referred to words as "slippery customers" when discussing the path to a rich contextual understanding of word meanings. Word acquisition is an incremental process, necessitating multiple exposures to words in different contexts. According to McKeown, Beck, Omanson, and Pople (1985), it takes as many as 12 encounters with a word to improve reading comprehension. Each encounter serves to advance the reader through four main stages of vocabulary knowledge (Dale, 1965; Dale & O'Rourke, 1986):

1. No clue . . . I have never seen it before.
2. Not sure . . . I think that I have heard it but I am not sure what it means.
3. Hmm . . . I think that it has something to do with . . .
4. Got it. I know and I can use it.

According to Nagy and Scott (2000), there are five important aspects to word knowledge:

1. Incrementality. Words are learned through multiple exposures in a variety of contexts that gradually enrich and deepen our understanding of a word.
2. Polysemy. Words have different meanings, and we use context to determine which meaning is appropriate for a particular usage. Polysemous words pose a particular challenge in the sciences, where their meanings can differ greatly from the meanings encountered in conversational English. We all know what a table is in a kitchen; not everyone knows what a table is in a science text.
3. Multidimensionality: Word knowledge—that is, the information structures that embody what we know about words—cannot be represented in a linear or list format. Types of word knowledge can include morphology, grammatical function, synonyms, antonyms, etymology as well as differences in usage in written and oral language.
4. Interrelatedness. Words are not learned in isolation. Knowledge of a particular word exists within a larger system of semantic relationships much like our solar system in the universe.
5. Heterogeneity. Diverse words require different types of word knowledge. At the very least, we have closed classes of words that, for the most part, do not change in their function or meaning such as prepositions and pronouns. We also have open classes of words whose function and meaning will change over time. The knowledge base required, for example, to understand scientific terminology (ion, plasma, neutrino) is quite different from the knowledge required to understand a pronoun or an article.

Although the five aspects of word knowledge are recognized as important components of a comprehensive vocabulary program, we have yet to see tests of vocabulary that measure the different ways in which we know words. There are tests that require students to point to pictures of words. There are tests that require students to provide synonyms, definitions, or complete analogies. (See Chapter 9.) The ability to recite a definition, however, is not necessarily an indication of an individual's preparedness to actually use a word. Miller and Gildea (1987) found that students often had difficulty using words correctly based on the definition alone, resulting in sentences such as ''The blue chair was usurped from the room'' (p. 98).

How Reading Comprehension Is Assessed

The field of assessment is rife with complaints about reading comprehension tests (RAND, 2002): They do not permit us to determine strengths and weaknesses of individual comprehenders. They do not adequately represent the complexity of true reading comprehension. They confuse the method of assessment with actual reading comprehension. They are narrow in their scope; they are not necessarily tied to the curriculum, and they are not helpful to teachers. I could go on.

Measuring Understanding

Reading comprehension is not easily quantified, and it can be difficult to separate out the factors that contribute to reading comprehension. We are limited by our ability to measure reading comprehension as it unfolds in real time; we can only measure it as a fait accompli, and the very fact that we ask questions to elicit responses may change or alter the way in which the readers think about what they have read. How do we test background knowledge? Can we measure the percentage of information structures that are retrieved per minute? How do we compare and contrast inferences based on anaphora in comparison to those that have their roots in background knowledge? How do we identify the point at which comprehension skills break down? While eye movement studies may tell us about neurological activity, they cannot speak to the quality of the thoughts themselves.

At the very heart of reading comprehension testing lies a problem. Although we may accept the Kintsch construction-integration model as a sound model of what happens when we read, we have not yet really agreed on what it is we want to measure. Should we be measuring an individual's understanding with respect to specific text content, or are we interested measuring the ability to answer questions that reach beyond the text and move into the realm of critical thinking? Is it possible to separate out background knowledge from reading comprehension? Is it even a good idea? Johnston (1984) raised the issue of whether reading comprehension tests can distinguish those with limited background knowledge from those who may do poorly as the result of poor comprehension strategies. The difference, he stated, is important because these students would require different types of remediation.

Reading Comprehension Tests Measure Different Skills

It is important to understand what reading tests actually measure and what they do not. I am not talking about the test descriptions provided by the publishers or even what subtest titles imply. Comprehension tests vary significantly in their processing demands. These demands will differ depending on students' age, skill levels, and disability status (Keenan, Betjemann, & Olson, 2008). Some tests may demand that readers rely more heavily on word recognition and decoding skills. Francis, Fletcher, Catts, and Tomblin (2005), for example, found that cloze (fill-in-the-blank tasks place a higher premium on decoding skills than comprehension tests using multiple-choice questions. Multiple-choice responses, it seems, correlate more with language skill.

There are many different ways to measure reading comprehension, and despite different structure, language, and content, we often treat reading comprehension tests as if they were all the same. Cutting and Scarborough (2006) wisely questioned whether unexpected or divergent results obtained by reading researchers were a consequence of the assessment tools themselves. They described research by Rimrodt, Lightman, Roberts, Denckla, and Cutting (2005) in which a group of children were administered three different measures of reading comprehension. When all was said and done, only 25% of the children identified by any test as having a comprehension deficit were identified by all three tests. Half of the children were identified by a single test alone. Based on this study, Cutting and Scarborough (2006) concluded that educators were duty bound to use multiple reading comprehension measures to determine eligibility for special education and for planning.

Different Tests of Reading Comprehension

As part of our quest to become knowledgeable about different reading tests, it may be helpful to examine how test authors define reading and what they think their respective tests measure. Table 12.1 provides a sample of how different test publishers think about reading comprehension.

Test Factors That Warrant Consideration

Good tests of reading comprehension should provide different types of passages that sample the ability to learn from text containing familiar and unfamiliar information about a variety of topics. The inclusion of multiple passages reduces the odds that a student's score will reflect a disproportionate

Table 12.1 **How Tests Conceptualize Reading: Wit and Wisdom From Test Manuals**

Test/Subtest	Views of Reading and the Purpose of Assessment
Gray Diagnostic Reading Tests—Second Edition (GDRT-2; Bryant, Wiederholt, & Bryant; 2004a)	‘‘The nature of reading is complex and not completely understood. . . . Readers have to accurately relate words to each other and relate sentences to other sentences in order to understand the meaning of the larger text. Obviously, in their search for meaning, readers must constantly relate the text being read to their own background knowledge’’ (GDRT-2; Bryant, Wiederholt, & Bryant, 2004b, p. 1).
Gray Oral Reading Tests—Fifth Edition (GORT-5; Wiederholt & Bryant, 2012a)	‘‘Basic reference sources . . . generally define *reading* as the act by which people grasp the meaning of written or printed characters, words, or sentences (Wiederholt & Bryant, 2012b, p. (1). ‘‘Two steps were taken to address the issue of passage independence with the GORT-5 comprehension questions. First, we eliminated the story prompts. Second, we returned to the open-ended response format for the comprehension items. After the open-ended items were finalized, we examined the passage dependence of the GORT-5 comprehension items . . . ’’ (p. 58).
Gray Silent Reading Tests (GSRT; Wiederholt & Blalock, 2000a)	‘‘Silent reading comprehension requires the ability of individuals to (a) notice, think about, and manipulate sounds of letters and words; (b) generate the fabric that relates words and sentences to each other and to the larger text; (c) monitor the ongoing comprehension of a word, sentence, paragraph, or entire text; and (d) apply their own background knowledge to the text in their search for meaning’’ (GSRT; Wiederholt & Blalock, 2000b, p. 4). ‘‘Obviously most questions should be passage dependent when testing comprehension’’ (p. 62).
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a): Reading Comprehension	‘‘The Reading Comprehension passage items emphasize the ability to extract meaning from a set of related sentences, and deemphasize the measurement of vocabulary level. . . . The KTEA-II passages (like those on the KTEA) do not achieve difficulty by inserting words that are much less familiar than the words in the rest of the passage. Instead, the passages rely on the structure and sequence of ideas, their phrasing, and the sentence syntax to challenge the readers. . . . Expository (nonfiction) and narrative (fiction) passages are represented about equally, with the easier passages tending to be narrative. . . . The decision not to add illustrations to the passages was based on the expectation that pictures might be distracting and might give clues to the answers. . . . the passage questions assess literal and inferential comprehension, with an increasing proportion of inferential questions at higher grades’’ (KTEA-II; Kaufman & Kaufman, 2004b, pp. 58–59).

(*continues*)

Table 12.1 (*continued*)

Test/Subtest	Views of Reading and the Purpose of Assessment
Peabody Individual Achievement Test—Revised; Normative Update (PIAT-R: NU: Markwardt, 1998a): Reading Comprehension	''Reading professionals debate whether the so-called higher comprehension processes may actually be intellectual rather than reading skills. . . . [T]he National Assessment of Educational Process (*National Assessment of Educational Progress*,1981) reports that teaching practices in reading focus on conventional understanding of material rather than other types of comprehension. For these reasons, the PIAT-R tests literal comprehension'' (PIAT-R:NU, Markwardt, 1998b, p. 35). ''The response choices are pictures rather than sentences or questions, thereby avoiding the confounding effect that occurs when the subject must read the response'' (p. 36).
Phonics-Based Reading Test (PRT; Brownell, 2002a): Comprehension	''Reading is a multifaceted process. While the PRT assesses an important subset of skills that contributes to effective reading, there are many aspects of reading that are not specifically evaluated. These skills include phonological awareness, prior knowledge, vocabulary, reasoning, and the use of metacognitive strategies''(PRT; Brownell, 2002b, p. 10).
Test of Reading Comprehension—Fourth Edition: (TORC-4; Brown, Wiederholt, & Hammill, 2009a): Text Comprehension	''The TORC-4 subtests were built to measure word identification and contextual meaning as opposed to more theoretical aspects of reading comprehension, such as predicting, inferring, and summarizing'' (TORC-4; Brown, Wiederholt, & Hammill, 2009b, p. 2). ''Reading tests are often given under standardized, timed conditions, and their purpose is to yield specific information. It is a waste of time to read the passage first. Good readers and good test takers already know this strategy and therefore have an advantage over poor readers and test takes who ''follow the directions'' explicitly. . . . Another reason for building this test taking strategy into the subtest is its consistency with real-life situations'' (pp. 43–44).
Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009): Reading Comprehension	''The Reading Comprehension subtest measures literal and inferential reading comprehension skills using a variety of passage and question types that resemble those used in a school setting''(WIAT-III: Breaux, 2009a, p. 38). ''This subtest design differs in part from the designs of other reading comprehension tests, and it enables students who are reading below grade level to demonstrate reading comprehension skills on passages at a lower readability level, controlling for potentially confounding weaknesses in word identification and vocabulary knowledge. The results indicate whether the student needs intervention to address weaknesses in reading or language comprehension skills apart from weaknesses in other reading-related areas'' (pp. 38–39).

Table 12.1 (*continued*)

Test/Subtest	Views of Reading and the Purpose of Assessment
Woodcock-Johnson III (WJ III ACH; Woodcock, McGrew, & Mather, 2001a): Passage Comprehension	''Some tests of reading comprehension are actually tests of information processing that happen to use reading as the medium of communication. Asking a subject to study a passage and then answer questions about the content, such as to state the author's purpose or to predict what may happen next, does not tap skills specific to reading. It taps language processing and cognitive skills. These are valid skills in their own right, regardless of the medium of communication. . . . However, scores from such tests do not measure the essence of the medium of comprehension, but instead reflect performance on a confounded language-processing task with indeterminate diagnostic results'' (WJ III; Mather & Woodcock, 2001b, pp. 80–81).

amount of background knowledge. Many test authors go to great lengths to identify topics that are somewhat exotic in nature in an effort to minimize the effects (positive and negative) of background knowledge on text performance (Johnston, 1984).

In addition to issues related to test format—that is, how we ask the reading comprehension questions—there are factors that are patently difficult to compare unless we resort to the arsenal of tools that linguists carry in their back pockets. These factors go well beyond what readability indexes can tell us. (See Chapter 13.) Texts within tests differ in their sentence and passage length, density of ideas, vocabulary selection, inclusion of abstract and figurative language, and inferential thinking demands.

We all like a test that is quick and efficient. Evaluators with large caseloads understandably might find the prospect of a reading test with short passages to be attractive. Research by Keenan et al. (2008), however, indicated that short passages assess decoding skill more than actual comprehension. They noted, for example, that failure to recognize one word on a cloze item of the WJ III Passage Comprehension test can lead to fallacious responses. The PIAT-R: NU Reading Comprehension subtest, also known for its brevity, uses a multiple-choice format. The multiple-choice responses, however, do not assess comprehension per se but rather the ability to decode visually similar words in context: *Did he go to a minister or to a minstrel?*

The saga of the Gray Oral Reading Tests, Fourth Edition (GORT-4; Wiederholt & Bryant, 2001a) illustrates some of the challenges that test authors face when designing reading comprehension tests. Over the years, many evaluators have found the results of the GORT-4 to be contrary to what common sense would dictate. It was not unusual, evaluators complained, for students to continue answering comprehension questions long after their oral reading had deteriorated into an endless stream of repetitions, omissions, substitutions, and words that were abandoned midsyllable. If decoding skills were so important, how then could the GORT-4 results be explained?

According to Keenan et al. (2008), decoding skills on the GORT-4 actually played a very small role in how well students were able to answer the multiple-choice comprehension questions. According to Keenan and Betjemann (2006), the answer was twofold. The first was that the questions were read to the student, resulting in the oft-heard cry ''So that's what that word is!'' The second was that, despite the authors' claim, many of the GORT items were passage independent. They could be answered without reading the passages.

According to Pearson and Hamm (2005), passages about everyday concerns or common topics in school are particularly vulnerable in this regard. Read and answer the next question:

How did Johnny feel when he finished his school project?
(a) Happy (b) Sad (c) Bored (d) Proud

If we are socially savvy, we know what teachers want to hear. *Proud* becomes the best answer because students who are invested in their work are proud of their academic accomplishments. Keenan and Betjemann's research led them to conclude that the GORT was not measuring decoding skills but background knowledge and verbal reasoning ability.

The GORT-4 has now been revised, and the Fifth Edition has discontinued the use of multiple-choice questions and questions that are independent of the text. Lest we be tempted to single out and chastise the authors of the GORT-4, Tuinman's study (1973–1974) of five major reading tests indicated that there was no guarantee that students were actually responding to comprehension questions based solely on passage content. Those of you looking for entertainment might want to try your favorite tests at home to see how you do. No peeking!

Different Types of Questions

Not all students demonstrate their understanding in the same way. The differences in how children respond to questions can help us understand their profiles as learners. When assessing reading comprehension, it is important not to confuse expressive language demands with the ability to understand text. Let us look at some of the ways that comprehension is assessed.

The *cloze procedure* was originally developed in the 1950s by Wilson Taylor (1953), who sought to reduce the subjectivity that he believed was inadvertently introduced into standardized tests. There are two types of cloze procedures: The strict cloze procedure requires readers to fill in the missing word at regular intervals; a modified cloze procedure refers to text in which words are omitted randomly or according to some other, often undefined, criteria.

The research on cloze procedures is mixed. There is concern that cloze reading is not like typical reading (Ashby-Davis, 1985). Word omissions result in decreased reading speed and constrained eye movements; readers must resort to atypical strategies in their efforts to determine the missing word(s). Some think that cloze procedures can be used to measure higher-order thinking skills "if a rational deletion procedure is followed" (Bachman, 1982, p. 67). Others disagree, noting that they may actually measure the linguistic predictability of a given text (Pearson & Hamm, 2005). McGrew (1999) has suggested that "all cloze tests may not be created equal" (p. 23), adding that there is no set criteria for removing words.

According to Shanahan, Kamil, and Tobin (1982), cloze tasks measure sentence-level skills. An interesting addendum to the Kintsch and Yarborough study (1982) reminds us of the importance of selecting assessments with forethought and planning. Because the cloze procedure only measures understanding at the microstructure or sentence level, it is not sensitive to differences in comprehension that would result from texts with explicitly stated rhetorical devices and those that are just plain inconsiderate (Armbruster, 1984). Most cloze procedures do not measure skill with coreferences (pronouns, synonyms, and repeated nouns) or the ability to identify important concepts and themes in contrast to less relevant detail. If the referral questions provided for your student reflect concern regarding inferential thinking, the cloze procedure is not for you.

Cloze tasks also place a premium on expressive language skill. Students with a poor grasp of syntax may struggle with the syntactic analysis required to determine the correct part of speech. On a similar note, students with word retrieval challenges may understand the passage but fail to come up with the exact word needed to do the trick. The cloze procedure is a highly unforgiving method of testing reading comprehension as only the perfect word will do.

Mazes are popular because they can be administered to groups of students. They require that students select one of three to five options to fill in a missing word in a sentence. Similar to their predecessor, the cloze procedure, maze tasks are thought to be confined by sentence boundaries (Parker, Hasbrouck, & Tindal, 1992). Researchers have found that students can perform well on cloze and maze tasks even when the sentences have been scrambled and their content is disorganized (Cain & Oakhill, 2006).

Maze tasks fall into the realm of multiple-choice questions. They provide a number of possible responses that are selected based on three parameters: meaningfulness, relatedness, and part of speech. Incorrect options (known as distracters) that are meaningful and grammatically compatible are more challenging than those that are nonsensical or that offer an incorrect part of speech. The number of distracters is important. When there are only two distracters, students can achieve a score of 33% by guessing alone (Parker, Hasbrouck, & Tindal, 1992). Most tests provide three distracters for this reason.

True/false sentence recognition tasks require students to respond to yes/no questions based on passages read. This type of response requires no expressive language skill. It is limited in the type of comprehension assessed. Because the inferences would have to be stated explicitly, this format does not support the assessment of inferential thinking.

Multiple-choice tasks require students to read and compare three or more responses based on the passage presented, and select the best option. They are appealing to evaluators because they are easy to score. Multiple-choice questions can be a good option for students with expressive language challenges. They do require that students compare and contrast the options presented which can be a challenge for those with limited working memories. As noted previously, the number of foils is important. Too few, and the odds work in the favor of students who are simply good at eliminating one option and guessing.

Multiple-choice formats are often criticized for inadvertently encouraging guessing and for creating an environment that permits students to get an answer instead of actually reading and considering the text (Farr, Pritchard, & Smitten, 1990). They are also criticized for their one-size-fits-all responses that do not necessarily recognize divergent thinking. J. O. Willis (personal communication, February 21, 2006) has commented that, in his experience, multiple-choice questions have the potential to lead astray children who would never have thought of the erroneous responses on their own.

Open-ended formats require students to formulate a verbal response as an indication of their understanding. This type of response is not as easy to score as the other formats. Sometimes acceptable criteria are not well explained and evaluators have to use their own verbal thinking skills to determine credit. From an assessment perspective, open-ended responses are valuable because they provide a clear window into the critical thinking abilities of students and their ability to formulate a cogent well-organized answer. This type of response places students with expressive language challenges at a clear disadvantage (Bishop & Adams, 1990). A list of reading comprehension tests and subtests is shown in Table 12.2.

Suggestions for Assessing Reading Comprehension

The following suggestions will help you in your efforts to administer and interpret tests of reading comprehension:

1. Know as much as possible about your student and referral questions prior to selecting comprehension tests. Make sure that you are testing comprehension and not expressive language skill alone.
2. Use more than one measure of reading comprehension. Understand what each measure has to offer. Be prepared to offer an informed opinion regarding why scores might differ.
3. Select tests with longer passages for middle school or high school students when referral concerns indicate difficulty with lengthy text.
4. Write down responses to test items verbatim. Although responses are generally scored for content only, it is your job as evaluator to interpret information—including everything that happens—and not look only at the scores. Your notes make it possible to document challenges (or strengths) in expressive vocabulary, word retrieval, sentence formulation, grammar, and organization.

Table 12.2 **Reading Comprehension Tests and Subtests**

Tests/Subtest	Word Meaning	Reading Comprehension	Listening Comprehension	Comments
Diagnostic Assessments of Reading—Second Edition (DAR-2; Roswell, Chall, Curtis, & Kearns, 2005) Grades: 1/2–11/12		Silent Reading Comprehension Grade levels 1–2/2: rating based on oral response to story that is scored as poor, fair, or good. Grade levels 3–11/12: answering multiple-choice questions based on passages read.		Associated with instructional program: Trial Teaching Strategies (TTS). Two forms.
Gray Diagnostic Reading Tests—Second Edition (GDRT2; Bryant, Wiederholt, & Bryant; 2004a) Ages: 6–13	Reading Vocabulary Level 1: pointing to words matching pictures. Level 2: selecting 2 of 5 words that are opposites	Meaningful Reading Level 1: book conventions. Level 2: filling in missing words in sentences when provided with the initial letter(s).	Listening Vocabulary: pointing to 1 of 4 pictures that illustrates an orally presented word	Modified cloze procedure based on three-cueing system, an approach not substantiated by research. Floor is limited on core subtests below age 8; floor is limited on supplementary subtests below age 11. Two forms.
Gray Oral Reading Tests —Fifth Edition (GORT-5;Wiederholt & Bryant, 2012a) Ages: 6–23		Responding to open-ended questions based on passages read aloud.		Questions are read to the student. Evaluator may provide up to 20% of words, potentially elevating Comprehension score. Two forms.
Gray Silent Reading Tests (GSRT; Wiederholt & Blalock, 2000a) Ages: 7–25	No	Multiple-choice questions focus on literal, inferential, critical, and affective content.	No	Designed as an adjunct to the GORT. Questions are not necessarily text dependent. Children with poor tracking and ocular-motor deficits should be watched carefully to ensure that they are working in the correct story box and on the correct item. Two forms: Floor is limited on both forms. Ceiling is limited on Form A.

Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Ages: 6–25 Grades: 1–12	Reading Comprehension: reading words and pointing to matching pictures, following written directions, and responding to literal and inferential questions based on passages read. Arranging sentences into coherent paragraph and answering the questions	Listening Comprehension: Listening to passages played on a CD and answering literal and inferential questions	A variety of open-ended and multiple-choice questions. Offers comparison of literal and inferential responses. Two forms.
Peabody Individual Achievement Test—Revised (NU) Reading Comprehension (PIAT-R: NU; Markwardt,1998a) Ages: 5–18 Grades: K–12	Reading Comprehension: choosing 1 of 4 pictures that best illustrates a passage from memory		Unique format for assessing comprehension. Passages are brief, and picture format does not lend itself to inferential questions. Strong word recognition component.
Phonics-Based Reading Test (PRT; Brownell, 2002a) Ages: 6–12		Comprehension: open response questions based on controlled passages that are read aloud	Literal questions that are not necessarily text dependent.
Phonological Awareness Literacy Screening (PALS; Invernizzi, Meier, & Juel, (2003–2011) Grades: 1–3		Oral Reading in Context: multiple-choice questions that are read by the teacher for primer and 1st-grade passages; students read 2nd- through 6th-grade passages. They read the questions for themselves.	Criterion-referenced assessment. Appropriate for screening. Part of the Virginia Early Reading Initiative. Two forms.

(*continues*)

Table 12.2 *(continued)*

Tests/Subtest	Word Meaning	Reading Comprehension	Listening Comprehension	Comments
Test of Early Reading Ability —Third Edition (TERA-3; Reid, Hresko, & Hammill; 2001) Ages: 3-6 through 8-6			Meaning: measures comprehension of words, sentences, and paragraphs as well as relational vocabulary, sentence construction, and paragraphing	Beginning items include popular logos as well as words with pictures. Floor effects for younger children; ceiling effects for older children. Two forms.
Test of Reading Comprehension —Fourth Edition (TORC-4; Brown, Wiederholt, & Hammill, 2009a) Ages: 7–17	Relational Vocabulary: reading and selecting 2 of 4 words that are related to 3 target words	Sentence Completion: reading a sentence and selecting a word pair that best completes the sentence. Paragraph Construction: rearranging sentences in logical order. Text Comprehension: answering multiple-choice passages based on passages	NO	Text Comprehension subtest has longer passages. The subtest measures the ability to scan for specific information. Students read the questions prior to reading the passages.
Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009) Ages: 6–19 Grades: K–12		Reading Comprehension: measures literal and inferential comprehension through a variety of passages and question types	Listening Comprehension (PK–12) consists of 2 components: Receptive Vocabulary: pointing to pictures of orally presented words. Oral Discourse Comprehension: responding to questions based on orally presented sentences and passages	Exercise extreme caution in interpreting out-of-level scores. This subtest permits students reading below grade level to demonstrate comprehension on passages written at a lower readability, ''controlling for potentially confounding weaknesses in word identification and vocabulary knowledge'' (p. 39).

Wide Range Achievement Test—Fourth Edition (WRAT-4; Wilkinson & Robertson, 2006) Ages: 5–94 Grades: K–12		Sentence Comprehension: filling in missing words in sentences		Should not be used as the only comprehension test. Two forms.
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+	Reading Vocabulary: reading words and providing synonyms, antonyms, and completing analogies	Passage Comprehension: matching rebuses with a picture, pointing to a picture, pointing to pictures representing phrases, and filling in the missing word in a passage	Oral Comprehension: filling in the missing word in an audio-recorded passage	This comprehension test should not be used as the only measure of comprehension particularly with older students; the modified cloze procedure measures sentence comprehension only.
Woodcock Reading Mastery Tests—Third Edition (WRMT-III; Woodcock, 2011) Ages: 4-6 through 79 Grades: K–12	Word Comprehension: reading words and providing synonyms, antonyms, and completing analogies	Passage Comprehension: filling in the missing words in a passage	Listening Comprehension (Grade 1–Adult): pointing to pictures of sentences presented orally by the examiner and responding to questions based on passages presented by CD	This comprehension test should not be used as the only measure of comprehension particularly with older students; the modified cloze procedure measures sentence comprehension only.

5. Students who answer questions by reading word for word from the text may be attempting to compensate for their lack of understanding. Some students have found that a strategy of locating and reading phrases with words from the questions can be successful even when they have little understanding of what they are reading.
6. Record all reading related behaviors. Is your student reading silently or orally? What about his or her attitude and level of activity? Some children have to concentrate so hard that they become restless and squirmy. Children who are busy with their bodies cannot concentrate on what they are reading.
7. Document whether your student finds it necessary to reread passages and search for answers. Remember that rereading passages is not necessarily a bad thing. We do not know to what degree rereading is typical or atypical.
8. Children earning the same low scores on measures of comprehension may have very different weaknesses that warrant different types of remediation. Students who cannot access text content for any reason, whether it is phonological, orthographic, syntactic, or semantic, will not be able to develop a coherent situation model.
9. Do not confuse the understanding of meaning with poor decoding skills. Performance on a test such as the Test of Reading Comprehension—Fourth Edition (Brown, Wiederholt, & Hammill, 2009a), for example, measures actual comprehension skills only to the extent that students can read the words.
10. Be sure to consider the association between reading comprehension deficits and oral language impairments. Language problems are both a cause of reading problems and a consequence of them (Catts & Kamhi, 1999). Whenever there are questions regarding the role of oral language skills in reading, run, do not walk, to the nearest speech and language pathologist. A good speech and language pathologist can help team members understand how the demands of academic language can affect a student's receptive and expressive language abilities.
11. Think carefully about students with suspected deficits in inferential thinking.
    a. Review past cognitive testing. Children who do not actively compare what they know to new learning may be struggling with a weakness in working memory (Crain & Shankweiler, 1988; Perfetti & Lesgold, 1977).
    b. Consider background knowledge. Inferential thinking presumes that children have background knowledge to draw on. Children who come to the classroom without background knowledge do not have the tools with which to think inferentially because they have little to compare and contrast (Kintsch, 1988).
    c. Think about metacognitive abilities. Some children are not ''aware'' of the need to think critically (Cain and Oakhill, 1999). These students require direct instruction and modeling of higher-level thinking skills. What is generally a covert internal process needs to become overt and discernible.

Instructional Implications and Recommendations

The suggestions below will help you ensure that your recommendations for students in need of reading comprehension will be in keeping with best practices:

1. Consider the interconnectivity of language and decoding skills when contemplating instruction

in the five core elements of reading (National Reading Panel, 2000). While programs that address decoding and fluency may be essential for those needing them, on their own, such programs do not work to bridge gaps in vocabulary (Hirsch, 2001).

Research by Hayes and Ahrens (1988) strongly suggested that students who engage in extensive reading will have the best prospects for vocabulary acquisition. Not all students are able, however, to benefit from extensive reading alone; many children are weak at inferring the meanings of unfamiliar words from context (Cain et al., 2004). Students who lack access to text and/or have weak vocabularies will require additional focused directly taught instruction in word meanings and word learning strategies (National Reading Panel, 2000).

The National Reading Panel (2000) recommended opportunities for direct instruction in word meanings as well as opportunities for incidental learning through wide reading. The panel did not recommend one method as being superior over others but recommended a variety of methods that include teaching synonyms, words with multiple meanings, and teaching words for new and unfamiliar concepts. Graves (2000) recommended that students also be taught independent word learning strategies, such as learning to use context cues, working with a dictionary, and analyzing the meaningful parts of words. Research by Biemiller and Slonim (2001) indicated that the study of root words is also an efficient and effective way of increasing vocabulary knowledge in students. According to Nagy, Anderson, Schommer, Scott, and Stallman (1989), about 60% of words in text can be broken into roots, prefixes, and suffixes.

One of the best sources on vocabulary instruction is *Bringing Words to Life: Robust Vocabulary Instruction* by Beck, McKeown, and Kucan (2002). In it the researchers provide important information on how to select vocabulary words for study as well as direct instruction and ''making the most of natural contexts'' (p. 102).

2. Think carefully about recommending strategies for reading comprehension. According to Willingham (2006–2007), ''If comprehension processes can't do the job, reading strategies won't help much'' (p. 44). Hirsch (2003) said that the ability to determine the main idea of a passage is not the result of strict adherence to a strategy but rather the ability to understand what the text says. This understanding requires background knowledge, and no amount of direct instruction in strategies can compensate for a fundamental lack of vocabulary and/or world knowledge.

Hirsh's perspective on the importance of acquiring knowledge instead of strategies as a foundation for reading comprehension has been echoed by McKeown, Beck, and Blake (2009), whose study found the students who focus on text content instead of strategies for thinking about text content were more apt to perceive connections between ideas such as cause and effect, motivation, and consequence. A content approach to comprehension encourages readers to build a coherent situation model of a text (Kintsch & van Dijk, 1978).

According to the National Reading Panel (2000), strategies that have been found to be effective include comprehension monitoring, question generation and answering, graphic organizers, summarization, cooperative learning, story structure, and the use of multiple strategies. Willingham (2006–2007) stated that there was little evidence to support the use of strategy instruction for students in the third grade or lower; these students are still learning how to read, and they do not have the cognitive overhead available to decode text, comprehend, and implement strategies at the same time.

Case Study: Tammy

The case study in Table 12.3 illustrates how knowledge of the processes that contribute to comprehension can be used to interpret findings and make recommendations.

Tammy, age 13, was referred for evaluation in order to document her current skill levels and obtain recommendations for instruction. Tammy was identified as having a speech and language impairment when she was 4 years of age. She has received speech and language therapy since that time.

A review of Tammy's background history shows that speech and language milestones were delayed. There was no documented history of hearing loss, and Tammy's vision with glasses was within normal limits. Tammy's health has always been good.

Tammy was described as a good decoder and speller. Computational skills were grade appropriate. Her math reasoning abilities, however, were poor—thought to be a consequence of weak verbal reasoning and language skills. Now that Tammy was in seventh grade, she was experiencing increased difficulty in language arts, social studies, and science. Her favorite classes were art and physical education; she aspired to be a famous artist. Until this year, Tammy typically received grades of B and C. This year her language arts grade had fallen to a D. Tammy struggled with homework, and her parents noted that she just ''doesn't get it.'' The content of her writing was young, and many of her sentences were not grammatically correct. Handwriting and spelling were good.

A review of Tammy's cognitive testing reflected significant and unusual differences between her verbal abilities, her perceptual reasoning and processing speed. For this reason, the evaluator did not provide a Full Scale IQ; it would have provided no useful or helpful information. After much consideration, the team decided that Tammy's ability to learn was best represented by her visual-spatial and visual-motor abilities. According to the opinion of the team, Tammy should have been functioning academically in the average range if not higher. Tammy was sent for an audiological evaluation which confirmed that her hearing was normal.

Tammy's performance on the KTEA-II Listening Comprehension subtest (SS = 80, 9th percentile rank) was consistent with teacher reports that Tammy was often confused during classroom discussions and that she had difficulty following oral directions. This score was also consistent with Tammy's performance on the KTEA-II Reading Comprehension subtest (SS = 78, 7th percentile rank) and the WIAT-III Reading Comprehension subtest (SS = 83, 13th percentile rank). Given the importance of oral language in reading, team members decided that they wanted (and needed) to know more.

Historically, Tammy had always performed well on measures of word recognition and word attack. No concerns were expressed about her reading skill until fourth grade, at which time her teacher noted difficulty determining the main idea and supporting details. Tammy was urged to read more over the summer. During this evaluation, Tammy performed well on the KTEA-II Letter & Word Recognition subtest (SS = 98, 45th percentile rank) and the KTEA-II Nonsense Word Decoding subtest (SS = 97, 42nd percentile rank). Her skill in Spelling was also good (SS = 96, 39th percentile rank). An analysis of these skills suggested a solid grounding in the rules of phonics.

Oral Reading Fluency on the WIAT-III was reduced (SS = 83, 13th percentile rank); Tammy's reading was accurate (SS = 95, 37th percentile rank) but slow (SS = 85, 16th percentile rank); Tammy had been doing repeated readings in the classroom with the hope of improving her reading speed. On the Comprehensive Test of Phonological Processing, Tammy demonstrated good Phonological Awareness (SS = 97, 42nd percentile rank) and Rapid Naming (SS = 97, 42nd percentile rank); Phonological Memory was weak (SS = 79, 8th percentile rank).

The team decided to turn its attention to Tammy's oral language skills. Receptive vocabulary (PPVT-4 SS = 90, 25th percentile rank) and expressive vocabulary (EVT-2 SS = 93, 32nd percentile rank) reflected age-appropriate skill.

Case Study: Tammy (Continued)

Table 12.3 **Tammy, Age 13 years, Grade 7**

Tests and Subtests	SS/ss	%ile	Sta9	95% Conf. Band
Wechsler Intelligence Scale for Children—Fourth Edition (WISC-IV)				
WISC-IV Verbal Comprehension Index (S V C)	77	06	2	72–85
WISC-IV Similarities (S)	6	09	2	4–8
WISC-IV Vocabulary (V)	7	16	3	5–9
WISC-IV Comprehension (C)	5	05	2	3–7
WISC-IV Working Memory Index (DS LNS)	80	09	2	74–89
WISC-IV Digit Span (DS)	7	16	3	5–7
WISC-IV Letter Number Sequencing (LNS)	6	09	2	4–8
WISC-IV Perceptual Reasoning Index (BD PC MR)	104	61	6	96–111
WISC-IV Block Design (BD)	12	75	6	10–14
WISC-IV Picture Concepts (PC)	9	37	4	7–11
WISC-IV Matrix Reasoning (MR)	11	63	6	9–13
WISC-IV Processing Speed Index (CD SS)	97	42	5	88–106
WISC-IV Coding (CD)	9	37	4	7–11
WISC-IV Symbol Search (SS)	10	50	5	8–12
WISC-IV Full Scale IQ	NP	NP	NP	NP
Peabody Picture Vocabulary Test—Fourth Edition	90	25	4	83–98
Expressive Vocabulary Test—Second Edition	93	32	4	85–102
Comprehensive Test of Spoken Language (CASL)				
CASL Synonyms	92	30	4	84–100
CASL Grammaticality Judgment	85	16	3	75–95
CASL Syntax Construction	78	08	2	65–91
CASL Grammatical Morphemes	81	10	2	77–85
CASL Syntactic Composite	80	09	2	73–87
CASL Nonliteral Language	82	12	3	72–92
CASL Meaning from Context	80	09	2	71–89
CASL Inferences	79	08	2	68–90
CASL Supralinguistic Composite	81	10	2	73–89
CASL Pragmatic Judgment	90	25	4	76–104

(*continues*)

Case Study: Tammy (Continued)

Table 12.3 (*continued*)

Tests and Subtests	SS/ss	%ile	Sta9	95% Conf. Band
Comprehensive Test of Phonological Processing (CTOPP)				
CTOPP Memory for Digits	7	16	3	3–11
CTOPP Nonword Repetition	6	09	2	2–10
CTOPP Phonological Memory Composite	79	08	2	72–86
CTOPP Elision	9	37	4	7–11
CTOPP Blending Words	10	50	5	8–12
CTOPP Phonological Awareness Composite	97	42	5	92–102
CTOPP Rapid Digit Naming	10	50	5	8–12
CTOPP Rapid Letter Naming	9	37	4	7–11
CTOPP Rapid Naming Composite	97	42	5	92–102
Kaufman Test of Educational Achievement—Second Edition				
KTEA-II Listening Comprehension	80	09	2	69–91
KTEA-II Letter & Word Identification	98	45	5	93–103
KTEA-II Nonsense Word Decoding	97	42	5	90–104
KTEA-II Decoding Composite	97	42	5	93–101
KTEA-II Reading Comprehension	78	07	2	69–87
KTEA-II Written Expression	74	04	2	61–87
KTEA-II Spelling	96	39	4	88–104
KTEA-II Written Expression Composite	84	14	3	76–92
Wechsler Individual Achievement Test—Third Edition (WIAT-III)				
WIAT-III Reading Comprehension	83	13	3	72–84
WIAT-III Oral Reading Fluency	83	13	3	76–90
WIAT-III Oral Reading Accuracy	95	37	4	82–108
WIAT-III Oral Reading Rate	85	16	3	78–92

SS = standard score, %ile = percentile rank, sta9 = stanine, conf. band = confidence band, NP = not provided

Case Study: Tammy (Continued)

Tammy also demonstrated an age-appropriate command of synonyms as measured by her performance on the Comprehensive Assessment of Spoken Language (SS = 92, 30th percentile rank). Tammy's scores on the WISC-IV Similarities subtest (ss = 6, 9th percentile rank) suggested difficulty with higher-level categorization skills; WISC-IV Vocabulary definitions (ss = 7, 16th percentile rank) were remarkable for their lack of depth and focus on less important aspects of word meaning.

Syntax was revealed to be a significant weakness for Tammy. Her score on the CASL Syntactic Composite (SS = 80, 9th percentile rank) suggested a challenge in sentence formulation, modal tenses, and the passive voice. Tammy had great difficulty with grammar; she did not demonstrate an awareness of how word endings were used to modify word meaning. The cognitive evaluator noted that Tammy's performance on the WISC-IV Comprehension subtest, in which Tammy responded to ''why'' or ''what would you do'' questions, was remarkable for reformulations, fragmented responses, and poor grammar. The very same challenges were evident in Tammy's performance on the KTEA-II Written Expression subtest; Tammy did not successfully complete tasks requiring that she combine facts into sentences. Her summary contained many simple sentences, sentence fragments, and awkward constructions.

Tammy also performed poorly on measures of higher-level language skill. She demonstrated a concrete style of language processing (Nonliteral Language SS = 82, 12th percentile rank), and she did not demonstrate the ability to read between the lines and draw conclusions based on her background knowledge or the information provided (Inferences SS = 79, 8th percentile rank and Meaning from Context SS = 80, 9th percentile rank). Her understanding of Pragmatics (SS = 90, 25th percentile rank) was good. Tammy's parents indicated that Tammy had many friends but that they were typically younger than she.

The team decided to identify Tammy as having a specific learning disability in reading comprehension, reading fluency, and written expression due to processing deficits in working memory and phonological memory. They noted that Tammy would require specialized instruction and they set about revising her individualized education plan (IEP) in order to address her reading comprehension challenges from an oral language perspective. It was agreed that the speech and language pathologist, the reading specialist, and the language arts teacher would work together on Tammy's goals. Goals were written to focus on syntax (oral and written), abstract and figurative language, and inferential thinking skills. As part of her work in syntax, Tammy would be taught to chunk words into meaning units (phrases and clauses). This effort would be carried over into her fluency training. Improved skill with meaningful groups of words would manifest itself into faster processing of text content and a potential increase in reading fluency. The team noted how important it would be to preteach all new vocabulary and concepts. All teachers would receive training with the speech and language pathologist to increase their awareness and understanding of language issues that might affect Tammy's performance in class.

Conclusion

At this point, no one instrument is capable of answering all of our questions about why students fail to comprehend. The lack of consensus over what comprehension is and how it should be measured has resulted in a marketplace that offers no clear standard for how we should assess reading comprehension. Comprehension is a complex entity and the situation model will be a function of decoding and language skill as well as factors that relate to the purpose and the structure of the text. According to Duke (2005), our ability to measure an individual's true skill in reading comprehension will be dependent on our knowledge of the processes that contribute to comprehension as well as our grasp of what makes particular assessment tools psychometrically sound.

Review Questions

1. You have received a referral on a seventh grader that cites difficulty with reading comprehension. You have been provided with a file containing recent testing that suggests age-appropriate word recognition and reading fluency, good reading vocabulary, and what appears to be good skill on a reading comprehension test using a modified cloze procedure. According to the classroom teacher, this student does not remember what she reads in her textbooks. What are your thoughts?
2. Several students in the second grade have been identified as having a learning disability in reading comprehension. Their IEPs contain several goals related to strategies for determining the main idea and supporting details. How would you address the inclusion of these goals? What would you suggest?
3. You are working with a novice teacher who spends a significant amount of time during her reading lesson activating prior knowledge. This activation entails, for the most part, asking the students what they know about the topic at hand. How might you aid this teacher to use her time more effectively?
4. Howard has been described as a ''concrete leaner.'' Until now (fourth grade), he has performed adequately on measures of reading comprehension. Now that texts are becoming more abstract in their content, he is struggling more with abstract and figurative expressions and content that is not directly stated. What skills do you question, and what type(s) of testing might you suggest?
5. Elaine has been diagnosed as being on the autistic spectrum; her decoding skills are good, but she struggles with reading comprehension. Speech and language testing suggests adequate vocabulary and syntax and poor skill with pronouns, abstract and figurative expressions, and inferential thinking. Elaine does not demonstrate an understanding of others' feelings and motivations. Do you need more reading testing? How would you design her reading comprehension instruction?
6. In a recent evaluation that was conducted over the course of 2 days, Sheryl performed well on a multiple-choice reading comprehension test and quite poorly on an open-format test. The team suggests that it was a matter of a ''good day'' versus a ''bad day.'' While this may certainly be the case, what other thoughts might you entertain?
7. Todd earned a score well above the average range on the Gray Oral Reading Tests, Fourth Edition. His Fluency score, however, was well below that of his peers. The team believes that his strong background knowledge and language ability are compensating for his word recognition challenges and that all is well. What do you think?

Informal Inventories and Readability

Chapter 13

Introduction

Although standardized, norm-referenced tests provide information regarding how students perform relative to their peers, they may not provide the data needed for the development of lesson plans. As a result, many teachers turn to informal reading inventories (IRIs) for what is considered to be a more up-close, personal, and authentic take on reading behaviors and skills.

IRIs offer the potential to examine a student's appreciation and understanding of narrative and expository text as well as the ability to read passages of greater length. The IRI examiner can often detect the love (or dread) of reading for pleasure and reading for purpose. Some authorities believe that IRIs are essential for diagnostic teaching (P. Cunningham, 1977; L. Fuchs, Fuchs, & Deno, 1982). Others vehemently disagree, citing IRIs as an area of assessment plagued by poor standards and an apparent indifference to issues of reliability and validity (Klesius & Homan, 1985; Spector, 2005).

This chapter focuses on the nuts and bolts of informal reading inventories as well as their strengths and weaknesses. In addition to examining commercially available reading inventories, we look at issues related to miscue analysis, running records, and readability.

What Informal Reading Inventories Are

IRIs are frequently recommended as a supplement to classroom instruction and standardized testing (Caldwell, 2002; Gunning, 1952; McKenna & Stahl, 2009). IRIs typically consist of a series of word lists and narrative and expository passages that are followed by a series of questions or an opportunity to retell the passages in one's own words. Some teachers develop their own IRIs based on instructional materials; they may tailor IRIs to match the interests of their students. Others buy published inventories. In either case, teachers draw conclusions, sometimes subjective, regarding the level of text that is appropriate for oral and/or silent reading tasks. As part of that decision-making process, teachers make determinations regarding vocabulary, background knowledge, critical thinking skills, motivation, and the ability to use strategies. Interpretation is aided by the use of running records and/or miscue analysis. With this information in hand, many teachers feel prepared to differentiate instruction.

Much of the information and research on IRIs is distributed in sources that are used primarily by teachers, such as the journal *The Reading Teacher*. In the mid-1930s Emmett Betts (1936) saw potential in the use of classroom materials to evaluate reading skill. Betts sought to develop a teacher-friendly framework for judging the reading needs of individual students. This framework, he believed, had certain advantages over standardized testing. It was inexpensive and easy to administer and interpret; there was no need for manuals or additional expertise. Teachers would not have to wait for results to be provided by a busy evaluator; control would be theirs. In the end, teachers could be sure that they were actually measuring what they were teaching.

Levels of Reading Skill

Betts (1946) created a hierarchical system with three levels (*independent, instructional,* and *frustration*) for the classification of reading skill. These levels were to provide important information regarding the readability of texts to be used for instruction. According to Betts, independent reading should be based on text that posed relatively few decoding or comprehension challenges to the reader; the *independent reading level* was the highest readability level that students could manage without instruction or assistance and learn new content on their own. Betts proposed that directed reading activities (reading lessons) be based on text capable of inspiring and challenging young readers to attain a higher degree of reading competency. The *instructional level* became the highest level at which a student could read with the assistance of a teacher or tutor. (If you are thinking about Vygotsky's zone of proximal development as discussed in Chapter 2, give yourself a pat on the back.) Betts defined the *frustration level* as the lowest level of text that would exceed a student's tolerance for challenge, resulting in protestations of ''No matter how much I try, it is just not worth it.'' All of these levels could be contrasted to a listening comprehension level that would become known as *reading capacity*. (Give yourself another pat on the back if you are thinking about the well-documented relationship between listening comprehension and reading comprehension.)

Betts (1946) felt that it was imperative for teachers to have a systematic means of establishing a learner's levels of development, and he developed the criteria shown in Table 13.1 to serve as a guide.

Betts gave teachers a high degree of control in this decision-making process; in his view the criteria for reading levels should not take precedence over teacher expertise and instinct. When students demonstrated the same levels of skill on word recognition and on comprehension, the decision regarding their overall level was clear. When students demonstrated different levels of skill on word recognition and comprehension, teachers were advised to go with the more conservative route and use the lower level unless there was a good reason to do otherwise (Caldwell, 2002; McKenna & Stahl, 2009). Unfortunately, the latitude permitted also resulted in a lack of consistency between teachers and in a system that did not offer clear criteria for assigning instructional levels.

Reading Level Criticism

The reading levels as defined by Betts were subject to a fair degree of criticism; he was, after all, forging new ground in the field of reading assessment. Spache (1963) proposed a different hierarchy of reading levels in which the independent level was more challenging than the instructional level. He suggested that students should not be reduced to reading only easy text for enjoyment; he believed that interest played a role in what students were willing to tackle and in their ultimate comprehension. Subsequent research (Asher, Hymel, & Wigfield, 1978; Guthrie, 1981) confirmed Spache's thinking; we have more incentive to engage with difficult text when the content is stimulating.

William Powell (1970) offered his own point of view. He suggested that the levels should not be considered static but instead should be viewed as variable; reading levels would be dependent, in part, on a child's interest and background knowledge. Powell also believed that the criterion for the instructional reading level was too high. He was concerned that increased intolerance for reading errors would result in a decrease in readability of texts selected for classroom use, and

Table 13.1 **Betts's Reading Levels**

Reading Level	Criteria
Independent, a.k.a. basal	Highest level of text at which: Comprehension ≥ 90% based on a mix of factual and inferential questions that are presented orally Accuracy ≥ 99% No signs of faulty silent reading: lip movements, vocalizations, head movements, holding the book too near or too far, tension movements, or finger pointing. No signs of faulty oral reading: monotonous reading, low rate, word recognition difficulty, poor phrasing, or a high-pitched voice. Betts commented that not all students would have an independent reading level. Students with severe challenges in decoding, oral language weakness, intellectual disabilities, or English-language learners might not present with the minimum skill needed for reading a preprimer text at the independent level.
Instructional	Highest level of text at which: Comprehension ≥ 75% Accuracy ≥95% The instructional reading level is an estimate of the ''just right'' level for reading materials that will challenge readers without causing them undue hardship or stress.
Frustration	Lowest level of text at which: Comprehension < 50% Accuracy < 90% Betts commented that several factors can push a text into the realm of frustration: in the student, these include poor word recognition skills, an inability to comprehend the content, a limited vocabulary, and a dearth of background knowledge; in addition, a poorly conceptualized text misjudges the ability of readers to make connections and follow the train of thought.
Capacity	Comprehension ≥ 75% This level does not refer to reading but rather to the highest readability of material that individuals can comprehend with at least 75% accuracy when it is read to them.

he feared that the hearty fare of the curriculum would be reduced to literary pablum.

To further complicate matters, Powell questioned whether there should be just one set of performance standards for all grade levels. Should young children be subject to the same stringent decoding demands as older students? According to Powell, children in grades 1 and 2 could achieve 70% comprehension with a minimum of 85% accuracy. Children in grades 3 to 6 could achieve the same percentage of comprehension with oral reading accuracy in the range of 91% to 94%. There were difficult decisions to be made.

Is a Test Ever Not a Test?

Paris and Carpenter (2003) cited numerous benefits of IRIs for classroom teachers and their students. IRIs are said to be authentic, teacher controlled, and student centered. There is much to be said for ongoing classroom-based assessment. (See Chapter 7 on Response to Intervention and progress monitoring.) Despite their acclaimed virtues, IRIs are not without their imperfections. Although the word *informal* connotes a certain degree of freedom from rules and the artificiality of formal testing, all is not as it seems. IRIs have many of the same problems that plague standardized tests and, in addition, they may present with some challenges that are uniquely their own.

Teachers have always designed their own tests. Teachers who seek to design their own IRIs are faced with a dilemma: What is best practice in selecting the passages to be used? It is well recognized that the readability of a given text will vary from paragraph to paragraph; as a result, most readability experts recommend a minimum size sample to be taken from a text at multiple intervals. Without straying into the minefield that we call readability (see the section on readability later in this chapter), we need to spend a little time on what readability means for teacher-designed IRIs.

According to a study by Bradley and Ames (1976), readability levels within a text do not vary in any way that can be predicted. The readability, for example, of an introduction and a conclusion are not typically lower than the readability of the main body of the text. As a result, it is difficult to ensure that student reading levels are determined accurately. In their study, 20 of 51 students ages 8 to 13 who read multiple passages from the same reader each earned scores suggesting skill levels from the independent level to the frustration level. What is a teacher to do? If we hope to use classroom materials for this determination, how do we select the passages? At this point, there are no tried and true guidelines except to say that multiple passages should be used.

For those who feel that the task of developing one's own reading inventory might be too daunting, commercially available reading inventories can be copied and used at a moment's notice with any student. According to W. Powell (1970, p. 16), however, "The strength of the IRI is not as a test instrument, but as a strategy for studying the behavior of the learner in a reading situation and as a basis for instant diagnosis in the teaching environment." Pikulski (1974) shared Powell's concern. He believed that published IRIs inadvertently sacrificed the raison d'être of a teacher-designed IRI; they did not test with the same materials that were being used to teach. As a result, teachers working with published IRIs lost the capacity to tailor the selection of passages based on interest or background knowledge, to group students, and to assess growth based on actual classroom materials.

Informal Is Not a Synonym for "Exempt From Considerations of Reliability and Validity"

In 1974 Pikulski raised the question of whether a published inventory was truly informal or whether it was really a standardized diagnostic reading test that had slipped under the radar. His concern was not just one of semantics. Almost 30 years later, Paris and Carpenter (2003) told us that IRIs were making their way with increasing frequency into high-stakes testing such as measuring progress on individualized education programs. They were, in fact, recommended by many special education textbooks as appropriate tools for evaluating children referred for special education services (McLoughlin & Lewis, 2007; R. Taylor, 2008).

Pikulski's question is serious and goes to the heart of the standards for test development. Tests lacking in scientific integrity may not give reliable results. While less-than-perfect results may not have major implications for the classroom (lesson plans can easily be tweaked), a misdiagnosis or misidentification is not easily corrected, and the consequences to students can be severe.

Pikulski (1974) might have been right when he mused that teacher-designed IRIs based on instructional materials probably did not need to be subject to the same questions of reliability and validity as standardized tests; content validity—the fact that we are measuring what we actually teach—should be sufficient. Pikulski, however, differentiated between IRI data used for instruction in the classroom and those used for diagnostic purposes. He thought that it might not be necessary for IRIs to be administered with a "very high degree of precision" for classroom purposes (p. 143). Ongoing contact with students would easily permit teachers to adjust lesson plans as needed.

Published IRIs, according to Pikulski (1974), were another story. Once IRIs entered the marketplace, they should be subject to the same standards as formal assessment instruments and he called for test publishers to address questions on IRIs relating to reliability and validity. Pikulski and Shanahan (1982) repeated this call. Spector (2005) asked the very same questions more than 20 years later when her research revealed that fewer than half of the reviewed IRIs provided data regarding reliability and that most of the data provided by IRIs did not support the use of IRIs for high-stakes decisions. Spector wondered whether the poor documentation and weak research methodologies of many of the reviewed IRIs were part of a ''considered decision by some IRI authors to ignore widely accepted professional standards of test quality'' (p. 599).

Other researchers noted additional concerns. Klesius and Homan (1985) cited apprehensions regarding interrater reliability. According to their review of the research, only 70% of teachers identified students' reading errors and comprehension levels accurately with respect to given scoring procedures. Schell and Hanna (1981) expressed concern regarding the potential of IRIs for determining strengths and weaknesses in comprehension subskills such as determining the main idea and recognizing detail. While we seek correlation as evidence that a test is consistent and that it measures what it purports to measure, the separate scales (or subtests) of a test should not intercorrelate too highly. We need to be sure that we are actually measuring essential discrete skills within the overall area of reading comprehension without under- or overrepresenting them.

In 1962 Lennon demonstrated that many of the discrete skills supposedly assessed by reading comprehension tests were actually one and the same. Lennon felt that, with some much-needed effort on the part of test publishers, tests could reliably measure a general verbal factor (vocabulary), literal comprehension, implicit comprehension, and a factor that he called appreciation (i.e., the ability to sense intent, purpose, mood, and tone, and perceive literary devices). Schell and Hanna (1981) saw the same problem with the subscales on many IRIs: Skill categories were not well defined; questions in different categories were not of comparable difficulty, and many questions could be answered without actually reading the passage.

There is also a need for published IRIs to accurately predict the appropriate level(s) of readability for instruction. Typically, IRIs provide results in the form of grade-level or reader-level scores. According to Betts (1946), for example, a child might have a fourth-grade independent reading level, a fifth-grade instructional level, and a seventh-grade frustration level. As we learned in Chapter 5, there is a surprising lack of continuity between grade-level scores, and the grade level proffered by one IRI may have little in common with the grade level given by another. Pikulski (1974) warned that this was particularly true of older editions of basal readers which were more challenging than those written for the student population of the 1970s, and he urged researchers to document the ongoing validity of older tests.

The lack of consistency between grade-level scores from different sources is compounded by the fact that there is considerable variation between passages purported to represent the same grade level (Gerke, 1980). As we show in the readability section of this chapter, formulas used to determine readability are based on different criteria, and one formula may not yield the same grade level as another. Grade-level scores are also problematic because it is difficult to ascertain whether differences in grade-level scores are statistically significant. Even though they may appear to measure spans in terms of months, the scores cannot be used to measure short-term progress (Bristow, Pikulski, & Pelosi, 1983). They detect only large performance differences of 1 to 2 years.

Miscue Analysis

If we accept the premise of a hierarchical system of levels based on accuracy in decoding for individualizing instruction, we need to ask the question that strikes at the heart of many a good evaluator: What is an error? Many evaluators take exception to the standardized, norm-referenced Gray Oral Reading Tests, Fifth Edition (GORT-5; Wiederholt & Bryant, 2012a) and the practice of counting repetitions and self-corrections as errors. Do the same concerns apply to IRIs? Are some errors more egregious than others? If so, how do we take those differences into consideration?

Miscue analysis was the brain child of Kenneth Goodman (1965, 1967, 1969) who proposed that young readers identify words not by attending to the print but through a process of making meaning. His 1965 study suggested that children identify words more successfully in context than in isolation. According to Goodman, good readers use *semantic cues* (Does the word make sense?) and *syntactic cues* (Does the word sound right?) to engage in a type of linguistic problem solving that has come to be known as the three-cueing system. (See Chapter 2.) If you are thinking that I have only listed two cues here, you are correct. Goodman included *graphophonic cues* (the print) but said they were cues of last resort. As such they did not, according to his theory, enjoy the same level of respectability as the other two.

Goodman (1979) used the word *miscue* instead of error because, in his view, not all digressions from the text were mistakes. He said (1969) that students made miscues in their reading when they were unduly influenced by the wrong cues. According to the precepts of miscue analysis (Goodman & Burke, 1972), these erroneous acts could be analyzed to determine the degree to which students were relying on each of the three types of cues. Teachers would then be able to adjust their instruction to ensure that children would rely more heavily on semantic and syntactic cues and read for meaning. Smith (1975) supported the focus on meaning over decoding, saying ''The art of becoming a fluent reader lies in learning to rely less and less on information from the eyes'' (p. 50).

Table 13.2 illustrates what happens to our error count when we discount errors that preserve meaning.

If we accept the notion that miscues preserving meaning are not true errors, our error count would not capture the lack of accuracy and automaticity that Ralph and Ethel experience when they attempt to decode text.

As we learned in Chapter 2, the three-cueing system has not withstood the test of time (M. J. Adams, 1990) and miscue analysis should not be regarded as a research-based component in lesson plan design. Goodman's study is said to be seriously flawed (Nicholson, 1985, 1991; Nicholson, Bailey, & McArthur, 1991; Nicholson, Lillas, & Rzoska, 1988). According to Rayner and Pollatsek (1989), only poor readers and novice readers rely on context, and they believe that errors preserving meaning or syntax (such as ''He went down the stairs'' instead of ''He went down the steps'') are no less culpable than those that do not.

Repetitions and Self-Corrections

Of course, the most controversial of errors are repetitions and self-corrections. Repetitions (saying a word twice) are controversial because they do not diverge from what is actually printed on the page and because the meaning remains the same. There are those who advocate a no-crime, no-time approach to scoring repetitions (Ekwall, 1974, 1976). Adherents to this practice recommend omitting repetition errors when calculating accuracy (Goodman, 1967). Ekwall (1974) pointed out that differing views on repetition (sin or no sin) make it difficult for IRIs to reach an accord regarding the level placement of students who engage in repetitions. According to Ekwall (1974), the criteria established by Betts (1946) were determined by counting repetitions as errors, so repetitions not counted would result in a level placement too difficult for the student. Ekwall documented in his research that not using repetitions meant that students reached their frustration level long before their accuracy fell below 90%.

Self-corrections—when a child makes an error and then corrects it without prompting or assistance—also give rise to conflict among evaluators. Clay (2000) recommended that a self-correction ratio (the number of self-corrections over the total number of errors) be calculated as part of the analysis done on a running record, the idea being that a high self-correction rate is important if children are to make progress in reading (Clay, 1969). According to Clay (2000), students who engage in self-correction are monitoring the quality of their reading and, as a result, will likely improve their skills over time.

Table 13.2 **What Is an Error?**

Text	**The crowd cheered the chimpanzee as he stared at his keeper.**	**Errors That Preserve Meaning**			**Errors That Alter Meaning**	**Error Count**	
		Synonyms	**Repetitions**	**Self-Corrections**	**Just Plain Wrong**	**Miscue**	**Absolute**
Alice	The crowd cheers the . . . champion as he starts to kick.	0	0	0	4	4	4
Ralph	The crowd cheers/cheered the chump/chimp/chimpanzee as he starts/started to go/stared at his . . . keeper.	0	0	3	0	0	3
Fred	The crowd cheered the monkey as he standed at the kennel.	1	0	0	2	2	3
Ethel	The crowd . . . the crowd cheers . . . cheered the chimpanzee as he stared . . . stared at his . . . his keeper.	0	3	0	0	0	3

Thompson's research (1984) indicated otherwise, and the devil was in the details. Thompson suggested that children who self-corrected their reading might be responding impulsively without adequately focusing on a word's identity. In his analysis of Clay's (1969) data, Thompson found that less skilled readers made the same number of self-corrections as their more adept peers. Their self-correction ratio was lower only because they made a greater number of errors to begin with. Share's study (1990) controlled the level of text difficulty; he found that there was no difference between the self-correction rate between skilled and less skilled readers, confirming that there was ''no direct support for the widespread view that self-correction is an important determinant of success in reading acquisition'' (p. 185).

Instead of miscue analysis, McKenna and Picard (2006–2007) recommended the use of absolute error totals—including all errors—for the determination of reading level in IRIs and running records. Meaningful miscues, in their view, should be considered as evidence of poor decoding skills. According to the data that we have in Table 13.2, all four students would warrant additional work in decoding. In contrast to Goodman, McKenna and Picard recommended that younger readers be cued by teachers to use their decoding skills first and context cues last. Context, they opined, was less central to the acquisition of reading skill than word recognition. (Note that they do not deny that context plays a role.) Finally, they recommended that teachers study miscues as part of a student's journey away from the use of context and guessing toward becoming a skilled decoder. Students who move from errors based on context to those based on graphemic similarities are actually making progress (M. J. Adams, 1990).

Running Records

Running records were developed by Marie Clay based on research conducted during the 1960s (Clay, 1967, 1969). Running records are a way to record a student's performance during oral reading in order to guide teaching, assess text difficulty, and measure progress (Clay, 2000). Clay (2000) recommended recording performance at three levels of text difficulty: easy, instructional, and hard.

Running records are described as easy to execute and they require no special materials other than a pencil, a paper, a book, and a willing child. Teachers are advised to make children as comfortable as possible and to warn them that the teacher will be writing notes during their time together. As the child reads, the teacher makes a tick for each word read correctly, as shown in Table 13.3.

Each digression from the text is noted. Omitted words are marked with a dash, and substituted words and inserted words are written in as they occur. Self-corrections are documented with SC; each incorrect attempt is separated by a slash if there is more than one trial. Repetitions are marked with R. (Self-corrections and repetitions are not counted as errors.) According to Clay (2000), other behaviors also may be recorded, such as pausing, sounding out letters, and breaking words into parts. Due to the difficulty in recording these behaviors on the fly, they are not included in the count. Tape recording as a means of backup is discouraged. Clay stated that it is ''a crutch to get rid of as soon as possible'' because it does not record visual behaviors (p. 7). Overall, the goal is to replicate the child's exact wording and record observations so that the evaluator has ample evidence to support recommendations.

Upon completion of the reading session, digressions are analyzed and categorized based on whether the error was influenced by meaning, sentence structure, or visual information. Clay (2000) then recommended calculating the rate of accuracy, the error ratio (the number of errors compared to the total number of words read), and the ratio of self-corrections to the total number of errors.

According to Clay (2000), teachers require training, practice, and opportunities for ongoing consultation. She recommended that novice teachers practice with readers having only about one year of school experience. Older proficient readers may work too quickly for these teachers

Table 13.3 **Running Record Example**

Text	Running Record	E	SC	Error Analysis	
				E	SC
The day began like most.	√ √ √ √ √.				
The sun rose in the east.	√ √ rised | SC √ √ R √. rose	1 +		M S V	M S V
The birds began to sing.	√ √ √ √ √.			M S V	M S V
Marty completed his paper route,	Mary | SC complained | SC √ √ √ Marty completed	+	2	M S V	M S V M S V
leaving, yet again, newspapers on	√ √ √ the newspaper √	2		M S V M S V	M S V
roofs and under sprinklers.	√ √ √ sprinkles | SC. sprinklers	+	1	M S V	M S V
Number of words: 29					
Accuracy: 26/29 = 90% Error Rate: 3/29 Self Correction Rate: 1/3					

to record every word; in these cases, Clay advised that the novice teacher document only ‘‘the processing [that] the reader does to monitor, solve words and self correct’’ (p. 9).

Blaiklock (2004) has raised a number of concerns regarding running records. He cited unclear guidelines for working with older, more proficient readers, and he has questions relating to the relationship between silent and oral reading, the lack of studies on interrater reliability, and the difficulty in making comparisons of texts not subject to the same readability procedures. He also noted a lack of clarity regarding the choice between familiar and unfamiliar text and expressed concern about the use of subjective interpretations of a child’s retell.

Some researchers condemn the use of word lists due to the absence of context as a support for word recognition (e.g., Goodman, 1969). Criticism notwithstanding, noncontextual word recognition has been found to be an excellent predictor of reading comprehension (Stanovich, 1984) and entry levels on published tests should always be observed as part of the test standardization. In IRIs permitting a certain degree of discretion, personal knowledge of the student’s reading skill in the classroom may temper the decision one way or the other. Some IRIs caution that word-list reading should be used only to determine the entry level of passage reading. They should not be used to make a conclusion about grade-level proficiency.

IRI Word Lists

Many published reading inventories provide word lists that students read aloud in order to guide the entry level of text passages that are administered next. If students correctly read 15 of 20 words at a fifth-grade level, for example, the examiner might begin the informal reading inventory with a passage at the mid-fifth-grade level. The word-list reading also provides valuable data about word-recognition skill.

IRI Passages

Most IRIs offer a selection of both narrative and expository passages (Applegate, Quinn, & Applegate, 2008; Cooter, Flynt, & Cooter, 2007a; Johns, 2008; Leslie & Caldwell, 2011; Woods & Moe, 2011). While we might think that genres are easy to identify, research indicates that the difference between the two is not always clear. Nilsson (2008) warned of particular confusion when seemingly factual information was presented in a story format. For example, a text describing how George Washington cut down the apple tree and subsequent pronouncements of his commitment to the truth is identified by some educators as expository in nature and by others as narrative. Recommendations related to genre (i.e., skill with narrative text or expository text) presume, at some level, that we can clearly identify which skill we are measuring.

Additional concerns relating to IRI passages include length and the use of illustrations. Passage length on IRIs varies and short passages may not provide a sufficient sample of reading skill that is worthy of educational decision making. Not all experts agree on just how long passages should be. According to Klesius and Homan (1985, p. 74), passages above the primer level should be at least 125 words in length in order to avoid ''inaccurate error patterns'' and the possibility of overestimating a child's skill in reading. Caldwell (2002) recommended that preprimer-level passages be 40 to 60 words in length and that primer-level passages be 60 to 100 words in length.

IRI authors also have different perspectives on the use of illustrations and whether children's reading skills should be measured with text that provides picture clues. (I can feel the hair rising on the back of my neck when I even consider the possibility of measuring word recognition skill with pictures.) Some IRI authors have eliminated illustrations entirely (Roe & Burns, 2011; Wheelock & Campbell, 2012). Others provide illustrated passages for younger students only (Bader & Pearce, 2009; Cooter, Flynt, & Cooter, 2007a; Johns, 2008; Woods & Moe, 2011).

What About the Questions?

In addition to discussing oral reading errors and how they are scored, we also need to consider the comprehension questions themselves. It is presumed that teachers who create their own IRIs design questions that are in keeping with the types of questions that they pose during their reading lessons. With respect to published IRIs, the rub is sometimes in the questions themselves. Questions can be asked in numerous ways. The selection of question types and the style in which they are written has an effect on how well students perform. A study by Peterson, Greenlaw, and Tierney (1978) found that different sets of questions (two literal, two inferential, and one vocabulary, as recommended by M. Johnson and Kress in 1965) administered to a group of 57 students in grades 2 to 5 resulted in two different instructional levels for 37 of the students. Eight of the students earned scores indicating three differing instruction levels. This study speaks to the complexity of asking good questions and the additional factors at play, such as the vocabulary and the syntax of the questions themselves. Some questions are just harder than others regardless of their expressed type.

IRIs are not immune to problems with text-independent questions that can be answered without reading the text (Tuinman, 1971). Klesius and Homan (1985) suggested that literal questions on an IRI are likely to be passage dependent. Vocabulary and interpretive questions, however, are more likely to cross the realm into passage independence. McKenna (1983) believed that this problem is not related to the type of question posed, but rather to a disconnect between the author and the learner. The authors of test questions cannot know what is in the heads of potential examinees.

A perfect test would distinguish between the ability to learn from a specific text and what students already know. Until such time as a perfect test is developed, McKenna (1983) suggested asking the questions without passages to a smaller group of higher-performing students of the same age as an indicator of topic familiarity. He also suggested setting high standards for passage-dependent questions. In order to ensure that questions are truly passage dependent, the content must be fairly exotic and not within the realm of common knowledge.

Table 13.4 provides a list of IRIs and their research on reliability and readability.

Table 13.4 **IRIs: Reliability and Readability**

Test	Measure	Reliability	Readability	Comments
Analytical Reading Inventory—Ninth Edition (ARI; Woods & Moe, 2011)	Word lists: untimed Passages: Narrative and expository Oral and silent reading Retelling Question Types: ''From the Text'' and ''From Head to Text'' Listening comprehension	**Interrater Reliability**: Total miscues, fluency rating, comprehension questions, and overall reading levels were considered. No evidence provided.	Readability was estimated with these formulas: Grades P–3: Spache Grades 4–6: Powers Grades 7–9: Flesch (Micro Power & Light, 1995) Vocabulary diversity also considered.	Grades: PP–9: 3 narrative forms 1–9: 2 expository forms
Bader Reading and Language Inventory—Sixth Edition (BRLI; Bader & Pearce, 2009)	Word Lists: Untimed Experiential word lists Phonics and structural analysis inventory Spelling tests Visual and auditory discrimination Preliteracy and emerging literacy Cloze tests Evaluation of language abilities Writing evaluation Open-book reading assessments Arithmetic Passages: ''A balance'' of narrative and expository text (p. 4) Oral and silent reading Retelling Questions: comprehensive with 1 interpretive question per passage Listening comprehension	**Alternate Form Reliability** is above .84 for oral reading and above .82 for silent reading. **Interrater Reliability** based on agreement between 4 reading specialists for levels of oral and silent reading instruction as well as for beginning evaluators. The authors report consistent scores for examiners with different levels of experience.	Readability was estimated with the Harris-Jacobson formula and the Fry formula.	Set C for children Set C/A for children or adults Set A for adults
Basic Reading Inventory—Tenth Edition (BRI; Johns, 2008)	Word Lists Passages: Narrative and expository Oral and silent reading Retelling Question Types: fact, topic, evaluation, inference, and vocabulary. Evaluators permitted discretion in question selection. Listening level	**Alternate Form Reliability** for Word Lists Test-Retest (1-day interval) No reliability studies provided by the author for comprehension. Alternate form and interrater reliability studies cited.	Readability was estimated using one or more readability formulas: Spache, Fry, and/or Dale-Chall. A readability program was used to assess the appropriateness of passages for assigned grade levels.	Grades: PP–12 Forms A, B, and C: Oral Grades: PP–8 Form D: Silent Expository Form E; Oral Expository Grades: 3–12 Silent Lengthy Narrative Silent Reading Expository

(*continues*)

Table 13.4 (*continued*)

Test	Measure	Reliability	Readability	Comments
Classroom Reading Inventory—Twelfth Edition (CRI; Wheelock & Campbell, 2012)	Word lists: untimed Passages: A variety of narrative and expository Retelling Oral reading Question Types: prediction, character, problem, outcome Listening comprehension	No evidence provided.	All passages were written by the authors. No data on readability provided.	Grades: K–8: 2 forms A third form for high schoolers and adults can be downloaded from: http://www.classroomreadinginventory.com
Comprehensive Reading Inventory (CRI-CFC; Cooter, Flynt, & Cooter, 2007a)	Interest inventory Reading attitude survey Alphabetics assessment: for grades K–3: phonemic awareness, letter naming, and phonics (nonsense words) Word Lists: 5 second limit Passages: Narrative and expository for all levels Oral and silent reading Retelling Question Types: story grammar, literal and inferential Listening comprehension	**Test-retest reliability** ranged from .93 (4th grade) to .67 (1st grade). Reliability for lower grades is not adequate. **Alternate form reliability** evidence suggests that the 2 forms are not equivalent.	Reading levels were determined using several "commonly accepted" readability formulas (p. 21).	Grades PP–9: 2 narrative and 2 expository forms Grades 3–12: expository form
The Critical Reading Inventory (CRI; Applegate, Quinn, & Applegate, 2008)	Word Lists: Timed and untimed Passages: Narrative and expository for all levels Oral and silent reading Retelling Question Types: explicit/implicit with/without lookbacks	**Interrater reliability** for comprehension based on score agreement (the extent to which different evaluators will assign the same score). Authors note that inference and critical response items lend themselves to more "creative and challenging responses" (p. 61). 95.2% agreement. Data provided for entire sample only, not by grade. Retelling: 92.5% agreement Fluency: 16/30 identical scores 12/30 scores differ by 1 point 2/30 scores differ by 2 points	Flesch-Kincaid Formula (Microsoft Word, 1997).	PP–12: 2 word list forms 2 forms with 3 passages each

Informal Reading Inventory—Eighth Edition (IRI-BR; Roe & Burns, 2011).	Word Lists: Passages: Narrative and expository for all levels. No illustrations Oral and silent reading Retelling Question Types: main idea, detail, inference, sequence, cause-and-effect, and vocabulary Listening comprehension	No evidence provided.	Readability was estimated using these formulas: Grades PP–3: Spache Grades 4–12: Fry Readability Graph	Grades PP–12: 4 forms for each level. 2 for pretesting and 2 for posttesting.
Qualitative Reading Inventory—Fifth Edition (QRI-5; Leslie & Caldwell, 2011)	Word Lists: Timed and untimed Passages: Narrative and expository for all levels Oral and silent reading Retelling Question Types: text based, inferential, and critical response	**Internal consistency** evidence provides the mean (M), standard deviation (SD), and standard error of measurement (SEM) of the proportion correct for all passages. The SEM ranges from 10% to 23%. In many cases the SD would exceed the 70% cutoff for the instructional levels (Spector, 2005). **Alternate form reliability** based on comprehension scores reported to be all above .80 based on data from 149 students who read 2 passages at the same level of readability. No further definition of the sample was provided. **Interrater reliability** based on score consistency (students do not have to receive the same score, only the same rank relative to their peers). 98%–99% agreement.	Preprimer–grade 3 Gunning formula (1998, 2002) Harris-Jacobson formula (Harris & Spray, 1990), and Fountas and Pinnell system (2006) Grade 4 and above Readability statistics from Microsoft Windows 7.0 (Micro Power & Light Company, 2009).	Minimum of 6 passages per grade level with increasing options for expository text.

(*continues*)

Table 13.4 (*continued*)

Test	Measure	Reliability	Readability	Comments
Standardized Reading Inventory—Second Edition (SRI-2; Newcomer, 1999)	Words Lists: untimed; students are told not to stop to sound out words Vocabulary in Context: selecting a synonym to a word read in a sentence Passages: Predominantly narrative Oral and silent reading Question Types: factual, inferential, and lexical	**Internal consistency** evidence (coefficient alphas) provided for 9 age levels as well as for select population subgroups. Reading quotient reliabilities are all above .88. **Test-Retest** evidence is provided for the original SRI as well as for 50 students in grades 5 to 8 tested after a 2-week interval. Range for Passage Comprehension was .89 to .94). The range for Word Recognition was .81 to .89). **Alternate form reliability** also provided for the same group (.79 to .82). Evidence also provided for the original SRI. **Interrater reliability** for 30 protocols scored by the author and a colleague were 97% consistent for Passage Comprehension and Word Recognition.	Readability statistics not provided. Passage levels were determined based on the performance of the normative sample that was identified as reading on grade level by their teachers.	PP–8: 2 forms with one story for each level

Adapted from ''How Reliable Are Formal Reading Inventories?'' by J. Spector (2005). *Psychology in the Schools, 42*(6), 593–603.

Readability

Over the years there have been many attempts to analyze written language. We ponder the content and style of writing. We argue about an author's perspective or grasp of complex topics. We eagerly look forward to what our favorite book reviewers have to say in the *New York Times*. Apart from questions of voice, style, and content, however, we sometimes are in need of a more objective interpretation of written language. It was Lucius Adelno Sherman in 1893 (Dubay, 2007) who brought written aesthetics, once thought to be the property of the muses, down from the heavens and into the material world and the scientific method.

Sherman's research on written language was founded in hard, cold statistics. According to Dubay (2007), Sherman's numerical analysis of print revealed that the average length of written sentences had decreased over the course of the past three hundred years and that written language was becoming more like spoken language. In pre-Elizabethan times, the average length was 50 words per sentence; Dubay noted that the average length in 2007 was less than half that, only 20 words per sentence. Three samples from Tolstoy's *War and Peace* published in 1869 reveal an average sentence length of 28 words; three samples from Hemingway's *The Sun Also Rises* published in 1926 reveal an average sentence of 20 words. Hemingway was known for his brevity; Tolstoy was not.

Sherman's work on sentence length resulted in another important revelation: Individual authors were consistent in their sentence length. He suggested that writers who produced texts with shorter sentences and a more concrete vocabulary were more understandable than those who did not. Sherman's research became the spark that inspired later educational researchers to use statistical analysis to understand what made some texts more attractive or readable than others. It also became the basis for using samples of text rather than the entire text in that process.

Readability was defined by G. Harry McLaughlin (1968), the author of the SMOG readability formula, as ''the degree to which a given class of people find certain reading matter compelling and, necessarily, comprehensible'' (p. 188). McLaughlin, in an unusually ebullient style not typically used for scholarly work, explained that this definition did not capture how understandable a text would be given typographical, motivational, and logical factors, such as the ''orderliness of presentation'' and ''optimal idea density'' (p. 191). Despite these shortcomings, he said that readability formulas had the potential to serve as objective predictors for teachers in the selection of children's books and as warning devices for authors writing prose not suited for their intended audience (p. 188).

Readability formulas have become a big part of educational decision making and our need to ensure that there is a match between a text and potential readers. Dubay (2004) stated that textbook publishers are keenly interested in the readability of their textbooks; readability, in fact, is considered ''more important than cost, the choice of personnel, or the physical features of books'' (p. 55), and 89% of publishers use readability formulas to determine the grade-level designations for their textbooks. Despite this practice, a reading grade level obtained through the use of a formula is not necessarily commensurate with a student's grade-level placement; there are, in fact, a wide range of reading abilities within any single grade level. Varied reading levels aside, textbooks written at a lower level of readability have a larger market potential because they can be read by more students.

Readability Applications Outside of the Classroom

Readability has implications that extend well beyond the leveling of textbooks for the classroom (Dubay, 2004). Readability studies have been applied to a host of publications, including drivers' manuals, newspapers and magazines, health information, and legal forms of consent. Concern over the public's right to understand legislation and regulations prompted the passage of laws (Truth in Lending Act of 1968; Civil Rights Act of 1964) requiring the use of plain language. In the case of *David v. Heckler* (1984), Edward Fry, author of the Fry Readability Graph (1968, 1969, 1977), testified that a denial letter written to Joseph David would not have been comprehensible to the vast majority of the Medicare-eligible population because it had been written at a 16th-grade level. As a result, the U.S. Department of Health and Human Services was ordered to improve the readability of Medicare communication to ensure that recipients would be able to understand Medicare decisions and benefits in the future.

Readability History

According to Chall and Dale (1995), two important events dating to the 1920s stimulated interest in readability. The first was that the United States was in the midst of a large wave of immigration from Europe. The effect of the this wave was so pronounced that Congress found it necessary to pass laws (the Emergency Quota Act of 1921 and the Immigration Act of 1924) intended to reduce the number of southern and eastern Europeans coming to the country. Public education experienced a substantial increase in ''first-generation'' high school students who lacked sufficient English-language skills to read their textbooks. The words were just too hard, and teachers had to find a way of accommodating the needs of these students if they were all to be educated.

The second was the advent of scientific tools that could be used to study language. Edward Thorndike published his *Teachers Word Book* (1921), the first word-frequency list for the English language. Frequency of use equates with understandability and teachers found the list helpful to evaluate the reading difficulty of classroom materials. Thorndike's work was soon followed by the Lively and Pressey method (1923) for evaluating what they called the ''vocabulary burden'' of textbooks. They based their work on the Thorndike list, and they suggested three methods for the analysis of vocabulary: the diversity of words used, a weighted median index derived from the Thorndike list, and the number of words not occurring on the Thorndike list.

Motive and means led to the development of the first readability formulas. Classic readability formulas are described as those that involve:

- counting the properties of words, such as the number of letters and syllables, frequency status, and diversity;
- the properties of sentences, such as the number of words, syllables, letters;
- the number of big words;
- the proportion of conjunctions or prepositions; and
- the number of punctuation marks (Dale & Chall, 1948a, 1948b; Flesch, 1948; Lorge, 1944).

Chall and Dale's definition of readability (1949) also included speed and enjoyment. They define readability as:

> *the sum total (including the interactions) of all those elements within a given piece of printed material that affects the success a group of readers have with it. The success is the extent to which they understand it, read it at an optimal speed, and find it interesting. (p. 1)*

Readability, Comprehension, and Prediction

Readability formulas are tied to a threshold of comprehension (e.g., the percentage of correct answers on a reading comprehension test). Contrary to general understanding, different readability formulas presume different levels of comprehension. The Dale-Chall formula (1995), for example, is based on a 50% criterion score on multiple-choice testing; the McLaughlin SMOG formula (1969) is based on a criterion of 100% on the McCall-Crabbs Standard Test Lessons in Reading, Revised (1961); as a result, it is the preferred formula for medical information, a field that cannot tolerate incomprehensibility or misunderstandings (Dubay, 2004). Formulas based on higher criterion scores generally predict higher grade levels. Those predicting lower scores typically present with higher validity correlations. Dubay concluded that the Dale-Chall formula is the preferable formula to use when assessing texts for classroom use. Texts need to be challenging and enriching yet not too difficult.

Given that readability formulas are tied to different measures and standards for comprehension, it is not surprising that they differ in their grade-level predictions; a text cited by Dubay (2004) received grade-level ratings ranging from 11.2 to 17+. The highest was the prediction from the Fry Readability Graph (1969, 1977); the lowest was the prediction based on the FORCAST formula, a formula designed to be used by the U.S. Army to address questions relating to professional materials for adults (Caylor, Sticht, Fox, & Ford, 1973).

Differences in readability determinations reflect several factors: different algorithms, different variables, and different criterion scores. The FORCAST, for example, is based on the number of single-syllable words in a 150-word sample. The Fry Readability Graph is based on the average number of syllables and the average number of sentences per 100 words. The formula used to calculate the passage difficulty for DIBELS-Next (Good & Kaminski, 2010) is based on several factors, including characters per word, proportion of words with seven or more characters, syllables per word, proportion of words with three or more syllables, proportion of rare words, and the number of words per sentence. Dubay (2004) stated that research has come to focus on two main variables: vocabulary and sentence structure. He noted that more variables are not necessarily better than fewer variables because they are more difficult to use and do not necessarily result in higher correlations with reading-difficulty scores.

Factors Affecting Readability

Four main factors affect readability: content, style, format, and features of organization (Gray & Leary, 1935). Within these four factors, more than 200 elements have been noted to affect how easily we understand text. Unfortunately, content, format, and organization are not easily countable, a fact that has left many developers of readability formulas wide open to criticism of their formulas' shortcomings.

According to Ojemann (2007), the effects of abstract content and an incoherent presentation are not measurable mathematically and he observed that a readability formula could not distinguish between straight text and text that was scrambled. Kintsch and Vipond (1979) criticized readability formulas for failing to consider the relationship between the reader and the text. Kintsch and Miller (1981) later came to step back from Kintsch and Vipond's initial rejection of readability formulas. Kintsch and Miller acknowledged that readability formulas worked because they were firmly grounded in theory and research. There was no denying the role of vocabulary and syntax in language comprehension, oral or written. They stopped short, however, of fully embracing readability formulas. Kintsch's main contribution to the field of readability was his study of text coherence and the virtues of well-organized text that was explicit in its structure. (See Chapter 12.)

Kintsch's work in text comprehendability was continued by Bonnie Meyer (1982), who studied text beyond the sentence level—that is, discourse. She noticed that readers understood more and read faster when text was structured and when authors signaled their use of rhetorical devices. According to Meyer, communication was more effective when it followed a topical plan. She focused on how the use of different organizational structures (antecedent/consequence, comparison/contrast, description, response, and time order) made content easier to understand.

Meyer (1982) helped the field of reading understand that different types of text were based on different structures. History texts, for example, were organized chronologically (time order). Political speeches were written as a series of comparisons and contrasts. Authors who used these structures would make their content more accessible to the average reader. In turn, readers who were knowledgeable about these structures would enjoy better comprehension of complex content. These observations were echoed by Bonnie Armbruster (1984), who studied textual coherence at two levels: Global coherence was the way in which higher-level concepts and ideas were integrated across an entire chapter or book, and local coherence focused on the use of cohesive ties (i.e., linguistic forms whose primary purpose was to make links between and within sentences). Armbruster found that comprehension and recall improved when texts satisfied the reader's need to understand not just text content, but how it was organized.

Armbruster's work (1984) revealed what went wrong when publishers attempted to reduce the readability of their textbooks by eliminating so-called big words and by removing words from sentences deemed to be excessive in length. Chopping sentences into smaller units does not make text more readable. Signaling devices and cohesive ties, often the first words to be deleted with a stroke of the pen, are every bit as important as the facts themselves.

New Dale-Chall Readability Formula

The new Dale-Chall Readability formula (Chall & Dale, 1995) is based on word difficulty and syntactic difficulty. These two aspects of style correlate highly with reading comprehension as determined by cloze comprehension scores in which readers fill in missing words at preset intervals. The scores are obtained by finding the number of sentences per 100-word sample together with the number of unfamiliar words in the tables provided.

The authors provided a new set of criteria for estimating text difficulty, an updated list of 3,000 words, and rules for determining whether words are familiar or unfamiliar. They also provided guidelines for matching texts to readers based on reader characteristics and cognitive-structural aspects of the text. There are specific rules for selecting sample passages based on text length. The Dale-Chall formula is also available online (http://www.readabilityformulas.com/new-dale-chall-readability-formula.php).

SMOG Readability Formula

G. Harry McLaughlin (1969) described the SMOG readability formula as ''laughably simple'' (p. 638). SMOG does not stand for ''simple measure of gobbledygook'' as is often suggested. The acronym was a tribute to Gunning's Fog Index (1952) and McLaughlin's hometown of London, England. Directions for the SMOG Index are listed next.

1. Count 10 consecutive sentences at the beginning, the middle, and the end of a text (30 sentences in all). A sentence is defined as a string of words ending with a period, a question mark, or an exclamation point.
2. Count every word with three or more syllables. Count all repeated words as well as strings of letters or numbers that would have three or more syllables if they were read aloud.
3. Estimate the square root of the number of polysyllabic words counted. If your math skills are not up to snuff, take the nearest perfect square. If your number is midway between two perfect squares, take the lower value.
4. Add 3 to the square root to get the SMOG readability index for your text. This will give you a prediction of the reading level that your student must have in order to fully understand the text.

Online Options for Readability

Today many widely used word processors offer readability formulas along with spell checkers and grammar checkers. Microsoft Word provides a Flesch-Kincaid Grade Level. Many teachers use the Lexile Framework, a scale from 0 to 2000 that is based on average sentence length and average word frequency of texts found in an extensive database, the *American Heritage Intermediate Corpus* (Carroll, Davies, & Richman, 1971). The Lexile Framework circumvents the need to perform one's own calculations. You can locate a title in the database (www.lexile.com), or you can upload a file in plain text format (with the extension .txt) in order to obtain the Lexile score. The Lexile authors have provided a table that converts the score into a grade level. The Lexile Framework (and readability formulas in general) cannot be applied to first-grade materials with illustrations or materials that are predictable in their language and content.

Recommendations and Considerations in the Practice of Informal Assessment

The list below provides suggestions for those considering the use of IRIs:

1. When using published IRIs, look for evidence of reliability and validity. Spector (2005, p. 599) warned that IRIs that do not provide evidence of reliability should not be used "regardless of how casually the results will be applied." Salvia, Ysseldyke, and Bolt (2010) recommended a minimum reliability of .90 for tests used for high-stakes testing (i.e., tracking progress, eligibility for specialized instruction, and opportunities for higher education).
2. Be sure that you understand how the readability was determined. Different readability formulas result in different readability levels. Do not assume that the readability levels for individual passages are consistent. Trust but verify.
3. When creating an inventory of your own, be sure that your question types, vocabulary, syntax, and style of presentation mirror the types of questions used in your instructional materials.
4. Make a recording of your students when they read aloud. Write down all question responses verbatim. Do not overanalyze question responses in an effort to discern particular strengths and weaknesses in comprehension skills (Schell & Hanna, 1981). Be alert to questions that are passage independent and that may result in an overestimation of reading ability. Also be alert to passages with illustrations or to those that are highly familiar; either may suggest an inflated level of reading ability.
5. Watch for behaviors that may speak to a child's enthusiasm or disdain for reading. McKenna and Kear (1990) have published a multiple-choice Elementary Reading Attitude Survey that is in the public domain. According to the authors, the purpose of the survey is to determine a student's attitude toward reading, provide profiles of groups of students, and monitor changes in attitude as the result of instruction.
6. Note that while it is helpful to be aware of and document patterns of difficulty in word reading skill, miscue analysis, based on the three-cueing system, has not withstood the test of time.
7. Never use one test as the sole source of information on a student's skill in reading.

Conclusions

Although IRIs offer the potential for learning more about a student's skill in reading, they may not provide sufficient evidence of reliability and validity in order to be used for high-stakes decision-making. Understanding issues related to the different types of oral reading errors and how they are documented provide a basis for comparing different measures of reading fluency and making instructional decisions. Evaluators who are knowledgeable about readability formulas can use this information to bring additional expertise to evaluations and the types of text used in reading assessment.

Review Questions

1. Why is the label informal reading inventory misleading?
2. What are some of the difficulties that teachers encounter when designing their own reading inventories? What are some of the advantages that these IRIs might present?
3. Why do different readability formulas differ in their grade-level determinations?
4. Discuss factors affecting readability that are not captured by readability formulas.
5. Calculate the SMOG readability index for this chapter.
6. Your school district is about to purchase a new social studies textbook. The publisher advertises a core curriculum with texts written at varying readability levels as a solution for meeting the needs of all students in the classroom. What concerns might you have regarding texts written for less skilled readers?

Written Expression and Spelling

14

Chapter

Introduction

Written expression is one of the most cognitively demanding tasks that humans perform. In fact, it is not the capacity for language that separates us from the animal kingdom; it is our ability to communicate our thoughts through a written symbol system. Written expression, however, is more than a vehicle for communication; it is a vehicle for learning. When we write, we are forced to consider our topic in depth. Writing challenges us to make connections, organize our thoughts, and think them through with sequence and logic.

It was Chall (1983) who said that children move from ''learn[ing] to read'' to ''read[ing] to learn (p. 20). The same, I suspect, is true of writing. We learn about science, history, and language arts when we write. Children who do not write are at a serious disadvantage; not only can they not communicate, they have fewer opportunities for developing higher-level thinking skills. Literacy is not just about reading; it is about writing.

Issues in the Definition of Writing

Although we have numerous models of skilled reading, the research and discussion of skilled writing has been more limited. Some believe that writing is a natural process much like talking. Others believe that writing skill is similar to reading, only somehow in reverse. In 1980 Hayes and Flower proposed a recursive model of writing in which adults alternated among planning, translating, and reviewing their content until their message met the needs of their audience. This view changed the way in which educators conceptualized writing. The writing process was no longer a clearly defined sequence of steps; good writers adjusted and fine-tuned their words until content and style were perfect.

Even though the Hayes and Flower model was insightful, history has taught us that adult thought is not like child thought. When adults write, the actual task of translating thought to text (encoding thoughts in words and sentences and writing them down) is minimized. After all, most adults have already learned to control their pencils and speak in sentences. Accordingly, the Hayes and Flower model did not detail the translation phase of writing; skilled adult writers focused more on planning and revision.

Berninger and Richards (2002) reexamined the Hayes and Flower model with respect to the child perspective. They found that the writing process for children was not the same as for adults, and they made it clear that ''[n]ovice writers [were] not younger expert writers'' (p. 175). Young writers do not yet have the higher-level cognitive skills that permit them to think deeply about their content and style. They are busy developing their graphomotor and language skills. It is here, in fact, that writing difficulties often begin.

Developmental Output Failure and Handwriting

The relationship between graphomotor skill and writing has long been discussed with respect to older children. In 1981 Levine, Oberklaid, and Meltzer described writing challenges in children between the ages of 9 and 15. The researchers felt that many of these challenges were due to a fundamental weakness in graphomotor ability, and they referred to the problem as ''developmental output failure'' (p. 18). According to the researchers, the inability to produce large amounts of written text with ease and efficiency at the middle and high school levels was a recipe for academic disaster. Frustrated students who could not keep up with the production demands for writing would find themselves suffering with low self-esteem, lack of motivation, and eventual academic failure (Levine, 1984).

While Levine and his associates focused on children age 9 and above, Berninger (1994) pointed out that the seeds for developmental output failure are actually planted much earlier when children learn to print. Researchers have identified handwriting as a critical cog in the intellectual machinery for beginning writers (Berninger, 1996; Berninger, Cartwright, Yates, & Abbott, 1994). There is evidence that children who labor to form their letters divert precious intellectual resources away from higher-level writing skills, such as organization and planning (Berninger, 1999; J. Hayes, 1996; Kellogg, 1999). Berninger et al. (1997) documented a strong relationship among handwriting, fluency, and composition in elementary school students. This relationship is more than a correlation; handwriting is a prerequisite skill for writing. While poor handwriting portends ill for young writers, Graham, Harris, and Fink (2000) found that explicit and supplemental handwriting instruction actually had the potential to prevent writing difficulties.

Writing and Expressive Language Skill

Writing difficulties are not the result of poor graphomotor skills alone. Children with expressive language deficits may be faced with the task of telling stories when they are not yet adept at retrieving words and formulating sentences. Writing requires skill at the word level, the sentence level, and the discourse level. The ability to relate two thoughts together occurs first at the sentence level; we use complex sentence structure to relate facts together in terms of sequence, cause and effect, contrast, and exclusion. Inherent in good sentence writing is also the need to adjust words for tense and number and to change word function to fit what we want to say. Sometimes we need a verb to be a noun. Other times we need a noun to be an adjective. Children have to have an understanding of morphology (i.e., the meaningful parts of words) and the skill with which to change words at will.

In years past students were taught how to diagram and write sentences, and they learned the rules of grammar for writing complex sentences that comprise much of written text. Students today focus more on writing connected text with little or no attention to sentence architecture. Many of them are unable to parse and construe lengthy sentences, leaving them at a loss for expressing their thoughts and understanding text beyond the simple sentence.

Given the general lack of direct instruction in syntax, children with expressive language challenges are at higher risk for writing challenges. The multitasking required for written expression has a way of aggravating subtle (and not so subtle) challenges in oral language. Students who cannot speak a grammatically correct complex sentence will not have the linguistic foundation for writing one. As evaluators, it is our responsibility to investigate challenges in written language at both the oral and the written level.

Research on the oral language foundation for written expression is surprisingly limited. Impoverished word choice on paper often has its roots in poor word finding. Scott (2010) believed that examining the ratio of word types to overall words known as tokens (the type-token ratio, or TTR) has the potential to differentiate the breadth and depth of vocabulary in written language samples. Zipf's study from 1932 (in Scott, 2010) documented the inverse relationship between word length and frequency of use. Words that have more letters occur less frequently. Lower-frequency words are associated with more mature writing, a principle that is used in the scoring the various editions of the Test of Written Language. Children without language impairments write with more varied sentence structure. Researchers (Gillam & Johnston, 1992; Scott, 2004) have found that varied use of clauses in T-units distinguished between children with language-based learning disabilities and those without. (A T-unit is defined as the shortest grammatical segment of discourse, oral or written, that can be created without creating a sentence fragment.) Scott and Windsor (2000) found that grammatical error rates in writing also have potential for discriminating between children with specific language impairments and those who speak with precision, grammar, and style.

Discourse-level assessment is more problematic and entirely dependent on the genre. Regardless of the genre, students with language impairments write less than others the same age (Scott & Windsor, 2000), raising the question of Matthew effects (see Chapter 7) for written expression (Stanovich, 1986). Children who do not practice writing do not become better writers, and they may not become better thinkers.

Role of Working Memory

We can return to the metaphor of the stage in order to put writing skills into a framework for assessment. Working memory is the stage with short-term memory and long-term memory waiting in the wings. Executive functioning skills are the backdrop; they comprise the cognitive setting for the work to be done. The players take on their roles with respect to language skills (words, sentences, and discourse), graphomotor and spelling skills, planning, organization, and revision. As is not unusual in the world of theater, the players compete for prominence and fame. When language and/or transcription skills take up too much of the stage or require too much rehearsal time, there is not enough room left for the higher-level skills that ensure good content, cohesion, and style. The working memory stage is shown in Figure 14.1.

Mihály Csikszentmihályi, director of the Quality of Life Research Institute, has written about creativity for the past 20 years. According to Csikszentmihályi, *flow* is a state of creativity in which an individual can focus on higher-level goals without becoming distracted or bogged down by lower-level skills. In 2005 Csikszentmihályi, Abuhamdeh, and Nakamura identified three conditions that are necessary for creative flow; these conditions, shown in Table 14.1, have a unique application to skilled writing.

According to Csikszentmihályi, Abuhamdeh, and Nakamura (2005), creative and skilled writing presumes the ability to integrate lower-level skills into a cohesive product. Good writing presumes that working memory is free to support verbal reasoning as well as facilitate connections between background knowledge and new learning. It also presumes that lower-level skills are finely tuned and ready to be called into play.

Issues in Assessment

Assessment of written expression has not received the same attention as assessment of reading skill. It is likely, however, that efforts to define a learning disability in written expression have suffered in part from the same challenges that have plagued the definition of a learning disability in reading. The ability–discrepancy model has not been helpful in providing children with prompt,

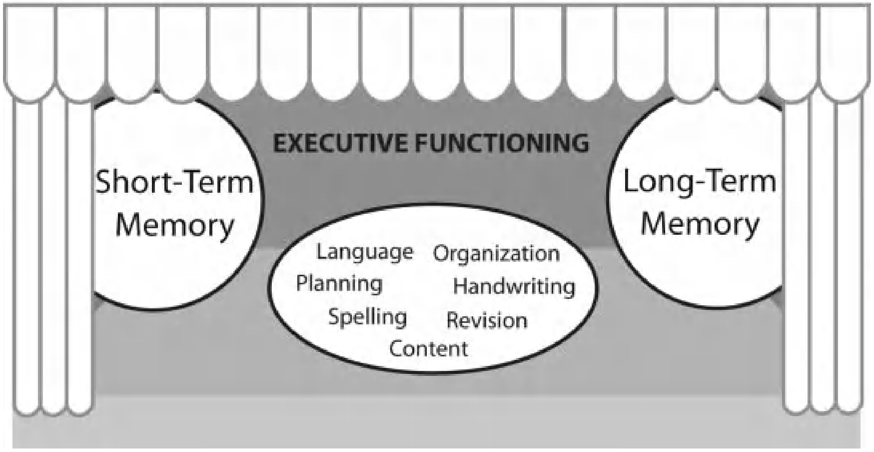

Figure 14.1
Working Memory Stage

effective remediation, and many young children with severe deficits in basic writing skill are not identified for specialized instruction.

Part of the difficulty in identifying children with specific learning disabilities in written expression is due to lack of agreement over how to define a learning disability. The term *written expression* is quite broad, and all educators do not conceptualize it in the same way. At what point does illegible handwriting rise to the level of a specific learning disability? Should students be identified when their inability to spell makes their writing unintelligible? How do we differentiate between students with organizational challenges in writing and those who cannot formulate sentences? The medical community also finds it difficult to define what constitutes a writing disability. According to the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (*DSM-IV-TR*; American Psychiatric Association, 2000), a developmental expressive writing disorder is specifically not due to an underlying neurological processing deficit, a distinct contradiction to the definition of a specific learning disability.

Researchers and those in the medical community may use the term *dysgraphia* for severe writing challenges. Dysgraphia is a word of Greek origin that is sometimes used to describe students who cannot use their pencils as tools. Children with dysgraphia have difficulty storing and retrieving

Table 14.1 **Three Conditions Needed for Skilled Writing**

Requirements for Creative Flow	Application to Written Expression
Clearly stated goal	Understanding of the genre and the needs of the audience
Confidence that there is a match between the skill set and the demands of the task	Ability to apply lower-level skills with automaticity, accuracy, and confidence
Clear and immediate feedback	Ability to respond to the changing focus of the writing process

the orthographic codes (letter forms), making it hard for them to acquire written language skills and express their thoughts on paper. Some children with dysgraphia also have reading disabilities; others do not.

Assessment of writing challenges suffers at a fundamental level from confusion over how to define writing and from a limited understanding of the cognitive processes that support the development of written expression. There are different types of writing; they are generally grouped into four categories: (1) narration/description, (2) procedural (step by step), (3) cause and effect or problem solving, and (4) topic exposition (Howie, 1984). According to Scardamalia and Bereiter (1986), most children are able to write narrative text by the end of the primary grades. Given that students are required to develop expertise in different types of writing by the time they leave high school, how should their writing be assessed? Does basic skill in story writing presume expertise with expository text? Should a standardized test include items addressing different types of writing, and if so, at what ages should the different tasks be administered? Most experienced evaluators know that tests of written expression are notoriously insensitive to the skills of young writers and that many struggling first-grade writers earn scores suggesting grade-level skill when they cannot put two sentences on paper.

There is also a significant question of whether tests of written expression should include spelling. Although spelling has been determined to be an important foundation skill in young writers, some measures of written expression deemphasize the spelling component and tell children, ''Do not worry. Spelling won't count.'' Should spelling be conceptualized as an integral part of the writing process instead of an unimportant ancillary skill? Spelling skill is presumed in most language arts and content areas courses. Does uncertainty over spelling rules force children to avoid taking risks with words that they cannot spell? Does consideration of how to spell words (Do I write a *c* or a *k*?) usurp working memory? Good spelling is also a requirement for most professional endeavors. At what point does poor spelling detract from the ability to convey a message in a socially and professionally acceptable manner?

Assessment of Writing Is a Cognitive Process

In contrast to reading and math, the assessment of written expression does not lend itself to test responses that can be scored quickly and easily. Skill in writing cannot be measured with a multiple-choice format, a favorite for test authors and evaluators alike. Assessment of writing requires not only attention to handwriting, spelling, and mechanics; it requires the ability to assess sentence structure, vocabulary choice, logical transitions, content sophistication, style, and organization. Assessment of written expression is a cognitive process in its own right.

The controversies inherent in defining good writing and how to motivate children to produce good writing samples have resulted in tremendous variation in test design. In some cases, as in the Woodcock-Johnson III Tests of Achievement, Third Edition (Woodcock, McGrew, & Mather, 2001a), skills are measured in isolation linked only by their numeric sequence. In other cases, skills are assessed within the context of a frame story, as in the Kaufman Test of Educational Achievement, Second Edition (Kaufman & Kaufman, 2004a).

Direct and Indirect Methods: Tests of written expression generally assess skills through a combination of direct and indirect methods. Indirect methods of writing require students to edit passages for errors in capitalization, punctuation, and usage. These items are generally easy to score, thereby increasing the interrater reliability of the test. The use of indirect methods of testing written expression begs the question of whether knowledge of writing conventions is equivalent to skill in applying conventions, not unlike the difference between word recognition and spelling. Hooper et al. (1994) commented about indirect methods: ''Given that their primary focus is measuring written language conventions (e.g., grammar, punctuation), their use appears to be valid only for questions addressing a child's knowledge of conventions'' (p. 403). This comment raises the question of whether the indirect methods used in some of the more psychometrically sound tests are fundamentally at odds with what we really need to know about writers.

Direct methods require students to write based on a pictorial or verbal prompt. The prompt establishes the context for the writing to be done as well as the nature of the hypothetical audience. Verbal prompts may be as brief as ''write an essay about your favorite activities.'' Other verbal prompts may provide a model of a good story as well as directions to plan and organize the content: ''Write a story describing a boy and his plan to ride 10 miles, then what happens when his bicycle breaks down. Take time to organize your thoughts before you begin to write. Be sure that your story has a beginning, a sequence of events, and an ending.'' Pictorial prompts raise concerns regarding the artificial nature of the writing task. While students at the elementary school level may be asked on occasion to write a story based on a picture prompt, such prompts are rarely used to generate writing samples at the high school level.

The nature of the picture prompt itself creates other dilemmas. Prompts have to be interesting and capable of inspiring a story with a beginning, a middle, and an end in children from elementary school to high school. They also have to be nonspecific enough so that they do not require much in the way of background knowledge or vocabulary. The famous lunar and mastodon pictures from the Test of Written Language, Third Edition (Hammill & Larsen, 1996a) were replaced in the Fourth Edition (2009a) with scenes from everyday life. While these new pictures were selected for their universal appeal, the change may have had inadvertent consequences. High school students can now write about these topics with a first- or second-grade vocabulary without there being a significant effect on their standard score. The way in which the test is scored has no way to penalize older students when they write with an immature vocabulary.

What Should Be Tested: In addition to the difficulties associated with obtaining writing samples, there also are serious questions relating to the balance of writing skills measured and to how writing samples should be scored. Students with writing disabilities vary in their profiles. A student with a major challenge in organization and planning may perform sentence-level writing tasks with ease and, as a result, demonstrate appropriate skill on a test such as the Woodcock-Johnson III without being able to write an essay. Students with graphomotor and spelling challenges may produce sentences that are phonetically readable by evaluators with years of experience with spelling disorders but may not be able to write text that is readily understood in the classroom. Students with weaknesses in sentence formulation may do poorly on the Contrived portion of the Test of Written Language, Fourth Edition. These same students, however, can write a story using simple sentences with a beginning, a middle, and an end that receives sufficient credit for a grade- or age-appropriate score.

Table 14.2 shows how a sample of three different tests of written expression, the Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a), the Peabody Individual Achievement Test—Revised (NU) (PIAT-R:NU; Markwardt, 1998a), and the Test of Written Language—Fourth Edition (TOWL-4; Hammill & Larsen, 2009) balance the skills assessed in terms of mechanics, spelling, vocabulary, sentence structure, and organization.

Scoring Writing Samples: There are three methods of scoring writing samples: holistically, analytically, and atomistically. Some writing samples are scored holistically, meaning that the evaluator scores the text based on a well-educated opinion as to the story's quality. Holistic scoring is based on an assessment of the product as a whole, generally using a four- or six-point scale. While holistic scoring is fast, it is problematic for several reasons. Interrater reliability can be low; evaluators may assign different weights to the various aspects of writing, resulting in scores that are subjective. Even though holistic scoring systems may attempt to establish rubrics, how are we supposed to provide one score that does justice to organization,

Table 14.2 **Percentage of Skills in a Sample of Written Expression Tests**

Test	Total Points	Mechanics		Spelling		Vocabulary and Word Choice		Sentence Structure		Organization Length and Style	
		Points	Percent	Points	Percent	Points	Percent	Points	Percent	Points	Percent
KTEA-II Written Expression Level 2a (Grade 1)	28	9	32%	10	36%	0	0%	9	32%	0	0%
KTEA-II Written Expression Level 2b (Grades 1 and 2)	70	22	31%	10	14%	0	0%	25	36%	13	19%
KTEA-II Written Expression Level 3 (Grades 3–5)	90	47	52%	3	03%	0	0%	25	28%	15	17%
KTEA-II Written Expression Level 4 (Grades 6+)	77	39	51%	0	0%	0	0%	23	30%	15	19%
PIAT-RNU Written Expression Level 2 (Grades 2–12)	24	4	17%	0	0%	2	8%	7	29%	11	46%
TOWL-4 Spontaneous Writing Quotient (Grades 4–11)	60	10	17%	9	15%	4	7%	14	23%	23	38%

style, mechanics, grammar, and usage? It is well documented that handwriting quality, word choice, length, and spelling errors have a large effect on holistic ratings (Charney, 1984). Holistic scoring is also weak in its potential to describe how writing skill develops over time. Can a four- or six-point scale define a writer's development from first grade through 12th grade in a way that is helpful to teachers?

The second method, analytical scoring, requires evaluators to assign a point value to specific components of writing, such as mechanics, spelling, sentence structure, and so on. Evaluators then total the point values to produce a global score. Analytical scoring has the advantage of forcing evaluators to assign the same weight to different components of writing. It directs them to examine written expression in the same way from the same perspective. Analytical scoring also has more to offer in terms of making specific recommendations that are helpful to students; the process forces us to think through the skills that differentiate good and poor writers. Unfortunately, analytical scoring can be quite time consuming, and few educators have hours to devote to scoring tests and writing reports. Even with all of this work, most tests of writing skill reduce test performance to one score, a number that can easily conceal both strengths and weaknesses.

Atomistic scoring focuses on aspects of written language that can be counted, such as the sequence of grammatically correct words, the number of words in clauses, or the percentage of words spelled correctly. Researchers have demonstrated that good writers write more words than poor writers (Deno, Marston, & Mirkin, 1982). Good writers also write longer sentences and a greater proportion of complex sentences (Morris & Crump, 1982).

With the advent of tools for progress monitoring, there are an increasing number of countable things in the assessment of written expression. According to research pioneered by Hunt (1965), sentence length as measured in T-units was a reliable means of assessing skill between ages and grade levels. Researchers have also examined clause density, the number of clauses divided by the number of T-units. While both measures have been found to increase from elementary grades to adulthood, the increase in the mean length of a T-unit from one grade to the next is not statistically significant. The new Correct-Incorrect Word Sequences subtest (CIWS) on the Wechsler Individual Achievement Test, Third Edition (Pearson, 2009) is touted as a measure of writing skill that is reliable and easy to score. It is also reported to be effective in differentiating between good and poor writers (Breaux & Frey, 2009).

What should we be evaluating when we assess written expression? Unfortunately, at this time, no one writing test will do it all. Evaluators need to use standardized tests of writing skill as well as multiple writing samples from the classroom. In this way we can see how children write for different purposes and audiences. We can also document their efforts to write with a structured writing process. Having tested more than 1,000 children, I have to say that very few students ever demonstrate the use of a writing process on a standardized test even when they are told to do so. Does the lack of planning and organization on a writing test speak to the quality of the prompt and the sometimes perfunctory nature of testing? Perhaps it reflects the failure of the student to generalize the writing process that has been taught and practiced in the classroom?

According to Berninger (1994), achievement in written expression should be measured in six main areas: (1) handwriting legibility, (2) handwriting fluency (words copied per time limit), (3) spelling words in a list format, (4) contextual spelling, (5) compositional fluency (words written within a time limit), and (6) paragraph writing.

Table 14.3 provides a list of tests of written expression and the skills that they measure.

Spelling

Spelling has the potential to take up more than its fair share of our working memory. Writers who stop to think about spelling rules interrupt their flow; they can easily become distracted and forget what they want to say. Confident spellers have

Table 14.3 **Skills Measured in Tests of Written Expression**

Test/Subtest	Alphabet	Spelling	Dictation	Punctuation and Mechanics	Written Vocabulary	Sentences	Transition	Paragraph Writing	Narrative Writing	Expository Writing
Assessment of Literacy and Language (ALL; Lombardino, Lieberman, & Brown, 2005) Grades: PreK, K, and 1	Letter knowledge: writing dictated letters	Invented spelling								
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Form B: Level 2a Grade: 1 (out-of-level testing permitted)	Writing letters in response to letter name; writing name	Words and sentences must be phonetically readable. Spelling assessed in separate subtest	Dictated sentence scored for mechanics and spacing	Initial capitalization and ending marks		Sentence completion and formulation; fill in the blank				
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Form B: Level 2B Grades: 1 and 2 (out-of-level testing permitted)	Writing letters in response to letter name Writing name	Words and sentences must be phonetically readable. Spelling assessed in separate subtest	Dictated sentence scored for mechanics and spacing	Initial capitalization and ending marks; capitalization of proper nouns		Sentence completion, formulation, and combining; fill in the blank			Retelling of frame story scored on number of words/sentence; subject matter, main point, logical flow, planning, and sequence	

(*continues*)

Table 14.3 (*continued*)

Test/Subtest	Alphabet	Spelling	Dictation	Punctuation and Mechanics	Written Vocabulary	Sentences	Transition	Paragraph Writing	Narrative Writing	Expository Writing
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Form B: Level 3 Grades: 3–5 (out-of-level testing permitted)	Writing name	Words and sentences must be phonetically readable. Spelling assessed in separate subtest	Dictated sentence scored for mechanics	Initial capitalization and ending marks; capitalization of proper nouns; serial commas; abbreviations; editing passage with errors		Sentence completion, formulation, and combining			Retelling of frame story scored on number of words/ sentence; subject matter, main point, logical flow, planning, and sequence	
Kaufman Test of Educational Achievement—Second Edition (KTEA-II; Kaufman & Kaufman, 2004a) Form B: Level 4 Grades: 6+ (out-of-level testing possible)		Words and sentences must be phonetically readable. Spelling assessed in separate subtest		Capitalization and ending marks: serial commas; abbreviations; colons, apostrophes; editing passage with errors		Sentence formulation and combining; fill in the blank	Conjunctive adverb; transition in paragraph		Retelling of frame story scored on number of words/ sentences, subject matter, involvement, introductory sentence, varied sentence structure, main point, logical flow, planning	

Oral and Written Language Scales—Second Edition Written Expression Scale (OWLS-II; Carrow-Woolfolk, 2011) Ages: 5–7	Copying and writing letters	Spelling is scored on most items.	One phrase	Capitalization and punctuation are scored on most items.	Synonyms	Sentence completion and formulation.			Writing a summary of a four-step process that is scored for conventions, syntax, and structure.	
Oral and Written Language Scales—Second Edition Written Expression Scale (OWLS-II; Carrow-Woolfolk, 2011) Ages: 8–10		Spelling is scored on most items.		Capitalization and punctuation are scored on most items. Editing	Synonyms and descriptive language	Sentence completion, formulation, and combining.	Writing a sentence that tells what will happen next.		Writing a summary of a four-step process, a note, summary, and a story with 3 events. All are scored for form and content.	Expressing an opinion that is scored for word use and syntax.
Oral and Written Language Scales—Second Edition Written Expression Scale (OWLS-II; Carrow-Woolfolk, 2011) Ages: 11–13		Spelling is scored on most items.	One dictated sentence	Capitalization and punctuation are scored on most items. Editing	Synonym and descriptive language; word structure	Sentence completion, formulation and elaboration. Writing a definition that is scored for conventions, word use, and syntax.	Writing a sentence that tells what will happen next.		Writing a summary of story that is presented in print and read aloud. Writing a story consisting of 3 events, and rewriting a note to make it more polite. All are scored for conventions, syntax, and structure.	Expressing an opinion that is scored for word use and syntax.

(*continues*)

Table 14.3 *(continued)*

Test/Subtest	Alphabet	Spelling	Dictation	Punctuation and Mechanics	Written Vocabulary	Sentences	Transition	Paragraph Writing	Narrative Writing	Expository Writing
Oral and Written Language Scales—Second Edition Written Expression Scale (OWLS-II; Carrow-Woolfolk, 2011) Ages: 14–16		Spelling is scored on most items.	One dictated sentence	Capitalization and punctuation are scores on most items. Editing	Word structure	Sentence completion, formulation, and combining. Rewriting a sentence with attention to style. Writing a definition.		Writing paragraphs that are scored for structure.	Writing a summary of a story that is presented in print and read aloud, and writing a note. All are scored for conventions, syntax, and structure.	Expressing opinion that is scored for word use and syntax. Writing a paragraph that interprets the data in a table. Writing descriptive paragraphs and stating opinions. All scored for conventions, syntax, and structure.
Oral and Written Language Scales—Second Edition Written Expression Scale (OWLS-II; Carrow-Woolfolk, 2011) Ages: 17–21		Spelling is scored on most items.	One dictated sentence	Capitalization and punctuation are scores on most items. Editing		Sentence completion, formulation, combining, and elaboration. Rewriting sentence with attention to style. Writing a definition that is scored for conventions, word use, and syntax.		Writing paragraphs that are scored for structure. Rewriting paragraphs that are scored for S and P structure.	Writing a summary of a story that is presented in print and read aloud. The summary is scored for conventions, syntax, and structure.	Writing a paragraph that interprets the data in a table. Writing descriptive paragraphs and stating opinions. Rewriting a paragraph with attention to style. All are scored for syntax and structure.

Peabody Individual Achievement Test—Revised: Normative Update Written Expression (PIAT-R(NU; Markwardt, 1998a) Level 1 Grades: K and 1	Copying letters and words. Writing 3 letters and words in response to letter names. Writing name.	Spelling assessed in separate subtest.	3 dictated sentences scored for mechanics and words that are recognizable (not spelling).						
Peabody Individual Achievement Test—Revised: Normative Update Written Expression (PIAT-R(NU; Markwardt, 1998a) Level 2 Grades: 2–12		Spelling assessed in separate subtest.		Capitalization of sentence beginning and ending marks *only* in story.	Word selection scored in story.			Credit given for identifiable paragraphs in story.	Story based on picture prompt. Scored on legibility, understandability, grammatical sentences, story grammar, paragraphs, capitalization of sentence beginning, and ending marks.
Phonological Awareness Literacy Screening (PALS; Invernizzi, Juel, Swank, & Meier, 2003–2011) Grades: K Criterion-referenced		Invented Spelling (K)							

(*continues*)

Table 14.3 *(continued)*

Test/Subtest	Alphabet	Spelling	Dictation	Punctuation and Mechanics	Written Vocabulary	Sentences	Transition	Paragraph Writing	Narrative Writing	Expository Writing
Phonological Awareness Literacy Screening (PALS; Invernizzi, Meier, & Juel, 2005) Grades: 1–3 Criterion-referenced		Spelling Inventory (1–3)								
Process Assessment of the Learner—Second Edition (PAL-II; Berninger, 2007) Grades: K–6	Writing lowercase letters while being timed. Copying sentences.					Writing sentences to go with sentences that are read aloud.			Compositional Fluency: writing about 2 topics for 5 minutes each; scored for the number of words.	Expository note taking and report writing.
Test of Adolescent and Adult Language—Fourth Edition (TOAL-4; Hammill, Brown, Larsen, & Wiederholt, 2007) Ages: 12–24		Orthographic Usage: editing for errors in punctuation and spelling.		Orthographic Usage: editing for errors in punctuation and spelling.		Sentence Combining				

Test of Written Language—Fourth Edition Contrived Writing Quotient and Spontaneous Writing Quotient (TOWL-4: Hammill & Larsen, 2009a) (Form A and B) Grades: 4–11		On Spelling subtest and Story; other subtests not scored for spelling.	Sentence dictation scored for Style (punctuation) and Spelling.	Capitalization and ending marks; serial commas; abbreviations; colons, and apostrophes In Style and in story.	Written Vocabulary subtest Vocabulary also scored in story	Sentence Combining subtest Logical Sentences subtest	Introductory phrases and clauses in story	Credit given for paragraph form, not content	Story based on picture prompt. Scored on spelling and mechanics, sentence structure, story grammar, style, and vocabulary.	
Wechsler Individual Achievement Test—Third Edition (WIAT-III; Pearson, 2009 Ages: 4–50 Grades: K–12	Separate Alphabet Writing Fluency subtest (PK–grade 3 only)	Scored on Sentence Combining and Sentence Building. Essay has score for correct word sequences. Spelling assessed in separate subtest.		Scored on Sentence Combining and Sentence Building. Essay has score for correct word sequences.		Sentence Combining and Sentence Building subtests	Scored on Essay Composition	Scored on Essay Composition		Essay Composition: 5-paragraph essay in response to written prompt
Writing Process Test (WPT; Warden & Hutchinson, 1992) Development and Fluency Grades: 2–12 Ages: 8–19		Scored in Fluency (3rd and final pass at writing an essay).		Scored in Fluency (3rd and final pass at writing an essay).	Scored in Development (1st pass at writing an essay)	Sentence structure/variety is scored in Fluency	Scored in 2nd pass of Development	Scored in 2nd pass of Development	Essay writing in response to written prompt	

(*continues*)

Table 14.3 *(continued)*

Test/Subtest	Alphabet	Spelling	Dictation	Punctuation and Mechanics	Written Vocabulary	Sentences	Transition	Paragraph Writing	Narrative Writing	Expository Writing
Woodcock-Johnson III Tests of Achievement (WJ III ACH; Woodcock, McGrew, & Mather, 2001a) Ages: 2–90+ Grades: K–17+	Spelling subtest includes tracing and writing small sample of letters.	Spelling assessed in separate subtests. Spelling and Spelling of Sounds.		Assessed primarily in separate subtest: Capitalization and Punctuation.		Sentence formulation (mostly simple sentences) on Writing Fluency subtest. Writing Samples: labeling, fill in the blank, sentences based on picture and written prompts, and sentence completion.	Transitional sentences within paragraphs on writing samples.			

more words at their fingertips, and they write with greater precision and detail. Sterling, Farmer, Riddick, Morgan, and Matthews (1998) found that adults with dyslexia rely more on single-syllable words to express their thoughts than their peers. Think of how it would be to write if you could not use words with two or more syllables (i.e., with two or more groups of sounds).

According to Ehri (2000), spelling and decoding are two sides of the same coin; they both rely on the same underlying skills. Spelling, however, is more challenging than decoding, and most children with weak decoding skills are also impaired in their ability to spell words with accuracy. The definition for dyslexia, in fact, includes the notion of poor spelling.

Spelling is about sensitivity to the structure of oral language; it is not about visual memory or how we think with shapes and pictures. The correlation between visual-spatial thinking on the Wechsler Intelligence Test for Children, Fourth Edition and spelling on the Wide Range Achievement Test, Fourth Edition (Wilkinson & Robertson, 2006), for example, is moderately low. Even sight reading (a serious misnomer) is a process by which letters and letter combinations are mapped to sounds (Ehri & Snowling, 2004).

Good spellers have phonemic awareness, and they understand how the code of print reflects the sound patterns of oral language. They are not only skilled at representing sounds in words, they are able to store and recall letters and letter sequences (M. J. Adams, 1990). This memory, referred to as orthographic memory, develops with exposure to print. When we look at the spelling of a word and think ''That doesn't look right,'' our orthographic memory is doing its job.

Spelling is a skill that develops in stages beginning with scribbles on walls and culminating in words of Greek and Latin origin. According to Moats (1994c), there are four main stages of early spelling development.

1. *During the prealphabetic or preliterate stage, young children begin to imitate writing behaviors that they observe in adults.* They happily interpret letters and numbers printed randomly in space as professions of love, the adventures of family pets, and tales of trips to the park.
2. *With the semiphonetic or prephonetic stage, children begin to show signs of left/right directionality, and they develop an awareness that letter symbols represent sounds.* Children in this stage may use letter symbols to stand for entire words. They may be confused between letter names and letter sounds; they begin to represent the sounds that they can perceive in words. This process is a direct reflection of their phonological awareness. They begin with sounds in the word-initial position before moving to sounds in the word-final position.
3. *The later phonetic stage heralds the ability to represent sounds systematically based on a limited awareness of what the mouth is doing.* During this stage of spelling development children approximate to the best of their ability the sounds that they perceive and do not represent all sounds with accuracy. Their spelling mistakes should not be regarded as errors; they are instead a visible record of their ability to discriminate speech sounds in words. Children typically have difficulty representing nasalized vowels (''wet'' for *went*).They might represent syllabic consonants with single letters (''tabl'' for *table*) and inflectional endings will be just a hint of the suffixes to come (''askt'' for *asked*). Vowels are conveyed in all their phonetic glory (bowt for *boat* and *gow* for *go*). Blends *tr* and *dr* are represented as they are perceived (''chrap'' for *trap*, and ''jres'' for *dress*); intervocalic flaps, known for their imprecise articulation, can be spelled with a *d* (''odr'' for *otter*).
4. *During the transitional stage, children fine-tune their ear and move into conventional spelling, with a growing understanding of silent letters, vowel teams, syllable patterns, and even irregular words.* In their desire to use spelling rules, they may overgeneralize some of their new knowledge, resulting in spellings such as ''gote'' (for *goat*) or ''fihte'' (for *fight*).

A Little on the History of English

Spelling development, however, continues beyond basic rules of sound–symbol correspondence. For this reason, our language is described as ''morphophonemic.'' English spelling is not just a record of how we pronounce our words; it preserves within it the history of our language and word meanings. The oldest layer of the English language, known as Anglo-Saxon or Old English, dates back to about AD 500 when Germanic tribes (Angles and Saxons) invaded Britain. Most of the vocabulary that we use to describe everyday objects, family members, animals, numbers, and feelings comes from this period.

In 1066 William the Conqueror invaded Britain, bringing with him the Norman French language and initiating the period that is referred to as Middle English. While the populace spoke in English, Norman French became the language of choice for government, trade, religion, and scholarship. Chaucer (1343–1400), the greatest poet of the period, established English as a literacy language in its own right. During this period the English language expanded to include words such as *court*, *rent*, *poor*, and *miracle*. Many of our modern spellings herald from this time; the use of *qu* for /kw/ and *c* before *e, i*, and *y* all come to us from French.

In 1476 William Caxton brought the printing press to London; as a result, the London-based dialect became the standard for written English. With the advent of the Renaissance, scholars found it necessary to create a new vocabulary that would do justice to the many scientific discoveries of the time. They enthusiastically turned to Greek as a source of new words for science and the humanities. The rate at which new words entered the language was alarming for some. Critics decried the fascination for foreign elements (known as inkhorn terms), citing them as frivolous and indulgent.

At the same time, England became the setting for the Great Vowel Shift, which remains to this day the greatest event in linguistic history. The comingling of dialects and the influx of new words resulted in a new standard for speech. Within the course of two centuries, eight vowels changed in their pronunciation, moving from one position in the vowel quadrangle (or circle, if you prefer) to another. Each time there was a change in pronunciation, the remaining vowels in the system had to accommodate. Only in this way would the balance of the vowel circle be preserved, giving us qualitatively distinct sounds that listeners could easily discern. The Great Vowel Shift led to many of the unusual spellings such as *night*, *through*, *though*, *rough*, and *bough* that we have today. Additional changes to sounds and how they were spelled in the 17th, 18th, and 19th centuries brought us to Modern English.

You may note that there are times when the spelling does not reflect the sounds in words. In many cases in our language, the meanings of words are preserved at the expense of sound–symbol correspondence. We have, for example, the words *sign*, *signal*, *signatory*, and *signature*, in which the spelling carefully documents the progenitorship of words and related word meanings. Balmuth (1992) speculated how much more difficult vocabulary acquisition would be if our spelling system was entirely phonemic; *know* and *knowledge* would be spelled as ''noe'' and ''nollij'' (p. 207). Knowledge of these relationships and of word origin as reflected in their spelling is an essential part of our literary heritage and of our quest to become independent lexophiles.

Issues in the Assessment of Spelling

Tests of spelling skill typically require students to write words in a list format. The word is dictated, used in a sentence, and then repeated. The student is required either to write or point to the word. Some tests of spelling begin with sound–symbol knowledge; students write or point to letter symbols in response to letter names or sounds. This practice permits test publishers to include younger students in kindergarten and the beginning of first grade.

Some students will do better on spelling tests than they do when they are writing sentences or paragraphs. It is not unusual for students to do acceptably on a formal spelling test while spelling poorly when writing in context. Writing in context is, of course, the last word on spelling ability—the reality check. Given that the English language is about 85% predictable without any knowledge of the history of the language and word meanings (Hanna, Hanna, Hodges, & Rudorf, 1966), we should expect an absolute minimum for spelling accuracy to be about the same in text. Of course, good instruction should leave educators to wonder about the 4% of words in English that are truly irregular.

When assessing spelling, three questions help to organize our thoughts and establish a baseline for spelling instruction and measuring progress (Moats, 1995):

1. *Are the sounds represented accurately?* Does the student have an explicit awareness of individual speech sounds in words, or does he or she require additional work in phonological awareness and perhaps even sound discrimination?
2. *Are words spelled according to the rules?* Students who represent sounds accurately but who are lacking in spelling conventions may be able to begin a little higher on the phonological awareness and spelling continuum.
3. *Are the meaningful parts of words spelled correctly?* Students with a command of basic spelling rules are ready to study word structure: prefixes, roots, and suffixes. This study is not relegated to issues of spelling alone; understanding word structure permits students to figure out word meanings on their own and improve their vocabularies.

In Table 14.4, Elva represents sounds in words accurately. She is ready to work on variant spellings for vowels, sound–symbol correspondences that are conditional, suffixes, and the six syllable patterns.

Alvin has difficulty discriminating sounds in words, and he confuses sounds that are close in their articulation. (See Chapter 10.) He requires direction instruction in phonemic awareness as a foundation for sound–symbol correspondence. He might also benefit from having his hearing tested.

Ellen has no difficulty representing sounds in words; she has mastered (with the exception of -ble) the six syllable patterns. She is ready for instruction that will focus on the Latin layer of the language (prefixes, suffixes, and roots) together with Greek combining forms. Studying morphology will not only improve Ellen's spelling; it will also improve her vocabulary.

As part of my discussion of spelling errors in my reports, I always note whenever spelling errors are consistent with word recognition/word attack errors. In this way I provide evidence from two sources of skills mastered and skills in need of instruction. Testing should not be an exercise in elevating random errors or careless mistakes to a position of instructional prominence. As evaluators, we are interested in patterns of responses and the automaticity with which skills are executed.

Handwriting

In the early 1900s handwriting, then known as penmanship, was considered to be an important part of the school curriculum. Since that time, however, handwriting has lost much its stature, and when it is taught, it is typically taught only as a by-product of written expression as a whole. Many teachers, in fact, view handwriting instruction as archaic, given the popularity of word processors and voice recognition systems. Why teach children to print when they eventually will rely on technology?

Unfortunately, the die for written expression is cast long before technology is made available to children. Children with poor handwriting not only suffer from the stress of learning how to write, they also struggle with biased teacher perception of their writing skill. It has been documented that teachers give higher grades to those with neat handwriting even when all other factors are equal (Briggs, 1980). What teacher has not quietly dreaded the prospect of deciphering illegible handwriting and the additional time that

Table 14.4 **Spelling Profiles**

Elva		Alvin		Ellen	
Word	**Spelling Sample**	**Word**	**Spelling Sample**	**Word**	**Spelling Sample**
landed	landid	wanted	wantid	departments	departmints
there	their	read	rit	location	locashun
surch	search	didn't	dint	enable	enabel
trying	triing	kept	cepd	gracious	grashus
rock	rok	with	wif	separate	separet
escapes	askapes	asked	askt	gymnasium	gimnasiem
back	bak	try	triy	pleasure	plesure
claim	clame	anybody	eny botty	telephone	telefon
right	rite	search	srth	introvert	intravert
wait	wate	excited	egsitd	definition	defunishun
arrive	arive	every	efry	interweave	interweave
celibrate	selibrate	practiced	pacdis	investigate	investugate

it takes to read and grade an assignment with poor handwriting?

Handwriting challenges leave a lasting impression on young writers and their self-concept as learners. According to Berninger, Mizokawa, and Bragg (1991), many children with poor handwriting view writing as patently unpleasant, and they may go to great lengths to write as little as possible or avoid writing altogether. We have a term for math anxiety. There does not appear to be a comparable label for children whose faces fall when we put a pencil in their hands.

We all think we know good handwriting when we see it. What, however, may pass a legibility test is not synonymous with having a functional graphomotor skill that is performed with automaticity, accuracy, and ease. In addition, handwriting skill in individuals can vary from day to day and even within the context of one writing sample (Herrick, 1960). Handwriting does not correlate with IQ (Askov & Peck, 1982). Girls have better handwriting than boys (Graham & Miller, 1980). Handwriting performance varies depending on the nature of the assignment; children will demonstrate better skill on a copying task than on a creative writing assignment (Graham, 1986b). Children with legible handwriting on the Friday spelling test may be unfairly chastised for their apparent lack of care in composition writing when the true culprit is the increased processing demands of the assignment. In addition, our own ability to evaluate handwriting may reflect our preconceptions regarding handwriting skill, our knowledge of the purpose of the evaluation, and our own energy levels.

Evaluating handwriting continues to be a highly subjective process with uncertainty regarding the skills that contribute to efficiency and legibility.

In many cases children are administered tests of visual-motor skill, such as the Beery-Buktenica Developmental Test of Visual-Motor Integration, Fifth Edition (Beery & Beery, 2004) as an indicator of handwriting ability. However, Berninger et al. (1992) reported no correlation between performance on this test and handwriting ability in children in grades 1 through 3.

According to Berninger and Richards (2002), the hand is not exclusively dedicated to learning how to print. There are two developmental paths. One path leads to printing, a skill that is linguistic in nature; the other leads to drawing. Drawing is a nonlinguistic skill; it does not tie into the language system. There are children with excellent artistic capabilities and poor handwriting; there are also children with poor artistic skills and the penmanship of John Hancock. While handwriting initially may be fueled by perceptual and motor abilities, handwriting at the elementary school level and above is a linguistic process where letter forms, letter names, and written shapes must be retrieved easily and efficiently.

Research into predictors of writing skill indicate that automatic letter writing is the best predictor of length and quality at the primary school level (Graham, Berninger, Abbott, Abbott, & Whitaker, 1997) and at the secondary and college levels (Connelly, Campbell, MacLean, & Barnes, 2006; Connelly & Hurst, 2001). Most tests of handwriting do not measure the skills of kindergarteners, a time when handwriting instruction commences, and most tests do not provide teachers with a means of determining writing proficiency and monitoring progress.

Process for Evaluating Writing Samples

Once you have made your decision about what writing test(s) to use and you are armed with multiple samples of writing, it is time to analyze the writing samples. It is helpful to follow a checklist to ensure that you address all skills systematically and comprehensively. If you follow the listed steps, you will be able to write up your observations easily, quickly, and authoritatively.

Process for Evaluating Writing Samples

1. Be sure that the spell-check options for spelling, grammar, and readability are enabled by going into Word Options.
2. Type the writing sample into the report exactly as written. Take care to ensure that the autocorrect function does not correct any spelling or grammatical errors.
3. If the handwriting is worthy of comment, you may wish to scan a picture of the writing sample into the report. If so, be careful not to include any printed text or the writing prompt picture from the protocols. The protocol itself is protected by copyright.
4. Consider the quality of the handwriting:
   a. Did the student write in print, in cursive, or in a combination of the two?
   b. Is the handwriting legible or hard to read? Does the lack of intelligibility make it hard for us to understand?
   c. Based on your observation of the student writing:
      i. Describe the student's posture.
      ii. What hand did he or she use? Was the paper anchored?
      iii. Did the student write with a proper grip?
      iv. Were letters formed correctly?
      v. Were they executed with controlled strokes? Do they have an appropriate slant?
      vi. Were the letters of appropriate size?
      vii. Were they oriented to the line?
      viii. Were they written with excessive pencil pressure?
      ix. Were there many erasures? Although frequent erasures are sometimes taken as a sign of impulsivity, it also means that a student is trying to do a good job.

5. Copy the writing sample into a separate Word document file. Read the text.
   a. Is there a beginning, a sequence of events, and an ending?
   b. Is the story cohesive? Does it stay on topic?
   c. Is the content mature?
   d. Does the student transition smoothly from one sentence to the next?
   e. Is there evidence of planning, organization, and revision?
6. Mechanics (capitalization and punctuation):
   a. Does each sentence begin with a capital letter and end with an appropriate ending mark?
   b. Are all proper nouns capitalized?
   c. Are commas used for dates, for items in a series, and to offset clauses and quotations?
   d. Are quotes offset with quotation marks?
   e. Are there colons and/or semicolons?
7. For the purpose of analysis, remove extra periods. Add in missing periods. Add a space/line between each sentence or sentence fragment. (This just makes the individual sentences easier to read.)
   a. Label each sentence according to sentence type: simple, compound, complex, compound/complex, run-on, or fragment.
   b. Are there adjectives, adverbs, and descriptive phrases?
   c. Calculate the mean sentence length. The mean sentence length is the total number of words divided by the number of sentences.
   d. Is there noun/verb agreement? Are there grammatical errors? Are there awkward constructions?
   e. Do the sentences make sense?
   f. Did the student maintain the correct use of tense?
   g. Does the student rely on high frequency words that lack descriptive power? Does the student use words that are more appropriate in informal, oral communication?
   h. Is the vocabulary mature, descriptive, and precise?
8. Run spell-check.
   a. Categorize each spelling error according to this list:
      i. Spell-check catches and corrects the word with the first option.
      ii. Spell-check catches and corrects the word with one of the secondary options.
      iii. The word is not caught at all. Be careful: spell-check does not capture all errors.
   b. Write down:
      i. the total number of words;
      ii. the total number of sentences; and
      iii. the Flesch Kincaid Readability Index (sometimes referred to as a ''scale'').
   c. Calculate the spelling accuracy. The spelling accuracy is the number of words spelled correctly divided by the total number of words in the writing sample.
   d. Examine the spelling errors. Answer the next questions:
      i. Are speech sounds represented accurately?
      ii. Is the spelling conventional? Does the student know the rules for spelling? What rules has the student mastered or not mastered?
      iii. Does the student have a command of words from Latin (prefixes, roots, and suffixes) and Greek combining forms?
      iv. Are the spelling errors consistent with performance on a standardized spelling test?
   e. Consider the Flesch Kincaid Readability Scale. This scale provides a grade-level equivalent that is based on the average number of words in sentences and the average number of syllables in words. The presumption is that multisyllable words and lengthy sentences represent a higher level of skill. Most students write passages with a readability index that is a year or two below their grade level. When the readability Index is unusually low, consider the maturity of the vocabulary and the length of sentences.

The Flesch Kincaid Readability Scale will overestimate the reading level of a passage if it is written with run-on sentences.

9. Write up the results in language that is free of jargon and easy to understand. Review before submitting.

Example of Informal Writing Assessment: Toby

The next writing assessment was written by Abigail Baker, a special education and elementary education teacher, using the steps just listed.

Toby, who is 10 years old and in fourth grade, was asked to write a story based on a picture of two astronauts in space with a rocket ship, a task that she found highly motivating. Upon presentation of the prompt, Toby thought for a minute and then wrote steadily for the remaining 15 minutes. This is what she wrote:

> *First, Lilly was dreaming about going to space. She was geting ready to go and off he went. She realized that she did not have a rocket but she asked if she barrow one from the president he said yes.*
>
> *Soncend, she had a rocket but she said, something is missing but what? then she thought and thought and said Oh I forgot a buddy so she asked Abby if she could some and she said yes? Finilly, they went to space a they realized that they where the first people on the moon and I said Thank you to Abby for coming. The Lilly woke up and went over the Abbys house and toled Abby the dream then they went to the moon for real and lived Happly ever after.*

Toby printed her story; her handwriting was easy to read. She wrote with her right hand, used a proper pencil grip, anchored the paper, and used appropriate writing pressure. Letters were correctly made from the top down and were written with controlled strokes, appropriate size, and were oriented to the line. Erasures were minimal.

Toby asked whether her story should have a beginning, a middle, and an end. She indicated that she planned to organize the beginning, middle, and end of her story by using the words *first, second*, and *third* like her teacher tells them to do in school. Toby's story had a sequence of events; the beginning was abrupt and did not establish a setting for the story. The ending was classic; with the words *happily ever after* Toby brought her story to a rapid close, eliminating the need for further plot development.

Toby's content was creative but somewhat immature for her age and grade. She wrote in the past tense; there was adequate noun/verb agreement. There were few adverbs and adjectives. Toby's use of first, second, and finally was not appropriate, and it did not help with the logical flow of the story. On a more positive note, Toby is becoming aware of the role of signal words and how they can be used to organize text content.

The use of run-on sentences also contributed to the disrupted flow of the story. Had Toby's sentences been punctuated correctly, the story would have consisted of three simple sentences, one compound sentence, two complex sentences, three compound-complex sentences, and one true run-on sentence. (The Flesch Kincaid

(continued)

Readability Index was not calculated given the predominance of run-on sentences.) Despite what is an apparent variety of sentence structure, Toby is not yet adept at working with cohesive ties. Vocabulary was adequate; Toby occasionally used words that were more appropriate for oral language than for the more formal style of written expression.

There were a few grammatical errors. Toby occasionally omitted words and letters. Mechanics were poor. Toby did not consistently begin her sentences with capital letters and conclude them with ending marks. She used commas to offset signal words; however, there was no evidence that she understood how to punctuate quotes or signal possession. She capitalized proper nouns but not the title (President).

Spelling accuracy was 91%. Toby made 12 spelling errors in her story. Seven of the errors were caught and corrected by spell-check on the first option, four of the errors were caught and corrected with one of the secondary options, and only one word, *barrow* (for *borrow*), was not caught at all. Errors were primarily omissions and additions. Sounds were, for the most part, represented accurately. Toby is ready for additional instruction in structural analysis including, but not limited to the doubling rule and schwa.

Recommendations

Spelling

Little research supports a natural approach to spelling instruction. Children with learning disabilities do not acquire spelling skills by virtue of immersion in a language-rich curriculum. Many whole language teachers provide some measure of formal spelling instruction in their classrooms (Fisher & Hiebert, 1990). Much of this instruction, however, is directed after the fact in ''teachable moments.'' The problem with these teachable moments is that the errant skill has already become part of the child's repertoire and, as such, is very difficult to correct. Permit me to exaggerate just a little: Once words are incorrectly encoded in memory, I think that nothing short of a lobotomy can remove them from use.

An effective spelling program does not teach students individual words; it teaches students rules that they then apply to new words. A good spelling program is directly taught, and it is coordinated with the reading program. It should focus on one rule at a time in a sequence that systematically builds in complexity from sound–symbol correspondence, to basic spelling patterns, and culminates in the teaching of words of Greek and Latin origin.

For most students, spelling problems cannot be treated without a strong phonological awareness component and the use of visual, auditory, and kinesthetic techniques (VAKT). Students should practice segmenting words into sounds and linking them to symbols. They should then work on acquiring the rules for conventional spelling and understanding word structure. Dictation should begin at the sound level, continue with words, and end with words in sentences; feedback should be provided immediately and always link back to sound patterns and rules that students have been taught. Irregular words should be introduced slowly, only one or two at a time. Homophones (there, their, they're) should not be taught together; it is best to master one word before introducing the second or third. Atypical spellings should always be taught with VAKT techniques. Students should develop spelling notebooks, which provide an organized system for reviewing spelling patterns and irregular words.

Word walls, lists of words posted in the classroom, that are based on letter symbols are not appropriate for children with spelling disabilities; think of how many sounds the letter a can have (cat, awe, art, ate, sofa, ant, amp, palm). How confusing it can be!

Handwriting

Not much research speaks to the superiority of printing over cursive or vice versa. Graham et al. (2000) believed that printing was more appropriate for younger students because printing letters is thought to reinforce reading and spelling. Advocates for cursive instruction note that students writing in cursive have fewer reversals and that early instruction in cursive eliminates the need for students to learn two different writing systems (Cox, 1992). Regardless of the system to be used, it is important that children receive direct, systematic instruction in handwriting.

Authorities on teaching handwriting to children with dyslexia stress the importance of using a multisensory approach (Cox, 1992; Slingerland, 1981). Children with poor handwriting benefit from activities designed to strengthen hand muscles and control of their pencils. Mazes, connecting dots to create letter forms, tracing, and imitation all provide good practice. Once letters are legible, children can then be trained to write with greater automaticity. It is helpful to provide models of letter formation with arrows so that directionality (such as top down) is clear. Writing letters from memory, writing letters from dictation (first individual letters and then in words), and writing in text are all beneficial for students to increase their written output. Students can then be supported to increase their writing efficiency with the use of timed activities in which they count the number of letters or words written and assess their legibility.

Writing

Graham, Harris, and Larsen (2001) speak to the importance of finding the right balance of instruction for writers with learning disabilities. Skilled writing depends on the integration of meaning, process, and form, and the emphasis for each area needs to be adjusted to meet the needs of the child. Some children will require specialized instruction that focuses on handwriting and spelling; others may require specialized instruction in syntax; while still others may struggle with ideation and organization.

Regardless of a child's individual profile, researchers note the importance of teacher expectations and how low teacher expectations result in more criticism, fewer interactions with the teacher, and less constructive feedback for students with writing disabilities. The unintended effect is that writers who are in need of the most practice and instruction often receive less. Some classroom teachers struggle with the behavioral side effects (clowning, frustration, and outright refusal) that writing assignments sometimes inspire. Young writers who develop maladaptive behaviors in response to writing challenges may require behavioral support in addition to explicit, systematic instruction in writing.

According to Graham and Perin's report *Writing Next: Effective Strategies to Improve Writing of Adolescents in Middle and High Schools* (2007), good instruction in writing should establish clear and explicit goals for each part of the writing process. While the report was written to address the needs of adolescent writers, many of the areas can also be applied to young writers. Good writing instruction should include, but not be limited to, these 10 elements:

1. *A functional writing system.* Writers of all ages need to have a functional writing system that permits them to focus on their content and style. Graham and Perin (2007) found that word processing has much to offer students with writing challenges by reducing the labor required for editing and revision. Word processing, however, presumes that students can type and that they can read. Russell (1999) found that students who could type at a rate of 20 words per minute were more successful with word processing than when writing by hand. When keyboarding

is not successful, voice recognition systems may be appropriate; such systems cannot, however, be used in a classroom or noisy environment, and training is needed for students to learn how to speak clearly into the microphone. It is important to understand that word processing and voice recognition systems are not a fix on their own. Students will still require direct, systematic instruction in all other aspects of writing, and they must be able to read.

2. *A process approach to writing.* A process approach to writing involves creating a structure for writing that follows a sequence from brainstorming through to the finished product. Process approaches to written expression vary. Some focus on the use of graphic organizers; others continue to stress the use of the ''old-fashioned'' numeric outlines. While some students benefit from graphic organizers, students with visual-spatial deficits may find that numeric outlines are better suited to helping them with planning and organization; such outlines may not tax students' understanding of spatial constructs to the same degree. Regardless of how it is implemented, the process approach to writing needs to be directly taught with frequent opportunities for practice and application. The process approach will be generalized by students more successfully when used with consistency from classroom to classroom, from grade to grade, and from school to school. The Graham and Perin report (2007) states, ''Explicit teacher training was a major factor in the success of the process writing approach'' (p. 20).
3. *Prewriting activities.* Brainstorming and prewriting activities improve the writing skills of adolescent writers; according to Graham and Perin (2007), less is known about the effects on students with writing challenges. Prewriting activities ensure that students understand the purpose of their task and the needs of their audience and that they have something to say before they work with pencil in hand.
4. *Strategies for planning, revising, and editing.* Strategies for planning, revising, and editing need to be made explicit for developing writers; the process by which strategies are taught needs to be implemented using the gradual-release-of-responsibility model originally proposed by Pearson and Gallagher (1983). As applied to writing, this process begins with the teaching of background knowledge, modeling, and memorization of the strategy, and then moves to practice and independent application. Many students with learning disabilities find the use of revising and editing checklists to be helpful.
5. *Inquiry.* The use of inquiry activities to develop ideas is an essential component of the revision part of writing, and it supports students to think deeply about their content and whether they are meeting the needs of their audience. Asking purposeful questions is an important part of reading comprehension instruction and may be more effective when inquiry activities are included in both reading and writing instruction.
6. *Sentence combining.* The importance of sentence combining activities for students cannot be overestimated. The purpose of sentence combining is not to highlight student errors but to focus on the inherent variation in the way that we express ourselves. Sentence combining forces students to expand their repertoire of syntactic structures and make linkages between facts and concepts. In addition to sentence combining, students should also work with sentence completion tasks, sentence expansion, and changing from one type of sentence to another (declarative to interrogatory).

   Students with difficulty expressing themselves at the sentence level require oral language testing. When problems exist at the oral and the written level, both areas need to be treated. This is a perfect opportunity for the teacher and the speech and language pathologist to work together.
7. *Summarization.* Summarization requires skill in categorization and in discerning what is important versus what is not. According to

Graham and Perin's report (2007), summarization can be taught either through a rule-governed process or by modeling what a good summary is. In either case, the instruction has to be explicit in order to be effective.

8. *Models of good writing.* Studying models of good writing permits students to analyze elements of good writing and to emulate them in their own writing. Less is known about the potential of this type of instruction for weaker writers.
9. *Collaborative writing.* Opportunities to write collaboratively have a strong effect on writing quality for many adolescent writers. The studies, however, for low-achieving writers are more limited in this area (Graham & Perin, 2007). Opportunities for collaborative writings are not a substitute for direct, systematic instruction in writing.
10. *Writing as a tool for learning.* The Graham and Perin report (2007) highlights the importance of writing as a tool for learning and its role in literacy instruction. According to the authors, writing for content learning is effective for all content area subjects; students organize their thoughts, make connections, and develop schema to support additional learning. Whether poor writers are able to reap the benefits of using writing as a tool for learning needs to be investigated further.

Conclusion

Most children with reading challenges also have writing difficulty. Written expression is a highly complex progress that depends on the integration of many different skills. Handwriting, spelling, mechanics, vocabulary, syntax, and organization each play a role in how both young and mature writers express their thoughts on paper. The assessment of written language should include measures of handwriting legibility and fluency, spelling in a list and in context, mechanics, syntax, and paragraph writing. Evaluators may also find it necessary to assess the oral language foundation. Knowledgeable evaluators will take care to ensure that writing evaluations are designed to answer all pertinent referral questions, and that different types of writing skills are addressed.

Review Questions

1. Sean has been referred for evaluation due to the poor quality of his writing skill. Explain to the team why the evaluation should also include oral language testing.
2. Lucas struggled with writing the alphabet in kindergarten, and in first grade he writes as little as possible. His handwriting is labored, and he has great difficulty orienting his letters to the line. In art class, however, Lucas is known for his detailed line drawings; he performed exceptionally well on a measure of visual-motor integration requiring that he copy geometric designs with pencil and paper. Lucas has been told that he needs to be neater when he writes, and that he should not rush his work. What are your thoughts?
3. Why are automaticity and accuracy critical for written expression?
4. Reed earned an average score on the WJ III Writing Samples subtest; he demonstrated skill well below the average range on the KTEA-II Written Expression subtest when tested on a different day with another evaluator. The team believes that the WJ III is proof that Reed can write when he wants to. Explain possible reasons for the difference in scores.
5. Why do young children who struggle writing their alphabet require additional handwriting instruction?
6. What are the benefits of including spelling in a reading evaluation?

Chapter 15

Last Words

Fairness dictates that we acknowledge those who extol the virtues of illiteracy. At the turn of the 20th century, G. Stanley Hall (1907), psychologist and educator, advocated a developmental approach to education based on physical maturation in which adolescents would focus on the moral qualities needed to live in society. He believed that they would be better served by spending less time on classical languages, grammar and style (which he called ''linguistic manicuring''), reading (''language through the eye''), and concrete language (''word painting the material world'') (pp. 245, 246, 249).

According to Hall (1907), print was a pale substitute for the richness of oral language, similar to the difference between a ''museum of stuffed specimens'' and a ''menagerie'' full of living, breathing animalia (p. 246). He wrote:

> *The winged word of mouth is saturated with color, perhaps hot with feeling, musical with inflection, is the utterance of a living present personality, the consummation of man's gregarious instincts. The book is dead and more or less impersonal, best apprehended in solitude, its matter more intellectualized; it deals in remoter second-hand knowledge. (p. 246)*

In defense of illiteracy, Hall (1911) argued that those who did not read would experience less ''eye strain and mental excitement'' and that they were ''probably more active and less sedentary'' (p. 443). They would also be free of temptations of ''vacuous and vicious reading.'' In Hall's opinion, ''we are prone to put too high a value both upon the ability required to attain this art and the discipline involved in doing so.''

Hall's opinions on literacy certainly should not stand as the sum total of his life work. Lest we think that he was harebrained, it is important to acknowledge that Hall contributed much to the field of psychology, claiming the honor of several firsts in the field. He was the first American to earn a PhD in psychology; he was the first president of Clark College; and he was the first president of the American Psychological Association.

Whether we agree with Hall and his views on education (and I am sure that Hall would agree that the world has changed greatly), there are some important facts relating to reading in school, in the home, and in society. Children who can read find school motivating and rewarding; those who do not find school to be boring at best and profoundly discouraging at worst. No child walks into a kindergarten classroom saying that he or she does not want to become a reader. Sometimes, however, nature and happenstance make learning hard.

Young poor readers often think that good readers are smart; they perceive skill in reading to be a sign of intelligence. These children are not far from the truth. Although decoding skills may not correlate with intelligence, it is how we become smarter. Books take us places hitherto unimagined and inaccessible without leaving the comfort of our chairs. In 1959 there was a *Twilight Zone* episode called ''Time Enough at Last,'' in which the sole survivor of nuclear holocaust is delighted to contemplate a future reading the classics without criticism from his wife, who called his books ''doggerel.'' He is surprisingly unaffected by the loss of his fellow humans; he falls into despair only when his glasses break and he can no longer read.

Reading, however, is not just about how we spend our idle moments. Gone are the days when we could live solely by our wits and our hands; reading has become an essential daily living skill. We read to manage our homes and our finances; we read to acquire new skills, live safely, and make informed decisions. Simple tasks such as the installation of infant car seats, taking medicine, and even filling out a ballot all require us to read with accuracy and confidence. We read to raise our children.

Better-educated and literate adults enjoy improved possibilities for employment, higher-paying jobs, and all the fringe benefits that financial security has to offer. They are more successful in marriage, and they have nicer homes. They are less likely to be remanded to an institution (Khatiwada, McLaughlin, Sum, & Palma, 2007).

Employment prospects improve when years of education increase. According to figures reported by Khatiwada, McLaughlin, Sum, and Palma, only 55% of high school dropouts were successful in their job searches. Those who managed to walk across the stage and get their diplomas had brighter futures; 70% of them found jobs. Of course, those with a master's or professional degree topped the charts with an employment rate of 84%. Of course, these numbers do not reflect the recent economic downturn.

The comparison does not end there. Higher employment rates are also accompanied by higher wages. A high school graduate can expect to earn $10,000 more per year than those who drop out of school (about $23,000 annually). In order to put this figure into perspective, however, we have to note that the weighted average poverty threshold for a family of four is about $22,000 (DeNavas-Walt, Proctor, & Smith, 2010). College graduates command salaries in the range of $50,000 yearly (Khatiwada et al., 2007).

According to the 2008 report of the National Commission on Adult Literacy, ''Education drives the economy'' (p. 1). While we may bemoan the additional tax burden that prosperity brings to us as individuals, we have to acknowledge the net fiscal contribution that educated adults make to federal, state, and local governments; our economy depends on it. Those with a master's or higher degree contribute more than $1.3 million to society's coffers over the course of their 49 years in the workplace. In stark contrast, adults without high school diplomas may well receive more from Medicare/Medicaid, food stamps, rental subsidies, social security, and the like than they contribute, resulting in a mean work life estimate of negative $33,000. Although we perceive public education to be expensive, it is not as expensive as the burden that society incurs when illiteracy and unemployment take their toll.

High school dropout rates do not bode well for the future; the graduation rate for the class of 2007 is an alarming 68.8 percent (Swanson, 2010). Those entering the workforce do not have the same level of education as those retiring from it, leaving hopes for innovation and efficiency in less capable hands (Jones & Kelly, 2007). Thirty-eight percent of employers rated high school graduates as being deficient in reading comprehension; 72% were declared deficient in written expression (National Endowment for the Arts, 2007).

The potential for decreased profits is matched by increases in judicial and social services. According to the U.S. Department of Justice study based on data from 1997 (Harlow, 2003), about 41% of inmates in state and federal prisons had not completed high school or earned a general equivalency diploma, a rate that was more than twice that of the general population. Within this group, 44% were identified as having a limiting condition, such as difficulty seeing; difficulty hearing; a learning, speech, or physical disability; or a mental and/or emotional condition. This group also included a disproportionate number of blacks and Hispanics. The majority of inmates (34.9%) reported dropping out of school due to behavior or academic problems or loss of interest (almost twice the rate of the general population). This high reported rate has led to the popular myth that states base their projections for prison budgets on the reading scores of third-grade children. While the truth is much more complicated, the research on educational outcomes suggests that the link between illiteracy and prison is very real (Lesnick, Goerge, Smithgall, & Gwynne, 2010).

Apart from personal and societal economic advantages, reading enhances our problem-solving capacities as individuals and as members of society. Maryanne Wolf explained (2007) that reading and writing have permitted us to move beyond what we can remember from day to day. With print, we have an ever-increasing source of knowledge to be shared with our contemporaries and with future generations. While some may think that we are born as blank slates, we do not remain that way for long. Reading permits us to acquire knowledge rapidly and, at the same time, to think deeply about what we read. Wolf stated, ''Few inventions ever did more to prepare the brain and poise the species for its own advancement'' (p. 216). She asked: ''What would be lost to us if we replaced the skills honed by the reading brain with those now being formed in our new generation of 'digital natives,' who sit and read transfixed before a screen?'' (p. 221).

Efforts to learn about how we feel, reason, and read have come a long way. Phrenology is no longer viewed as a science but as a curiosity of 19th-century salons. The content of Skinner's black box, once declared off limits by the empiricists, is now being mapped and studied with increasing precision. We now have a growing pantheon of researchers who use keen intelligence, knowledge of the scientific method, and state-of-the-art medical technology to provide insight into what happens when the brain encounters print. This research is permitting us as educators to provide better instruction to typical learners and more expert instruction to those with diverse needs.

The teaching profession is unique in its calling and its responsibility; what other profession can claim to reach into the neural systems of young brains to forge links between new and old? As evaluators, we stand at that all-too-critical juncture between teachers and how students learn. Properly equipped with our powers of observation and tools of assessment, we illuminate individual strengths and weaknesses as a foundation for effective instruction.

Answer Key

Appendix A

Chapter 1

1. Establish a child's skill levels with respect to his or her peers.
2. The distribution of scores about the mean.
3. The test provides consistent results between test administrations, from evaluator to evaluator, between different forms, and within the test itself.
4. This was not how the test was normed.
5. The confidence band for 2009 is 85 to 95; the confidence band for 2010 is 80 to 90; because the confidence bands overlap, the difference between the scores is not statistically significant, and it could have occurred by accident.
6. When a test has an insufficient floor, it does not have enough items to discriminate between children with marginal skill levels and those with severe weaknesses. Because there are so few items, a few lucky guesses can inflate children's scores.
7. The structure of language refers to the layers of language: phonology, morphology, syntax, semantics, and pragmatics.
8. The components of a comprehensive reading evaluation could potentially include different aspects of oral language (listening comprehension, vocabulary, syntax, inferencing, and higher-level language skills) and the skills that contribute to reading fluency (fluency, automaticity, word recognition and word attack, spelling, and underlying processes).
9. Reading fluency is a prerequisite skill for reading comprehension.
10. The six syllables patterns are: VC (closed), V (open), VCe (magic e), VV (vowel team), VR (r-controlled), and Cle (final stable syllable).
11. Multiple-choice, cloze (fill-in-the-blank), mazes, and open-ended questions.
12. Dyslexia is a specific learning disability in reading that is unexpected given a child's intelligence and the provision of instruction that is presumed to be research based. Dyslexia typically reflects a weakness in phonological processing. It manifests itself in difficulties with word recognition, spelling, and fluency.
13. A double deficit is a type of reading disability that is characterized by weaknesses in phonemic awareness and rapid naming. Children with double deficits are sometimes described as treatment resistors; they require instruction that is more intensive and more individualized than their peers with reading disabilities.

Chapter 2

1. Many proponents of whole language believe that learning to read is as natural as learning to speak and that children will learn to read by virtue of their efforts to solve problems and make meaning.
2. The three-cueing system is based on the premise that readers create meaning by integrating syntactic, semantic, and graphophonemic information in text. According to many whole language proponents, graphophonemic cues are the cues of last resort, and phonics is viewed as being contrary to children's efforts to self-motivate and make meaning.
3. The Simple View of Reading (Gough & Tunmer, 1986; Hoover & Gough, 1990) is based on the premise that both receptive language skill and decoding skill are necessary for reading comprehension and that weaknesses in either area will compromise the ability to understand text. A comprehensive reading evaluation based on the Simple View potentially assesses skills in both areas.
4. Scarborough's rope model (2001) elaborates on the Simple View as applied to young children. It states that skilled reading is the fluent execution and coordination of two major strands: language comprehension and word recognition.
5. Chall's stages of reading development begin with Stage 0 and the oral language foundation. Stage 1 readers focus on sound–symbol correspondence; stage 2 readers work on developing automaticity and fluency. In stage 3, readers move from learning to read to reading to learn (reading comprehension). Stage 4 readers focus on working with text from multiple perspectives, and stage 5 readers use the information acquired to develop their own unique perspective and expertise. Children move through these stages at different rates; it is important that reading instruction accommodate children's skill levels, which may not be commensurate with their grade placement.
6. Ehri's research suggests that training phonemic awareness together with phonics is more effective than phonemic awareness training on its own. Work with decoding and spelling permits students to develop their understanding of sound patterns in words.

Chapter 3

1. Social interactionism focuses on the unique relationship between parent and child and our need to bond with each other.
2. The concept of a critical period in language acquisition suggests that children will make more progress in their language development prior to adolescence than after. As educators, however, we know how important it is to have high expectations for all students. Our job as educators is simply to take children from wherever they are to the next level of skill.
3. Brown proposed five stages of language development based on the mean length of utterance (the average number of morphemes in a given utterance); his research on the MLU tells us that all children acquire language in the same way regardless of their native tongue.
4. Berko's research tells us that children do not acquire words (e.g., teach, teaches, teaching, teacher) as separate entities; instead they acquire a set of rules for applying grammatical endings to form inflections and derivations. A child who can change wug into wugs knows how to use suffix -s to form a plural.
5. We hope that children have had a lot of experiences and that they have many words with which to label those experiences. We hope that they can discuss events in the past, present, and future and that they are aware of the impact of their words on the listener.
6. Some children may not be aware that the order of presentation may not be the same as the actual order of the events; this lack of understanding may cause them confusion when they attempt to follow directions or listen to a story.
7. Children find it easier to recall and understand content when they can chunk words into meaningful units, such as phrases. Otherwise, they have to remember each word as an isolated

entity, a process that is memory intensive to say the least. Children who do not easily chunk words into phrases and clauses will struggle to understand oral and written language, and they will have difficulty formulating their thoughts with precision, grammar, and style.
8. The term receptive language impairment refers to difficulty understanding language as it is spoken; children with expressive language impairments may have difficulty expressing their thoughts in a manner commensurate with their understanding.
9. Children with language impairments are at a profound disadvantage in the classroom, where even the best of multisensory teachers rely heavily on language to convey new learning.

Chapter 4

1. The Hart and Risley study pointed to the importance of language experience during the first 3 years of life as a foundation for future language acquisition.
2. Children with language differences speak in a nonstandard form of language that may have its own rules for pronunciation, grammar, word usage, and pragmatics. Children with language disorders are impaired in their communication skills because they are fundamentally unable to interpret language as it is used by others or to speak with grammar, precision, and/or style.
3. It is important to be knowledgeable about nonstandard language usage so that we do not confuse it with a true language impairment or disorder.
4. Given her history of ESL, her reading challenges may reflect her lack of academic language proficiency. It would be appropriate to assess her CALP levels and then respond to what the data suggest.
5. Bilingual programs provide instruction in the content areas in both the native language and the target language. Immersion programs provide instruction only in the target language. Research supports bilingual instruction.
6. Geva's research indicates that language proficiency need not precede the development of English reading skill as it does with typical learners; it can occur simultaneously.
7. Children with limited language proficiency have been overrepresented in special education programs. That being said, individual differences in phonological awareness and rapid naming are predictive of decoding and word recognition skills in L1 and L2 children. It is possible to screen English language learners as young as kindergarten and first grade for learning disabilities in reading. According to IDEA (2004), testing should be conducted by bilingual professionals who are knowledgeable about second language acquisition and how to conduct an evaluation that is culturally sensitive and relevant.

Chapter 5

1. Automaticity frees up working memory to focus on higher-level skills.
2. Norm-referenced tests do not always assess particular skills comprehensively. A child might appear to have mastered basic reading skills because we simply did not test the skills thoroughly.
3. The test was not administered according to the directions for administration, and, as a result, the administration was not standardized.
4. She has violated the directions for administration. The scores, which are a comparison between the examinee and the children in the norming sample, are meaningful only if the administration of the test is the same as for the children in the norming sample.
5. Percentile ranks are not equal units, and they cannot be compared. It might be a good idea to suggest using standard scores instead.
6. Grade equivalents are not necessarily grounded in reality; test developers have a limited window in which they take their data, and grade equivalents have to be extrapolated for the months of the year beyond that of the norming sample. Grade equivalents are not consistent from test to test, and they are not equal units; as a result they cannot be compared. Suggest that the team consider standard scores.

7. Best practice would be to use both age norms and grade norms. With respect to reading, we generally place more emphasis on age norms because the development of reading in children is not generally dependent on grade-level placement. When conducting a learning disability evaluation, we need to make an apple-to-apple comparison with intellectual tests; the vast majority of them use age norms.
8. It is possible (and likely) that the tests used did not have sufficient bottom for children in the first grade.
9. No matter how good we are at administering tests, no test is perfectly reliable, and if we were to test a child repeatedly (and he or she did not profit from the experience), the child would earn scores that would cluster about an unknown ''true score.'' The SEM permits us to take the reliability of the test into consideration.

Chapter 6

1. Perform the reverse operation (addition), check previous evaluations, and ask the examinee.
2. A health history speaks to a child's availability for learning; some health challenges, such as chronic ear infections, are associated with learning difficulty.
3. A true learning disability in reading (dyslexia) presumes that children have been provided research-based instruction.
4. A fatal error in report writing, such as a mistake in calculating the age, is one that results in incorrect scores. Nonfatal errors are errors such as typos that do not have consequences for the child and the program of instruction. Nonfatal errors, while less serious, undermine the credibility of the evaluator.
5. One-on-one formal evaluations are highly structured, and the directions are carefully evaluated as part of the norming process. In addition, the tasks that are required of examinees do not typically require much in the way of organization, planning, and sustained effort. Children with attentional deficits and/or weaknesses in executive functioning often perform well in a highly structured environment, particularly when the tasks are presented one step at a time.
6. It would be appropriate to test Marcus's reading fluency; some examinees are able to demonstrate adequate reading comprehension on tests because the passages are short and time is not a factor. Depending on the referral questions and concerns, it may also be appropriate to test Marcus's oral language skill.

Chapter 7

1. A Standard Protocol Model reportedly requires less expertise to implement because the Tier 2 interventions are predetermined and they are delivered in the same way for all children. The Problem-Solving Model is an individualized approach to remediation in which skilled educators make decisions regarding assessment and intervention on an individual basis. Although it is harder to implement, the Problem-Solving Model offers greater potential for individualization.
2. More may well be better, but in order for instruction to be effective, it has to match the profile of the individual child. Children with weaknesses in word recognition and word attack may require additional instruction in phonemic awareness and decoding as a foundation for reading fluency. Additional information is needed. Although the group may have a common problem, their profiles may require differing solutions.
3. If a discrepancy model is to be used to identify a child with a specific learning disability, the measure of ''ability'' should not be compromised by the disability itself. The Mark Penalty reflects the recognition that there are not necessarily clear boundaries between ''ability'' and academic achievement. Weaknesses, for example, in verbal reasoning and verbal knowledge will result in a decrease of a Full Scale IQ and at the same time compromise academic functioning. This double whammy makes it appear that there is no discrepancy when, in fact, the

weakness is having a profound effect on the examinee's verbal intellectual functioning as well as academics.

4. When children respond to intervention, all is good. When children fail to respond, however, it is important to have multiple data sources that include cognitive assessment. The direct assessment of processing weaknesses can potentially permit children to be identified prior to experiencing school failure. A combination of both RTI and an individual psychoeducational assessment has the potential to offer a more precise understanding of the problem as well as better links to effective interventions.
5. The single most effective way of reducing the need for special education referrals is to ensure that classroom teachers are providing research-based instruction and that they respond quickly to children who do not make progress that is commensurate with their peers.

Chapter 8

Be prepared to ask your evaluator good questions. See questions at the end of Chapter 8.

Chapter 9

1. Best practice in the assessment of speech and language abilities includes both standardized testing and speech and language sampling as well as a developmental history, interviews with caregivers and teachers, and observation in different settings.
2. The language of the classroom differs from language in the home in that there are fewer opportunities for conversational repair, less feedback, and less potential for reassurance and admonishment.
3. Listening comprehension tests can potentially provide information about how well a child would comprehend presuming that there were no decoding challenges. Listening comprehension tests can also alert us to receptive language difficulty.
4. The team should consider a speech and language evaluation; strategies are not a substitute for language skill.
5. Most vocabulary tests measure essentially how many words we know. They do not measure the depth of our knowledge about a specific word (i.e., multiple meanings, unusual usages, antonyms, synonyms, the part of speech, or word structure).
6. Knowledge of word structure gives students the tools to become independent word learners and discern word meanings by analyzing prefixes, suffixes, and roots. It also helps students with higher-level decoding and spelling skills.
7. It is difficult to discuss sentence structure and grammar without having a command of the vocabulary related to parts of speech and different types of sentences.
8. Written language piggybacks on oral language. Students with difficulty formulating sentences when they speak often experience the same challenge (if not worse) when they attempt to express their thoughts on paper. If this student also has difficulty understanding lengthy or complex sentences, we can expect that he or she will experience the same problems when reading sentences in text.
9. Students who do not understand how to use language effectively to meet their needs, wants, and desires may be unaware of what language usage has to tell us about character development and how characters interact with each other. They may not recognize an author's tone, such as when an author is using sarcasm.

Chapter 10

1. Leon needs to learn how to pronounce his sounds correctly; it will then be easier for him to blend them into words. It might be a good idea to verify that his teacher is pronouncing sounds correctly. Some teachers overenunciate their sounds and unintentionally pass on bad habits to their students.
2. Sensitivity to sound patterns in words is generally good, but rhyming is not one of our

better predictors of reading skill. Kyra may or may not learn to read easily.

3. Neil is aware of individual sounds in the word-initial position. He is ready to work on sounds in the word-medial position. An examination of Neil's spelling would likely provide additional information about his perception of sounds in words.
4. No research speaks to the efficacy of simply memorizing words. Keith should be screened for possible weaknesses in phonemic awareness as well as his mastery of the alphabet.
5. Reading delays are not a product of immaturity, and they do not get better with time. Research by Juel (1988), D. Francis, Shaywitz, Stuebing, Shaywitz, and Fletcher (1996), and S. Shaywitz et al. (1999) showed that early reading weakness and lack of phonemic awareness had consequences for learning that persisted through high school.
6. Presuming that Eric worked with good effort with both evaluators, we would have to question the specific measures of phonological awareness and whether the tests administered had sufficient bottom for a child of Eric's age.
7. It is not a question of what is age appropriate; it is a question of what Martha requires in order to become a reader. If Martha is lacking in phonemic awareness, she needs to be taught phonemic awareness. Linguists learn about speech sounds in graduate school; there is no reason why this content cannot be presented in an age-appropriate manner to individuals in middle school or even high school.

Chapter 11

1. The orthographic path of the dual route was thought to be the path used by mature skilled readers. The thinking was that only poor readers would resort to sounding out words and that the brain could not possible manage the demands that linguistic processing would require. It was a matter of teaching to the strength.
2. Eye movement studies tell us that the phonological route typically is activated for all words during skilled reading. Evidence indicates that phonological and orthographic processes work cooperatively and with the utmost efficiency to facilitate word recognition in skilled readers. These studies suggest the need for instruction to incorporate both phonological and orthographic skills.
3. Letters are easier to learn when the sound of the letter occurs in the letter name, such as letter s and /s/.
4. Harry is confused about his short vowel sounds, and he requires instruction in phonemic awareness that is specifically targeted at discriminating speech sounds that are close in their articulation. Kate has mastered her short vowel sounds, and she is ready to move on to blends and vowel teams as a precursor to two-syllable words with closed syllables.
5. Syllable patterns:

Word	Pattern
nŏstălgĭc	VC-CVC-CVC
vācănt	V-CVCC
dēvīs**e**	V-CVCe
stē**e**ple	VV-Cle
ĭmpŏstěr	VC-CVC-CVR
ĭnŏppŏrtūn**e**	VC-VC-CVR-CVCe
lē**a**děr	VV-CVR
hărbŏrsīd**e**	VR-CVR-CVCe
ĭnspěc$\boxed{\text{tion}}$	VC-CCVC-tion
cŏmplēt**e**	VC-CCVCe
vācā$\boxed{\text{tion}}$	V-CV-tion
dēpărtměnt	V-CVRC-CVCC

Note: Silent letters are in boldface. Suffix -tion is boxed.

6. It is possible that the test lacked sufficient bottom for a child of Aaron's age. Review the protocol to see exactly what Aaron was required to do to earn that score.
7. Alyssa's lack of reading fluency may reflect a variety of underlining skills that may not be accurate or automatic in their execution. Additional data on Alyssa's reading would help to determine exactly what decoding or language skills are contributing to the problem.
8. There are serious ethical issues here; our job as teachers is to work with children and move

them to the next skill levels regardless of their profile as learners. Leaving the ethics aside, it is important to base the decision on where to go from here on a variety of data. We need to verify hearing and vision; we also need to look at Chuck's instructional history and consider the type of instruction, whether it was implemented with fidelity, and the dosage. It may be that that program is not a good match for his profile (i.e., he may need more explicit instruction in phonemic awareness); it may be that the program has not been taught as designed. It may also be that he requires a much larger dose of instruction than he presently receives.

9. There are two main considerations here. First, older children do not respond as quickly to instruction as younger children. Second, not all children can be taught to read with fluency; for this reason, some children with rapid naming deficits are characterized as treatment resistors. Given these sobering thoughts, the ability to read is a life skill. Tony requires every opportunity while he is still in school to become a skilled reader. If he has not had a comprehensive evaluation, it would be important to perform one; decisions regarding his instruction should be based on as much data as possible with a thorough knowledge of his profile as a learner.

   I suspect that Tony's reading instruction is likely to be intensive, possibly 3 hours daily, focusing not only on decoding skills but skills related to comprehension. He will require access to text-to-speech software for all of his textbooks. He will require numerous accommodations designed to ensure that he is not overwhelmed by the high school curriculum as he is being taught. If you are thinking "Oh my gosh," you are right. This is why we cannot permit children to reach the middle and high school levels without good skill in reading. The stakes are too high.

Chapter 12

1. Most reading comprehension tests that use the cloze procedure only measure sentence-level skills. It is therefore important to have a measure or measures of reading comprehension that use longer passages so that we can address the teacher's referral concerns. It might be interesting to look at writing samples for evidence of organization and structure. In addition to the usual suspects in reading, it might be illuminating to look at cognitive testing. Cognitive testing might speak to weaknesses in working memory, processing speed, spatial thinking, and nonverbal fluid reasoning that are affecting this child's ability to take in new learning, store it with structure, and recall it as needed.
2. Think back to the Simple View of Reading, and take your data. Verify that decoding skills are good. (Given the age of these students, it is likely that they are not.) Presuming that it is truly a decoding issue, instruction should then focus on decoding; comprehension should be addressed through listening-based activities. If reading decoding skills are good, it would be important to document oral language skill. Strategies are not effective when challenges are related to decoding or receptive language difficulty.
3. Work with the teacher to restructure her lesson plan. Have her identify critical vocabulary and concepts that are necessary to understand the text and preteach these items. After preteaching, the teacher can conduct a discussion of what the students know and what they might predict with the benefit of preteaching.
4. Children who are described as concrete learners typically understand language word for word precisely as it is presented. They do not understand language that is abstract and words with multiple meanings. They may have difficulty with reading between the lines and inferential thinking. This would be a good opportunity to involve the speech and language pathologist or an evaluator who is knowledgeable about language. Progress in reading comprehension will be closely tied to progress in receptive language skill.
5. Given that you have covered your bases with respect to decoding, fluency, and reading comprehension and that you have good data from

the speech and language pathologist, you probably do not need more testing. In this case I would want to work closely with the speech and language pathologist. We have an opportunity here to integrate instruction in reading comprehension with speech and language therapy and social skills training.

6. It might be a good idea to think about Sheryl's expressive language skill.
7. Young students may appear to compensate for weak decoding skills by virtue of a well-developed background knowledge and strong language abilities. This slight advantage, however, is generally short-lived as students encounter text that is more specialized and less predictable in its content. No one, for example, predicts their way through a biology text. In this case, the GORT-4 Comprehension score is inflated because the questions are not text dependent.

Chapter 13

1. The word informal suggests that these are not real tests and that they are not subject to the same standards of reliability and validity as more ''formal'' testing.
2. Given that readability within a text will vary, it can be difficult to ascertain the reading level of a given text. There are no tried and true guidelines for text selection. IRIs do offer the potential for a more up-front and cozy look at a student's reading skill; the IRI passages are longer than what is typically presented on more formal tests, and who does not enjoy discussing literature with a student?
3. Readability levels differ because they are based on different views (formulas) of what makes a text readable and understandable.
4. Not everything of importance can be counted. Readability formulas are not able to account for typographic, motivational, and logical factors such as organization and density of ideas.
5. Three samples from the Introduction, Repetitions and Self-Corrections, and Readability sections of this chapter yield 104 words with 3 or more syllables and a readability index of about grade 13.
6. The prospective texts need to be examined to determine whether the texts with lower readability levels sacrifice comprehendability in order to obtain a lower grade level rating. Check for the use of transitional phrases and signal words; also examine the vocabulary to be sure that word usage remains precise and explicit.

Chapter 14

1. Written expression piggybacks on the oral language system.
2. Writing letters of the alphabet is a linguistic skill; it is not the same as drawing pictures and copying shapes. Lucas's dislike of writing should not be interpreted as evidence of poor motivation. He requires additional direct instruction in handwriting.
3. Written expression requires writers to integrate lower-level skills into an organized, cohesive product that reflects our best thinking abilities. Skills that can be executed with automaticity and accuracy free up cognitive resources that can then be applied to higher-level applications.
4. It is important to look at what each test measures. The WJ III Writing Samples test focuses, for the most part, on sentence level skills. The KTEA-II Written Expression subtest requires students to demonstrate skill with writing a summary. Despite what the subtest titles suggest, these tests do not necessarily measure the same skills.
5. The ability to write the alphabet is one of our best predictors of future skill in writing. As luck would have it, handwriting can be taught, and students benefit from additional instruction.
6. Spelling provides evidence of skill in phonemic awareness and decoding. Instruction in spelling strengthens and reinforces decoding skills.

Glossary

Appendix B

ability: performance on a measure of intelligence. Given that IQ tests vary in their theoretical foundations and in the skills they actually assess, an examinee's ability may vary from test to test.

academic: an adjective describing performance on measures of reading, writing, and math. In a broader sense, it refers to skills that are taught in school.

accent: phonetic variations in the pronunciation of a language that we perceive to be different from our own.

achievement: performance on testing relating to academic skills.

active sentence: a sentence in which the noun phrase (NP) is the agent of the action.

adjective: a lexical category of words that describe properties of nouns.

adverb: a lexical category of words that describe actions.

affix: a bound morpheme that modifies the meaning of the stem or root.

affricate: a consonant sound that is characterized by a stop and a slow release of the sound, such as /ch/ & /j/.

age equivalent: a manner of describing performance on tests that is discouraged by most knowledgeable professionals. It refers to the average age of students who earned the same raw score, a number that is often extrapolated. It is typically reported in terms of years and months, as in "Johnny (age 13 years and 2 months) demonstrated skill commensurate with a child age 7 years and 3 months." Suffice it to say that the cognitive abilities of a 13-year-old have little in common with the cognitive abilities of a 7-year-old.

age norm: comparison of an examinee to a norming sample based on age.

alphabetic: relating to a writing system that represents speech sounds with letter symbols.

alveolar ridge: the ridge just behind the upper front teeth.

anaphora: a reference to something stated previously as in "We ate the cake. *It* was delicious."

article: also known as a determiner; a functional category that serves to define the type of reference being made to a noun. We can refer to things in general (*a* book); we can refer to things with specificity (*the* book).

articulation: the process by which speech sounds are pronounced by the human vocal tract.

assessment: a comprehensive evaluation of an individual that incorporates a review of background history, testing, observation, relevant interviews, and recommendations.

auditory processing: the ability to discriminate and process sounds.

automaticity: the ability to perform an action without conscious effort; not to be confused with *fluency*.

average: the sum total of a series of values that is divided by the number of values. See also *mean*. Average may also refer to the mode or median.

babbling: an early stage of language development in which babies practice and refine their articulation of speech sounds.

background knowledge: the knowledge needed to understand a particular text.

basal: a convention for reducing testing time that permits evaluators to award full credit when a certain threshold for performance has been met. Basal rules (such as four correct items in a row) enable evaluators to focus on higher level skills without running the risk of insulting examinees with the administration of too many easy items.

base word: a free morpheme to which affixes are added.

benchmark: level of proficiency desired in order to proceed to the next level of instruction.

BICS: basic interpersonal communicative skills; the language used for social interaction.

bilabial: sound that is made with both lips, such as /p/ and /b/.

bilingual education: an education program that provides instruction in the content areas in two languages: the native language and the target language.

blend: two or three adjacent consonants that retain their values within a syllable when they are pronounced. The word *blend* has an initial blend and a final blend.

blending: the act of combining speech sounds into syllables and syllables into words.

bottom: the lower-level items in a test that permit evaluators to distinguish between marginal skill levels and skills that are seriously impaired. The bottom of a test is particularly important for children at the lower end of the norming sample.

bound morpheme: a meaningful part of a word that cannot stand on its own. Suffix -s is a bound morpheme.

breve: a diacritic mark that designates a vowel as short, as in the word *bĕd*.

Broca's aphasia: a language disorder in which speech is halting, lacking in intonation, and contains numerous phonemic errors.

CALP: cognitive academic language proficiency; the level of language proficiency required for success in the classroom.

ceiling: a convention for reducing test time that permits evaluators to cease testing when items become too difficult. Ceiling rules (such as four incorrect items in a row) enable evaluators to address more appropriate levels of skills without wasting time on higher-level items that exceed an examinee's skill set. Ceiling rules also permit evaluators to address appropriate skill levels without running the risk of frustrating examinees with items that are just too hard for them.

CHC theory: currently the most influential theory of intelligence that is guiding the field of cognitive assessment. It represents the integration of Cattell-Horn *Gf-Gc* theory (Horn & Noll, 1997) and Carroll's three-stratum theory (Carroll, 1993, 1997).

closed syllable: a type of syllable pattern that ends in a consonant; the vowel is short.

cloze procedure: a technique for assessing reading comprehension at the sentence level that requires examinees to fill in missing word as evidence of their understanding.

coarticulation: the act of blending speech sounds together.

coding: the evaluation of graphemes and syllable patterns by which letter symbols are designated as having specific speech sounds. See *breve* and *macron*.

cognition: the study of human mental abilities.

complex sentence: a sentence consisting of an independent clause and a dependent clause.

complex syllable: syllables that have one or more consonant blends or clusters (CCVC, CVCC, CCCVC, VCC, etc.).

compound sentence: a sentence consisting of two independent clauses that are linked by a conjunction (for, and, nor, but, or, yet, so).

confidence band: because there is no such thing as a perfect test, test scores can never be perfectly reliable. A confidence band or range of scores (such as a standard score of 90 ±5) helps us understand how scores can vary simply by chance (typically 65%, 90%, or 95% of the time).

conjunction: a functional category that joins two or more categories of the same type, such as words, phrases, clauses, and sentences.

considerate text: text that is written with structure and organization.

consonant: a speech sound that is blocked or partially blocked; it can be voiced or unvoiced. Consonants are characterized by the place and manner of articulation.

consonant cluster: adjacent consonants within a syllable, as in the word *sprints*.

consonant digraph: two consonants that make one sound, as in the word *bath*.

content validity: the extent to which a test measures what it purports to measure.

continuant: sound that can be prolonged, such as /m/, /f/, /s/, and /sh/.

correlation coefficient: an index of the relationship between two variables, typically expressed as *r*.

criterion-referenced test: an evaluation in which a student's performance is compared to a set criterion instead of to other students.

cross battery assessment: a method of assessment that is based on CHC theory.

curriculum-based measurement (CBM): tests that are designed and constructed using classroom materials in the hope of measuring what has actually been taught.

decoding: the ability to recognize words through the application of rules based on the alphabetic principles of the English language.

dental: a sound that is made with the tongue placed at the back of the upper front teeth, such as /t/ and /d/.

derivation: a word that changes its part of speech through the application of a suffix (e.g., *happy* to *happiness*).

dialect: a regional or social variation of a language that has its own phonological, lexical, and syntactic characteristics.

digraph: two letters that make one sound such as /sh/, /th/, /ch/, and /wh/, and /ee/, /ea/, etc.

diphthong: vowels that change their pronunciation within a syllable, as in cow/crown and boy/boil.

discourse: units of language, oral or written, that are longer than one sentence or utterance.

distinctive features: the particular qualities of speech sounds that distinguish one from another.

double deficit: a type of reading disability that is characterized by weaknesses in phonological awareness and rapid naming.

dysgraphia: an impairment of writing ability that has its foundation in poor graphomotor control; the difficulty is unexpected given a child's intelligence, hearing, vision, and research-based instruction.

dyslexia: a specific language-based learning disability in reading that is unexpected given a child's intelligence and the provision of instruction that is presumed to be research based. Dyslexia typically reflects a weakness in phonological processing, and it manifests itself in difficulties with word recognition, decoding, spelling, and fluency.

elision: a measure of phonemic awareness in which the examinee is asked to say a word without one of its parts. Say ''test'' without the /s/.

emergent literacy: reading and writing behaviors that precede formal instruction.

English-language learner (ELL): a nonnative speaker of English, formerly known as a limited English proficient (LEP) student.

expository text: text that describes and explains factually based content.

expressive language: language that is spoken.

etymology: the study of a word's history.

fixation: the point at which the gaze of the eye rests momentarily on a target.

fluency: refers to speech that flows without disruption or the reading of text that is both accurate and automatic, and read with phrasing and expression.

formative evaluation: ongoing assessment as instruction is occurring.

free morpheme: a meaningful unit of sound that can stand on its own, e.g., clog.

fricatives: consonants that are produced by a continuous, constricted flow of air, such as /s/ and /z/.

***g*:** a symbol that refers to overall intellectual ability originally proposed by Spearman (1927).

glide: a sound preceding a vowel that is produced with a quick movement of the tongue, such as [j] and [w].

glottal: a sound that is produced by obstructing airflow in the vocal tract; a glottal can be heard in the word ''uh-oh!''

grade equivalent: a manner of describing performance on tests that is discouraged by most knowledgeable professionals. It refers to the average grade placement of students who earned the same raw score, often extrapolated. It is typically reported in terms of years and months as in ''Johnny (grade 7.3) demonstrated skill commensurate with a child in grade 2.3 (third month of second grade). Grade equivalents are not consistent from one test to another. Because they are not equal units, they cannot be used to measure progress. We can say that higher grade-level equivalents are generally better than lower ones.

grade norm: the comparison of an examinee to a sample of the population based on grade.

grammar: a system of rules that permits language users to produce and understand oral and written language.

grammatical sentence: an oral or written sentence that is judged to be acceptable by speakers of a given language.

grapheme: a letter or combination of letters that represents a single speech sound.

graphomotor: the ability to make the small movements necessary to control one's pencil.

homophone: a word that has the same pronunciation as another despite different meaning and different spelling, such as *there*, *their*, and *they're*.

hyperlexia: a precocious ability to recognize words that is accompanied by limited comprehension.

immersion: a method of teaching a second language in which content courses and activities are conducted in the target language.

inconsiderate text: text that lacks a well-defined structure and that does not signal how information within the text is organized or the relationships between ideas and concepts.

independent clause: a sentence that consists of a noun phrase and a verb phrase that can stand on its own.

inferential thinking: the ability to draw conclusions based on information provided as well as one's background knowledge.

inflection: a change in a word's form that makes the meaning more precise, such as *bat* to *batted*.

informal assessment: assessment that does not involve the use of norm-referenced instruments.

informal reading inventory (IRI): a method of assessing reading that may be designed by teachers using classroom materials or purchased from publishers. IRIs emphasize teacher observation and judgment; they may or may not provide evidence of reliability and validity.

IQ: Intelligence Quotient. It was first conceptualized as the ratio of Mental Age (MA) to chronological age (CA), multiplied by 100. (This simply eliminated the decimal.) Unfortunately, IQs were not consistent across the age span. IQ in current usage typically refers to a standard score often, but not always, with a mean of 100 and a standard deviation of 15 or 16 points.

Intelligence Quotient: See *IQ*.

interdental: a consonant sound that is made with the tongue between the teeth, such as /th/.

intonation: change in pitch from one part of an utterance to another.

jargon: language that is specific to a given field.

keyword: a word that is used as part of multisensory instruction to cement the relationship between a letter symbol and its sound as in ''a – apple – ă.

labial: a sound that is made with one or both lips, such as /p/ and /b/.

labiodental: a sound that is made with the lower lip and the teeth, such as /f/ and /v/.

language: a socially agreed on convention for the communication of ideas.

lax vowel: a vowel that is made with decreased tension in the tongue resulting in less vocal tract constriction; often referred to as a short vowel.

lexicon: an individual's mental dictionary.

limited English proficiency (LEP): a nonnative speaker of English who has difficulty with listening, speaking, and writing.

linguistics: the scientific study of language.

liquid: a class of consonants that includes /l/ and /r/.

literacy: skill in reading and writing that permits individuals to communicate and learn.

logograph: a symbol, such as & and %, that is used to represent a morpheme, word, or phrase in contrast to words represented orthographically, it does not signify pronunciation.

macron: a diacritic mark that designates a vowel as long, as in māke.

manner of articulation: the different ways in which the lips, tongue, velum, and glottis can be positioned to generate speech sounds.

Matthew effects: an observation by Keith Stanovich (1986) that describes the role that practice and extensive reading play in cognitive development. Good readers (generally those who read a lot) become better readers; poor readers (those who do not read a lot) do not.

maze: a method of testing reading in which examinees are required to select one of three or four words to fill in a blank.

mean: an average that is obtained by adding all scores and dividing by the number of scores.

mean length of utterance (MLU): a method of documenting language skill in children that is based on the average number of morphemes (meaningful units) in an utterance.

median: the middle score in an odd number of scores. In series with an even number of scores, the median would fall halfway between the two middle scores.

Medians are preferable to means when there are extreme outliers in the series.

minimal pair: two words with distinct meanings that differ only in a distinctive feature such as voicing, as in *tap* and *tab*.

miscue analysis: a process by which deviations in oral reading are analyzed to determine the strategies used by the child in question. Miscues are analyzed in order to assess a child's ability to use cueing systems (phonemic, syntactic, and semantic) to make meaning from print.

MLU: See *mean length of utterance*.

morpheme: the smallest unit of sound that conveys meaning. The word *dogs* consists of two morphemes (dog + s).

morphology: the study of the smallest units of sound that convey meaning.

morphophonemic spelling: a system that preserves meaning over pronunciation. The underlying form of the morpheme trumps its actual pronunciation (backed, bagged, batted).

multiple choice: a method of assessing skill that requires examinees to select one of three or four possible options.

narrative text: text that relates a sequence of events, both real and fictitious, often in a story format.

nasal: a sound that is made by redirecting the flow of air through the nose.

neurolinguistics: the study of language with reference to how it is processed in the brain.

nonstandard dialect: a variety of a language that differs systematically from what is deemed to be the standard usage.

nonverbal: without language

normal distribution: the bell curve in all its glory. A normal distribution tells us that there are more ''average'' events than extreme events and that the curve is symmetrical about the mean. In a normal distribution, 1 standard deviation in both directions captures about two-thirds of the population.

norm-referenced test: a test that is administered to a sample of the population that should be designed to mirror the statistics provided by the U.S. Census. The scores obtained by the sample of individuals are then used to calibrate the performance of individuals who take the test under the same conditions and constraints.

noun: a lexical category that names a person, place, thing, or idea that can be inflected for number and possession.

nucleus: the most prominent speech sound in a syllable.

obstruent: a consonant sound that is caused by obstructing the air flow, such as /p/ and /b/.

onset: the initial phoneme or consonant cluster in a syllable that precedes the vowel or nucleus.

open syllable: a syllable that ends in a vowel, as in the word *go*; by definition, the vowel sound is long.

orthography: the writing system of a language, including letters, numbers, punctuation, and diacritic marks (symbols used to clarify how a letter symbol is pronounced).

palatal: a sound that is made with the tongue against the roof of the mouth, such as /l/ and /r/.

passive sentence: a sentence whose grammatical subject is the recipient of the action, as in ''The boy was bitten by the dog.''

peak: part of a syllable, typically a vowel, that is articulated with increased length, volume, and higher pitch.

percentile ranks: a scoring system that defines that percent of a group who earned scores below or equal to the score obtained. Because percentile ranks are not equal units, they should not be added or subtracted from one another.

perceptual reasoning: a type of problem solving that includes visual spatial thinking, nonverbal concept formation, and/or visual motor integration.

phone: the sound of speech as it is actually articulated.

phoneme: the smallest unit of sound that discriminates meaning.

phonemic awareness: the ability to discriminate, recall, and manipulate individual speech sounds in words.

phonemics: the study of speech sounds that discriminate meaning.

phonetics: the study of the production, transmission, and reception of speech sounds.

phonics: a method of teaching reading that focuses on letter–sound relationships.

phonological awareness: the conscious understanding of the sound patterns in a given language.

phonological processing: the use of phonological information for processing spoken and/or written language. It is thought to include phonological awareness, the encoding of phonological information in working memory, and the retrieval of phonological information from long-term memory.

phonology: the study of the speech sounds of a given language and the rules by which they are combined, including phonetics and phonemics.

phrase: a basic unit of syntactic structure.

pitch: the perceived quality of a sound as related to its frequency of its sound waves.

pragmatics: the ability to use language effectively to achieve one's needs, wants, and desires.

predicate: the verb phrase in a sentence.

prefix: an affix that is attached to the front of a base or root word.

preposition: a lexical category that designates how things relate in time and space.

print awareness: the realization that print has a communicative function.

prior knowledge: the knowledge possessed by an individual prior to reading a given text; this knowledge may be correct or incorrect.

processing speed: the ability to perform simple cognitive tasks (often visual in nature) and mark efficiently.

progress monitoring: the assessment of student progress on a frequent basis (typically at a minimum of three times yearly) as a screening for learning difficulty. The purpose of progress monitoring is to ensure that learning problems are addressed promptly and effectively.

pronoun: a lexical category whose members can replace a noun or a noun phrase (e.g., he, she, it, they).

prosody: the nonverbal aspects of speech (rhythm, volume, intonation) that permit us to communicate important information.

pseudoword: a nonsense word that is contrived to provide practice or permit students to demonstrate skill with specific rules of phonics.

rapid automatized naming (RAN): the ability to retrieve language labels from memory with accuracy and speed; Difficulty with RAN is considered to be a marker of disordered reading and of learning problems in general.

raw score: the number of items correct in a test.

readability: an index, expressed in grade levels, that describes the reading skill needed to cope with the demands of a given text.

receptive language: language as it is understood.

referent: the entity to which a word or group of words refers.

regression: with respect to assessment, a significant decrease in test scores from one test administration to another that can be validated by additional sources of information. When reading text, regression describes the movement of the eyes back to a previously viewed word.

reliability: the consistency of a test. Consistency can be measured from one test session to another, within the test itself, between different forms, and among different evaluators.

Response to Intervention (RTI): a movement in education that is focused on early intervention and progress monitoring.

rime: the nucleus (usually a vowel) and the coda (the consonant sounds that follow the nucleus) of a syllable; sometimes spelled as "rhyme."

root: a morpheme that has been stripped of all affixes.

rounded sound: a sound that is made by protruding the lips, as in the word *boot*.

running record: a method for documenting behaviors during oral reading that was developed by Marie Clay (1967).

saccade: the jerky movements of the eyes during reading.

scaled score: a type of standard score that is defined by a mean of 10 and a standard deviation of 3.

schwa: an unstressed speech sound (ə) that originates from the mid-central position in the mouth, as in the second syllable of the word *lessen*.

screening: a preliminary test that documents the possible need for further evaluation.

segmentation: the act of breaking words into their component speech sounds; the word *cat* can be segmented into the sounds: /k/ + /a/ + /t/.

SEM: See *standard error of measurement*.

semantics: the study of meaning in language.

sentence: a syntactic unit that consists of a noun phrase and a verb phrase.

SES: See *socioeconomic status*.

short-term memory: the capacity to capture input briefly as a precursor to further processing.

sight word: an irregular word that is taught as a whole with the goal of instantaneous recognition.

simple sentence: an independent clause that consists of a noun phrase and a verb phrase.

simple syllable: a syllable that does not contain a blend or a cluster.

situation model: the understanding that results when we think deeply about a text.

social interactionism: a theory of language development that stresses the relationship between the child and the caregiver.

socioeconomic status (SES): a combined measure of work experience, social standing, and income.

sonorant: a sound that can be sung, including vowels, liquids, glides, and nasals.

specific language impairment (SLI): the term used to designate receptive and expressive language challenges that occur despite a positive language learning environment. SLI is not the result of physical or hearing impairments, autism, or developmental delay.

speech: spoken language.

standardized test: a test that has specific rules for administration and scoring that must be followed if the obtained scores are to be meaningful.

standard deviation (SD): a yardstick for norm-referenced tests that makes all scoring systems comprehensible; it describes how the scores distribute about the mean. One standard deviation in both directions from the mean captures about two-thirds of the population in a normal distribution. Two standard deviations in both directions comprise about 95% of the population.

standard error of measurement (SEM): a statistic that describes the amount of possible error in a test score. Reliable tests and subtests have a smaller SEM than unreliable ones.

standard score: a term that can be confusing to novice evaluators. Standard scores represent a variety of scoring systems that describe the distribution of scores with respect to the mean. Standard scores also designate particular scoring system that has a mean of 100 and a standard deviation of 15.

stanine: a 9-point scoring system with a mean of 5 and a standard deviation of 1.96.

stop: a sound that is made with a momentary stoppage of air flow, such as /p/, /b/, /t/, and /d/.

stressed vowel: a vowel that is articulated with greater volume, length, and pitch.

subject: in a sentence, the noun or the noun phrase that performs the action.

subordinate clause: a sentence-like construction that cannot stand on its own and is embedded into other sentences.

suffix: an affix that is added to the end of a root or base word.

suprasegmental: features of prosody including tone, length, and stress.

syllable: a unit of sound that contains a vowel sound, the precise nature of which is still being vigorously debated among linguists.

syntax: the rules by which words are combined into sentences.

tense vowel: a vowel that is made with increased tension in the vocal cords; often referred to as a long vowel.

textbase: the text as it is written.

top: the higher-level items on a test that permit evaluators to distinguish between above-average skill levels and skills that are truly exceptional. The top of a test is particularly important for students at the upper end of the norming sample and for students who are particularly skilled.

trigraph: three letters that make one sound, such as "igh" in *sigh*.

unvoiced: a sound that is produced when air passes directly through the glottis without vibration such as /p/ and /t/.

validity: the degree to which a test actually measures what it purports to measures.

velar: a sound that is produced at the rear of the roof of the mouth, such as /k/ and /g/.

velum: the soft area at the rear of the roof of the mouth.

verb: a lexical category that expresses existence, action, or occurrence and that can be inflected for number and tense.

verbal: related to language.

verbal dyspraxia: a profound difficulty in sequencing speech sounds due to difficulty coordinating speech musculature and the vocal tract in an absence of physical impairment.

voiced sound: a sound that is produced when air passes through the vocal folds, causing them to vibrate such as /b/ and /d/.

vowel: a speech sound that is voiced and that is produced without constriction.

vowel team: two vowels that produce one sound as described by the rule, ''two vowels go walking and the first one does the talking.''

Wernike's aphasia: a language disorder characterized by speech that is grammatical and fluent but nonsensical.

whole language: an approach to reading instruction that is based on the premise that learning to read is as natural as learning to talk.

word: the smallest free form in a language.

word retrieval: the ability to find a word at the precise moment it is needed.

working memory: a cognitive workspace in the brain where new learning is compared, contrasted, and integrated with what is already known.

wug: a mythical creature used by Jean Berko to document the development of language skill in young children.

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