Teaching Readers of English

Second Edition

STUDENTS, TEXTS, AND CONTEXTS

John S. Hedgcock and Dana R. Ferris

Teaching Readers of English

A comprehensive manual for pre- and in-service ESL, EFL, and EIL educators who work with multilingual students at the secondary and postsecondary levels, this text balances insights from reading theory and research with highly practical, field-tested strategies for teaching and assessing second-language reading that educators can readily adopt and adapt to suit their contexts and student populations.

Teaching Readers of English is a complete "go-to" source for teaching reading and promoting classroom and professional literacies in an increasingly digital world. Offering principled approaches and methods for planning and delivering effective L2 reading instruction, the text includes pedagogical features, such as questions for reflection, further reading and resources, and application activities to develop purposeful classroom reading lessons in a range of contexts.

Changes in the Second Edition:

- Updated and revised chapters on formative and summative reading assessment, developing vocabulary knowledge and grammatical skill, and cultivating extensive reading and literary appreciation
- Updated information on institutional settings and reader demographics
- New pedagogical features in each chapter, including Chapter Summaries, Further Reading, Reflection and Review, and Application Activities
- A streamlined chapter sequence to enhance the text's usability

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Students, Texts, and Contexts

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Brief Contents

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Full Contents

Preface to the Second Edition

Like the first edition, the second edition of *Teaching Readers of English* presents approaches to the teaching of second language (L2) readers in the context of current theoretical perspectives on L2 literacy processes, practices, and readers. This volume is designed as a comprehensive teacher-preparation book, as well as a resource for in-service teachers and L2 literacy researchers. The volume focuses on preparing instructors who work with L2 and multilingual readers at the secondary, postsecondary, and adult levels. *Teaching Readers of English* addresses the needs of these audiences by providing overviews of research on L2 reading, as well as numerous opportunities to reflect on, develop, and practice teaching skills needed for effective ESL, EFL and EIL literacy instruction.

The eight chapters of *Teaching Readers of English* (second edition) progress from general themes to specific pedagogical concerns. Situated in a broad literacy framework, Chapter 1 explores contemporary conceptualization of literacy and literacies, including the evolution of digital literacies. The chapter then examines writing systems, their role in society, and the complex ways in which writing influences human cognition, especially reading. Informed by recent research in neuroscience and cognitive linguistics, Chapter 1 surveys theories and models that have shaped L2 literacy instruction. It culminates with a discussion of the dynamic interactions of skills and strategies that comprise L2 reading. Chapters 2 and 3 focus respectively on the two most important elements of the interactive process known as reading: readers and texts. Chapter 2 describes and defines L2 readers, acknowledging the growing complexity of the term and the diversity of the student audience. The chapter examines background variables that influence literacy development, including the unique characteristics of individual readers. Chapter 3 provides definitions and in-depth analyses of the structural properties of text, with a specific focus on challenges faced by readers in their encounters with (L1 and) L2 texts—particularly texts in English. The chapter concludes with a practical discussion of the linguistic components of texts, suggesting that teachers may wish to present direct lessons targeting these features.

In Chapter 4, we amplify principles introduced in Chapter 3 by exploring the vital role played by vocabulary knowledge in developing efficient reading skills. The chapter defines the complexity of word knowledge, presents implications for teaching L2 reading, and introduces practical tools for building vocabulary in L2 literacy instruction. Chapter 5 builds on Chapters 3 and 4 by outlining principles for designing intensive reading lessons and by exemplifying effective practices for leading learners through meaningful encounters with challenging texts. In Chapter 6, we introduce extensive reading as a

complement to intensive reading; we thus review the many benefits of extensive reading and suggest options for incorporating literature into the L2 literacy curriculum. Based on the socioliterate premises outlined in Chapter 1, Chapter 7 addresses needs assessment, course design, materials selection, and lesson planning. The volume concludes with Chapter 8, which presents principles of classroom assessment and introduces tools for developing practical classroom assessments of L2 reading that not only measure student achievement but that also contribute to the learning process.

We have been gratified by the positive response to the first edition of *Teaching Readers of English* and have found in our own courses that it "teaches well." We are particularly honored by the award that the book received in 2009: the Annual David E. Eskey Memorial Award for Curriculum Innovation. Conferred by California Teachers of English to Speakers of Other Languages (CATESOL), this award recognizes professional work that carries on Professor Eskey's legacy. As we were both students of Professor Eskey at the University of Southern California, and as he served on Dana's dissertation committee, this award was personally as well as professionally meaningful to us.

Of course, even something good can be improved, and thus we have made changes in this second edition, some inspired by the excellent feedback from teacher-educators who had used the book in their teacher preparation courses. Our graduate students also supplied thoughtful and productive input on the book's theoretical and practical content. In addition to the usual "second edition stuff" (i.e., updating content and making other needed improvements to the writing), we removed the chapter dedicated to teaching literature and integrated its main points into a single chapter on extensive reading (Chapter 6). We also reorganized the chapter sequence by moving the vocabulary chapter to the center of the book, directly after the chapter on working with texts (Chapter 3). We hope that our updated and repositioned vocabulary material in Chapter 4 will provide a more in-depth look at one specific (and very important) issue in the "text" chapter, leading more naturally into the practical suggestions given on teaching intensive reading lessons in Chapter 5. The more general chapters on course design and assessment, which naturally go together, now close the book.

Our user surveys suggested stand-alone chapters on digital literacy and K–12 teaching issues, such as the *Common Core State Standards* (CCSS) Initiative in U.S. education. After discussing these suggestions with our editor, we opted instead to weave digital literacy content more organically into the relevant chapters, much as we did in the third edition of our writing book, *Teaching L2 Composition*. As for the CCSS suggestion, we felt that an increased K–12 focus would contribute to "mission drift" and that other volumes address this student population in depth and with more expertise than we can offer. We also wanted to avoid making the volume too U.S.-centric by including an extended look at U.S. educational policies. Readers of the second edition will nonetheless find that we have endeavored to address and incorporate multiple literacy and reading standards into Chapters 7 and 8. Finally, several readers requested more substantial coverage of reading–writing connections (as we have done in our writing book); an extended subsection of Chapter 5 now addresses this topic in more detail.

We believe that the new edition offers an updated version of the first edition, as well as a more coherent sequence. In reviewing recent (post-2008) L2 reading publications, we encountered an abundance of research, a selection of which our revised chapters attempt to synthesize. Among our many discoveries was Han and Anderson (2009), an

edited volume that presents a series of useful new research reports. In the epilogue to that volume, William Grabe (2009a) traced eight themes:

1 understanding the needs of the *L2 reader* (in contrast to the L1 reader);
2 identifying "critical components skills for reading" (p. 199);
3 awareness that proficient L2 reading "involves a large recognition vocabulary" (p. 200);
4 highlighting the critical role of extensive reading in L2 literacy development;
5 emphasizing "fluency and automaticity of [text] processing" (p. 201);
6 recognizing the importance of strategy instruction and "the strategic reader" (p. 201);
7 appreciating the role of background knowledge and familiar content in reading development and instruction;
8 moving beyond research insights to "instructional applications" (p. 202).

We were pleased to note that this new edition of *Teaching Readers of English* covers all of these themes extensively (and in several places). This summary by a scholarly leader in the field of L2 reading affirmed for us that our book is on the right track both in coverage of topics and in its practical approach. We hope that readers enjoy it!

Acknowledgments

We once again must acknowledge the unwavering support and guidance of our editor, Naomi Silverman, who was with us for over 20 years and five editions of two different books. Her faith in us has been inspiring and calming(!). Her successor, Karen Adler, has followed Naomi's admirable precedent by generously sharing her expertise and showing great understanding as we drew the project to a close. We deeply appreciate her professionalism and patience. We are also grateful to our many students over the years who have interacted with *Teaching Readers of English*, giving us useful feedback on what is working well and what could stand improvement. We are thankful for the encouragement of our colleagues at the Middlebury Institute of International Studies in Monterey and at the University of California at Davis. John would like to convey his deep appreciation to Kristen Cardoso, Ann Flower, and Pamela Jungerberg, members of the William Tell Coleman Library staff at MIIS, for their superb bibliographic assistance and encouraging words. He is also deeply grateful for the patience and reassurance of his husband, Simon Hsu, and for the soothing company of Amica and Lily (the cats) and Bella and Soda (the beagles). As always, Dana would like to thank her husband, Randy Ferris, for his good cheer and companionship.

Credits

- Figure 1.3 is adapted from Birch (2015), *English L2 reading: Getting to the bottom* (3rd ed., p. 6).
- Figure 1.4 originally appeared in Bernhardt (2005), "Progress and procrastination in second language reading" (*Annual Review of Applied Linguistics*, *25*, pp. 133–150). We thank Cambridge University Press for its policy concerning reproduction and adaptation of these resources.

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CHAPTER 1

Foundations of L1 and L2 Literacy, Reading, and Learning to Read

> Books are the bees which carry the quickening pollen from one to another mind.
>
> James Russell Lowell (1849)

QUESTIONS FOR REFLECTION

- Do you have any recollection of learning to read at home or at school in your primary language or in a second/foreign language? If so, what were those processes like? How were they similar or different across languages?
- How is text-based communication similar to and distinct from speech-based communication? How is *learning* to read and write distinct from acquiring speech and listening skills? Why?
- What are some of the principal challenges that you associate with reading certain kinds of text? What are the main obstacles that novice readers face in *learning* to read?
- Why do you think it is important for novice L2 educators to become acquainted with the principles and practices of *reading* instruction (in contrast to other skills, such as speaking, listening, writing, or grammar)?
- How has digital technology influenced your reading habits, skills, and strategies? What roles do you think digital technology can and should play in teaching reading?

The high premium that many people place on literacy skills, including those necessary for succeeding in school and in the workplace, emerges largely from the degree to which educated adults depend on text-based and digital resources for learning and communication. When educated people think about how and why literacy is important, few question the fundamental notion that reading is a crucial building block, if not the chief cornerstone, of success at school, at work, and in society (Feiler, 2007; Gee, 2015a, 2015b, 2015c; McCarty, 2005; Olson, 2009). In primary education around the globe, one of the first things children do at school is participate in literacy lessons and "learn to read." Of course, "the developmental transformations that mark the way to reading expertise begin in infancy, not in school" (Wolf, 2007, p. 223).

In many parts of the world, primary-level teachers receive specialized education and training in teaching children to read, sometimes in two or more languages. As children advance toward adolescence, they may undergo sustained literacy instruction designed to enhance their reading comprehension, fluency, and efficiency. Formal "reading" courses taper off as children progress toward and beyond secondary school—except, perhaps, for foreign or second language instruction. Many language teachers assume that teaching and learning a foreign or second language (L2)[1] depend on reading skills. In fact, they may devote considerable time and effort to promoting L2 reading skills among their students, often under the assumption that learners already have a developed system of literate knowledge and skill in their primary language(s) (L1s) (Lin & Li, 2015; Verhoeven & van Leeuwe, 2012).

Teachers in disciplines such as science and mathematics, social studies, and the arts may need to assume that their pupils or students already know "how to read." Such educators may not provide much, if any, explicit instruction in the mechanics of processing texts. Similarly, many teachers of writing at both the secondary and tertiary levels often assume that students know "how to read," or at least that students have been *taught* to read: "Reading instruction becomes invisible" (Grabe, 2009b, p. 278). Paradoxically, while formal education, professional activities, and use of digital tools including the Web depend on reading efficacy, many educators find themselves under-equipped to help students develop their reading skills when they need intervention. In other words, we often fail to recognize the complexity of reading because, as proficient readers, we overlook the marvel of reading, assuming that reading processes are automatic: "Literate people likely do not notice how frequently they rely on the ability to read" (Willingham, 2017, p. 7). As Seidenberg (2017) pointed out:

> Reading is one of the few activities you do every day whether you want to or not. Street signs, menus, e-mails, Facebook posts, novels, ingredients in Chex Mix. You read for work, for school, for pleasure; because you have to, because you want to, because you can't help it. That is a lot of practice over a long period. If it takes thousands of hours to become an expert at something like chess, we readers are in grandmaster territory.
>
> (p. 3)

It is easy to ignore the complexity of reading processes, as many of us do not have to think much about how we read. After all, you can read and understand the words on this page because you have somehow "learned to read" English (and perhaps other

languages, as well). You have also successfully automatized your ability to decode alphabetic symbols, interpret meaning from text, and retrieve a great deal of information from memory. Precisely how you achieved this level of skill, however, involves processes that cognitive scientists and neuroscientists are still trying to demystify—although dramatic strides have been made in recent decades (Dehaene, 2009; Seidenberg, 2017; Willingham, 2017; Wolf, 2007). Our experiences as students, language teachers, and teacher educators have led us to a profound appreciation of the complexity of the reading process and for the fact that, for many novice readers—whether working in L1 or L2—reading processes are far from automatic. We have also come to recognize the seemingly overwhelming challenges of *teaching reading* to language learners. Reading, learning to read, and teaching reading are neither easy nor effortless.

In this chapter, we consider fundamental aspects of the reading process that make it a complex social and cognitive operation involving readers, writers, texts, contexts, purposes, and extensive knowledge of formal conventions. We will introduce contemporary principles of literacy and literacy development to familiarize readers with definitions of key constructs in the interrelated fields of literacy studies, L1 and L2 reading research, and pedagogy. Our aim is to help readers develop a working knowledge of key issues, insights, and controversies in L2 literacy education by presenting an overview of key theories, models, and metaphors. Our chief focus is on the literacy development of multilingual learners in secondary and postsecondary educational settings.[2] Naturally, we refer to research on L1 literacy development, which has richly informed agendas for L2 literacy research and instruction. In the first part of this chapter, we consider contemporary views of literacy as a sociocultural and psychological construct that frames reading development and processes among L1 and L2 learners. By comparing research and theory associated with prevailing processing metaphors, we explore instructional issues of particular relevance to the teaching of L2 reading. These issues include the uniqueness of L2 reading processes, interactions amongst L1 and L2 literacies, and the importance of strategies-based instruction in promoting L2 literacy.

THE NATURE OF LITERACY AND LITERACIES

> Literacy is both an urgent practical concern and a metaphor for modernism itself.
>
> Olson and Torrance (2009, p. xiii)

Before examining the mechanics of reading, we would like to situate reading processes and instruction with respect to the sociocultural and educational contexts where reading skills are valued and learned. It is certainly true that the main job of any reading teacher is to cultivate learners' literacy skills and that reading skill should be central to any definition of literacy. Traditionally, researchers and educators have treated literacy as a mental process that involves reading and writing ability, a view that positions literacy in the heads of individuals rather than in society. In line with many other contemporary theorists, Gee (2015c) argued that this cognitivist perspective "obscures the multiple ways in which literacy relates to the workings of power in society" and to the social, cultural, and educational practices associated with reading and writing (p. 30). Literate knowledge, skill, and practice are shaped by institutions, history, politics, economics, ideologies, and

value systems (Cope & Kalantzis, 2000; Cummins, Brown, & Sayers, 2007; Gee, 2015a, 2015b; Goldenberg, Rueda, & August, 2006; Lewis, Enciso, & Moje, 2007; Robinson, McKenna, & Wedman, 2007).

We can refer to *reading* and *writing* as literate processes, but reading and writing are among numerous areas that we now characterize as forms of literacy. For example, the International Literacy Association (formerly called the International Reading Association) defined *literacy* as "the ability to identify, understand, interpret, create, compute, and communicate using visual, audible, and digital materials across disciplines in any context" (www.literacyworldwide.org/why-literacy). Seidenberg (2017) summarized this broad definition of literacy as "the exchange of information by linguistic and non-linguistic means" (p. 278). Across disciplines, "the term **literacy** has become a code word for more complex views of what is involved in reading and writing" (Barton, 2007, p. 5), such that a literate person can become "competent and knowledgeable in specialized areas" (p. 19). Literacies are multiple, overlapping, and diverse: "People have different literacies which they make use of, associate with different domains of life. These differences are increased across different cultures or historical periods" (Barton, 2007, p. 37). Consequently, in a *multiple literacies* framework, we frequently use the term *literacy* as a countable noun when describing skills, knowledge, practices, and beliefs allied with specific disciplines, discourse communities, and social practices (Cope & Kalantzis, 2000; New London Group, 1996; Unrau & Alvermann, 2013). Familiar examples include:

academic literacy	*digital literacy*	*multimodal literacy*
computer literacy	*financial literacy*	*remix literacy*
consumer literacy	*information literacy*	*scientific literacy*
cultural literacy	*media literacy*	*workplace literacy*.[3]

Contemporary conceptions of literacy do not characterize literacy merely as a cluster of isolated mental processing skills. Scribner and Cole (1981) framed literacy as a system of socially organized *literacy practices*. This view led to an "emerging theory of literacy-as-social-practice" (Reder & Davila, 2005, p. 172), now widely known as the *New Literacy Studies* (NLS) (Barton & Hamilton, 1998; Barton, Hamilton, & Ivanič, 2000; Barton, Ivanič, Appleby, Hodge, & Tusting, 2007; Burnett, Davies, Merchant, & Rowsell, 2014; Gee, 2000; Mills, 2016; Street, 1984, 1995, 2003, 2005). As socioculturally constructed and organized systems, literacies consist of much more than an individual's ability to work with print-based, digital, and multimodal media. Reading and writing may be the most observable processes in literacy development, but literacy practices go beyond reading and writing alone and are intertwined with people's lives and learning activities (Barton et al., 2007). From an NLS perspective, readers and writers are

> primarily engaged in social or cultural *practices*. Written language is used differently in different practices and used in different ways by different social and cultural groups. In these practices, written language never sits all by itself and it is rarely if ever fully cut off from oral language and action. Rather, within different practices, it is integrated with different ways of (1) using oral language; (2) of acting and interacting; (3) of

> knowing, valuing, and believing; and, too, often (4) of using various sorts of tools and technologies.
>
> (Gee, 2015b, pp. 35–36)

Literacy practices refer to "common patterns in using reading and writing in a particular situation. People bring their cultural knowledge to an activity" (Barton, 2007, p. 36). In an NLS view, literacy is therefore more than a skill or ability that people "acquire" it is something that people *do* in the course of everyday life. We can describe what people do with their knowledge of literate practices as *literacy events*, "the actual embodiment, engagement, and interaction among people in real time as they make their everyday lives within institutional, social, cultural, and economic contexts." Within literacy events, people adapt literacy practices to "the *in situ* circumstances in which people find themselves" (Bloome & Green, 2015, pp. 20–21). More concretely, a *literacy event* can be "any occasion in which a piece of writing is integral to the nature of the participants' interactions and their interpretative processes" (Heath, 1982, p. 93). School-based literacy events might include a reading lesson, a discussion about a reading assignment, or a writing activity. In the workplace, employees might read and respond to email messages, review and write documents, discuss reports and proposals, or deliver presentations. At home, people might help a family member with homework, shop online, check in with friends on Facebook, chat with someone on their mobile phones, or discuss current events reported in a newspaper. These individual literacy events might engage participants in multiple literacy practices, all of which are inherently social in nature and many of which involve regular, repeated activities that have evolved in culture (Barton, 2007; Barton, Hamilton, & Ivanič, 2000; Barton et al., 2007; Berman & Ravid, 2009; Duckworth & Ade-Ojo, 2015; Gee, 2015a, 2015c; Gunderson & D'Silva, 2017; Mills, 2016; Tolchinsky, 2009).

Critical Views of Literacy and Literate Practice

Literacy is further understood in terms of the individual's relationship to literate communities, institutions, and social structures (e.g., fellow readers and writers, teachers, employers, school, online networks, and so on). Influenced by the emancipatory view of literacy and education promoted by Freire (1970, 1985, 1994), literacy theorists such as Gee (2015a, 2015c), Street (1984, 2005), and others have proposed that literacy can privilege some people while excluding others. Societies and discourse communities use literacy to enforce social and economic controls that maintain sometimes-oppressive hierarchies, a central premise of *critical literacy theory*. The NLS approach makes two assumptions about literacy and society that inform critical literacy inquiry and that offer significant implications for education: (1) that social *context* is fundamental to any understanding of literacy and its development; and (2) that literate and oral practices overlap and interact in complex and often implicit ways (Barton, 2007; Barton et al., 2007; Berman & Ravid, 2009; Collins & Blot, 2003; Gee, 2015c; Gee & Hayes, 2011)

Grounded in social context, NLS research offers guidance for how we might view reading processes, reading development, and reading pedagogy. As already suggested, a key precept of NLS that departs from conventional notions is that literacy consists of

much more than reading and writing (Gee, 2015c; Purcell-Gates, 2007; Purcell-Gates, Jacobson, & Degener, 2008; Smith, 2004, 2007). Literacy practices and literacy events are not limited to libraries and schools: "Literacy development is a process that begins early in childhood, long before children attend school: and involves many different skills and experiences" (Lesaux, Koda, Siegel, & Shanahan, 2006, p. 77). L2 reading teachers may be confined to classrooms and digital spaces in their encounters with learners, but literacy education need not be limited to promoting school-based literacies alone (Freire & Macedo, 1987; Gee, 2000, 2015a, 2015c; Kalantzis & Cope, 2000). After all, literacy is "rooted in people's intimate everyday experiences with text" (Reder & Davila, 2005, p. 173). These daily experiences can range from the most mundane (e.g., scribbling a grocery list, dashing off a quick text message, checking Google Maps for driving directions) to those with high-stakes consequences (e.g., composing a college admissions essay, writing a cover letter for a job application, or crafting a letter of resignation).

Classrooms, of course, are unquestionably key sites for cultivating school and non-school literacies. Students must develop literate skills that will enable them to succeed in school and beyond, although some of these skills may not be featured explicitly in the curriculum (Crockett, Jukes, & Churches, 2011; Gee, 2015a, 2015c; Gee & Hayes, 2011; Gunning, 2010; Mills, 2016). In other words, surviving and thriving in school require much more than developing literacy in the traditional sense: Learners must also develop new predispositions, attitudes, behaviors, and skills while cultivating social alliances. Novice readers must learn "a set of complex role relationships, general cognitive techniques, ways of approaching problems, different genres of talk and interaction, and an intricate set of values concerned with communication, interaction, and society as a whole" (Wertsch, 1985, pp. 35–36).

Literate practices and literacy events of all sorts involve interaction and social activity around written texts, which are the products of a kind of technology—writing itself. As such, writing is a value-laden cultural form, "a social product whose shape and influence depend upon prior political and ideological factors" (Gee, 2015c, p. 65). Because "the immediate social context determines the use and nature of texts" (Reder & Davila, 2005, p. 175), texts and their uses are inherently tied to power at some level: "[L]iteracy can be seen as doing the work of discourse and power/knowledge" (Morgan & Ramanathan, 2005, p. 151). In this view, literacy and literacy development can never be neutral: Literate activity always involves learners interacting with teachers and other skilled literate persons who can use their literate knowledge as a social tool. As a social tool and form of cultural capital (Bourdieu, 1991), literacy can confer real and perceived power, which people gain by accruing not only expertise (knowledge and skill), but also prestige, privilege, social class, and economic assets. A tool such as literacy can serve productive, beneficial purposes depending on how it is used (and by whom). By the same token, it is worth remembering that a tool can easily become a weapon that can be wielded for detrimental purposes. Limiting or denying access to a tool such as literacy can likewise produce damaging results for disenfranchised groups (e.g., students, workers, women, minorities, the poor) who seek it but who lack ways to secure it (Freire, 1970, 1985, 1994; Freire & Macedo, 1987; Gee, 2015c; Janks, 2010).

NLS and critical literacy theorists remind us that ideological meanings underlie all literacy events, although we may not be aware of these meanings in the learning or

teaching process. L2 literacy educators can benefit from cultivating a critical awareness of how "literacy practices provide the textual means by which dominant values and identities (e.g., avid consumers, obedient workers, patriotic citizens) are normalized and, at times, resisted" (Morgan & Ramanathan, 2005, pp. 152–153). This perspective helpfully captures the spirit and scope of critical literacy, which Rogers and O'Daniels (2015) defined broadly as "the practice of using technologies (from print to digital technologies) to analyze, critique, and redesign structures that influence daily life" (p. 62). Because of the field's diverse intellectual roots and evolving purposes, critical literacy "resists being defined and categorized" (p. 63), although it is fair to say that critical approaches address and reflect the contradictions and inequalities of the sociocultural contexts where educators, advocates, and activists put them into practice.[4]

Perspectives on critical literacy, along with NLS research and theory, are invaluable to teachers of reading: They remind us that literacy practices and literacy events pervade culture and everyday life. They further remind us that literacy and access to literate knowledge are often unfairly distributed in society and in educational settings. Literacy emerges as a vital knowledge and skill base, as well as a socialization process that shapes how we learn, how we perceive the world, and how we come to participate in certain literate activities (Mickan, 2013). Describing early literacy development, Smith (1988) observed that children become successful readers "only if they are admitted into a community of written language users," which he called the "literacy club" (p. 2). Before they can read or write a single word, children become members of a *literacy club* similar to the community of oral language users into which infants are inducted at birth. "The procedures are the same, and the benefits are the same—admission to the club rapidly results in becoming like established members in spoken language, in literacy, and in many other ways as well" (Smith, 1988, p. 2).

Unique conditions affect adolescents and adults acquiring L2 literacy, yet the principle that literacy is socially embedded unquestionably applies to developing literacy in an additional language. Kern (2000) defined L2 literacy as "the use of socially-, historically-, and culturally-situated practices of creating and interpreting meaning through texts" constructed in a language other than one's primary language(s) (p. 16). Being literate in another language requires knowing how textual conventions and contexts of use shape one another (Barton & Lee, 2013; Chik, 2015; Lin & Li, 2015). And because literacy is purpose-sensitive, it is dynamic "across and within discourse communities and cultures. It draws on a wide range of cognitive abilities, on knowledge of written and spoken language, on knowledge of genres, and on cultural knowledge" (Kern, 2000, p. 16). Before reviewing the unique demands of developing literacy in a technological age, we conclude our overview of literacy and literacies with Peter Freebody's (2014) definition of what it means to "be literate," which informs the principles introduced elsewhere in this book. "Being literate," he wrote,

> is best considered an open-textured idea that covers a range of highly variable capabilities relevant to the sites of our everyday activities. The material, intellectual, social, and institutional conditions of literacy's uses are integral to our understandings of what it is and how it can be developed in learners; they are conditions that are not just incidental features of the 'bucket' in which a particular instance of an idealized

> 'literacy' might take place. 'Being literate' refers to the linguistic, psychological, and cultural work that can be done in light of the materials to be used or made, in the here-and-now.
>
> (p. xii)

Print and Digital Literacies

The dynamic aspects of Freebody's wide-ranging characterization of "being literate" in the twenty-first century must include *digital literacy* (or *digital literacies*), which we associate with "technology-mediated textual, communicative, and informational practices" (Ingraham, Levy, McKenna, & Roberts, 2007, p. 162). The pervasiveness of digital technology in the everyday lives of children, adolescents, and adults—and its penetration in the workplace, education, public discourse, and interpersonal communication—has produced new and constantly-evolving imperatives for literacy instruction. Any contemporary definition of literacy simply **must** include how individuals comprehend, learn from, and produce digital materials—regardless of the measurable benefits and negative effects of reading and writing in digital spaces. The digital dimension of literacy in the twenty-first century involves "how much of what is read and written has been conveyed electronically as binary strings of ones and zeros before appearing as letters, words, numbers, symbols, and images on the screens and pages of our literate lives." Invisible to the average person, this digital feature of literacy is "the very currency that drives the global information economy. Yet, what we see of this literacy is remarkably continuous with the literacy of print culture, right down to the very serifs that grace . . . the fonts of digital literacy" (Dobson & Willinsky, 2009, p. 286).

Settling on an accurate, informative definition of digital literacy presents serious challenges because the concept is a moving target (Hartman & Morsink, 2015; Jones, 2017; Warschauer, 2015). As recently as 2007, Eagleton and Dobler characterized digital literacy in terms of how readers gain knowledge from "digital texts such as those found on the Web" (p. 28). This definition suggests a now-outdated Web 1.0 array of "static and non-interactive" tools and resources such as Webpages, which were designed "purely for the consumption of information, so the reader could not contribute, revise, or . . . share" (Bloch & Wilkinson, 2014, p. 10). Web 1.0 tools also include email, chat, and listservs, which are certainly interactive, but with well-known limitations. On the other hand, Web 2.0 technologies and tools such as wikis, blogs, and microblogging platforms (e.g., Twitter) not only accommodate multimodal content (e.g., audio, video, animation) but also "encourage participation in the creation of material" so that everyone can "become a content creator." These technologies thus require competent users to develop "new, more sophisticated skills," "new ways of understanding how . . . information is . . . distributed and interconnected," and "new methods [of] filtering this information" (p. 11).

Given these cognitive, metacognitive, and social demands, we can see that digital literacies are perhaps best understood in somewhat flexible terms, partly because developing technologies—to say nothing of technologies that we haven't yet anticipated—will necessitate new definitions (consider Web 3.0 possibilities, for instance). Johnson (2014) identified five component skills that are essential to digital literacy: creativity,

communication, collaboration, critical thinking, and (crucially) comprehension. Somewhat more concretely, digital literacy requires facility with the technology itself (i.e., the ability to use multiple digital platforms), navigational skills, and critical knowledge about how to evaluate information. Crucially, these aptitudes, abilities, and skills all depend on *knowing how to read* (Bloch & Wilkinson, 2014; Cobb, 2017; Mills, 2016; Park & Warschauer, 2016; Pullman, 2016; Seidenberg, 2017; Warschauer, 2015). Dudeney, Hockly, and Pegrum (2013) defined digital literacies as "the individual and social skills needed to . . . interpret, manage, share, and create meaning [effectively] in the growing range of digital communication channels" (p. 2). These channels include Web-based tools such as blogs, wikis, and social networking sites (e.g., Facebook), in addition to mobile messaging apps (e.g., Line, WhatsApp), and microblogging platforms (e.g., Twitter).

The imperative to cultivate digital literacies systematically in L1 and L2 education is motivated by necessity and by the demographic reality that an increasing number of learners around the world are (or are becoming) so-called *digital natives* (sometimes variably known as *Generation Y*, the *Millenial Generation*, *Generation Next*, and *Net Generation*). An obvious factor underlying the necessity of cultivating digital literacy entails the ever-increasing time that people devote to interacting with digital media via their smartphones, tablets, and computers. A 2015 Common Sense Media study estimated that U.S. adolescents (ages 13–18) spent an average of nine hours per day and tweens (ages 8–12) an average of six hours per day consuming "entertainment media"—quite apart from time spent using digital media for homework. 45 percent of teens and tweens reported using social media on a daily basis (Common Sense Media, 2015). Although we should not necessarily accept these findings at face value, there is no shortage of empirical evidence that people of all ages spend staggering amounts of time within reach of, or directly connected to, the digital universe via their smart phones.

In response to this reality, researchers and policy-makers have advanced increasingly strident arguments for positioning digital literacies as central to language and literacy education, as this selective chronological sample indicates:

- ". . . we need to develop robust forms of media literacy, computer literacy, and multimedia literacies, thus cultivating 'multiple literacies'. . . . [Education] must expand the concept of literacy and develop new curricula and pedagogies" (Kellner, 2006, p. 250);
- "It is no longer enough to educate only to the standards of traditional literacies. To be competent and capable in the 21st century requires a completely different set of skills" (Crockett et al., 2011, p. ii);
- "Literacy demands of 21st-century society require that we move beyond simpler views of reading comprehension in our theories, research, and assessment" (Goldman, Lawless, & Manning, 2013, p. 180);
- "To teach language solely through *print literacy* is, in the current era, to short-change our students on their present and future needs" (Dudeney et al., 2013, p. 3).

Having been immersed in digital media, most young readers in the developed world today encounter print texts in many forms. Educators must consequently view literacy and reading in the twenty-first century in terms of "an ecology that includes broad-

based access to many different media" (Mackey, 2007, p. 13). Digital participation thus requires readers "to orchestrate their knowledge and abilities to operate multiple streams of input, such as graphics, videos, and other content, as well as texts" and places added burdens on L2 readers (Park & Warschauer, 2016, p. 282). Still, slightly more than half the world's population—3.9 billion people, primarily in developing countries—had zero Internet access as recently as 2016 (International Telecommunications Union, 2016). Internet penetration will inevitably increase globally, and the number of digital natives will grow. Nevertheless, digital natives must still *learn to read*. As Grabe (2009b) noted, "citizens of modern societies must be good readers to be successful. Reading skills do not guarantee success for anyone, but success is much harder to come by without being a skilled reader." Digital technology and the vast resources available online "[do] nothing to change this fact about reading. If anything, electronic communication only increases the need for effective reading skills and strategies as we try to cope with the large quantities of information made available to us" (p. 5).

Recent research unquestionably reveals that digital and multimedia technologies require new and ever-evolving skills and competencies that L1 and L2 literacy education must robustly address. However, some literacy scholars and reading researchers reject the premise that digital technology necessitates a completely new model of literacy education. For example, Goldman (2015) boldly asserted that "the Web and online reading have not created new literacies. Rather, what the Web has done is to make explicit aspects of reading and . . . comprehension that have always 'been there' but that have gone largely unattended" in existing reading curricula, testing, and research (p. 89). Instead of introducing and teaching new literacies, literacy education should endeavor to strengthen basic reading proficiency and systematically cultivate complex comprehension. Moreover, as leading cognitive scientist Mark Seidenberg (2017) succinctly reminded us, the ability to use digital technologies "is important, but a person still has to be able to read" (p. 279). More specifically, the automatic comprehension of print-based and electronic media requires the same "foundational skills" (decoding, fluency, and vocabulary) as reading traditional print (Eagleton & Dobler, 2007).

For the growing population of digital natives, literacy in a polysymbolic, transactional environment includes expertise in decoding and encoding print-based media, as well as interpreting and producing messages in multimodal spaces with impressive facility (Barton & Lee, 2013; Cobb, 2017; Crockett et al., 2011; Dudeney et al., 2013; Eagleton & Dobler, 2007; Frey, Fisher, & Gonzalez, 2010; Gee & Hayes, 2011; Gillen, 2015; Johnson, 2014; Jones, 2017; Mills, 2016; National Writing Project, 2010; Pullman, 2016; Spiro, Klautke, & Johnson, 2015; Warschauer, 2015). Given these realities, as well as our view that learners need to develop both print and digital literacies, we present Table 1.1 as a tool for highlighting key contrasts between traditional print and digital environments—both of which bear on the role of writing systems and the complex processes of reading and reading development explored later in this chapter.

In the remainder of this chapter, we explore L1 and L2 reading and reading development from a sociocognitive perspective. We believe that L2 reading teachers can best serve their students by viewing the learning and teaching of reading as much more than skill-oriented practices. We must engage students in authentic literacy events, which Kern (2000) distinguished from "just rehearsing reading and writing skills" (p. 17). To develop L2 literacy, students must "learn not only about vocabulary and grammar but also about

Table 1.1 Comparison of Formal and Functional Features of Print and Digital Environments

Function or Feature	*Traditional Print*	*Digital Environments*
Navigation	• In many text genres, conventional tools such as tables of contentsand indexes offer support foridentifying and locating specific content.	• Semantic clues and structural labels for hyperlinks in digital spaces (e.g., Webpages) may be ill-defined, as digital texts provided fewer context clues to guide readers as they anticipate where a hyperlink may lead. • Viewers and readers can enter anywhere in a website (from countless starting points).
Stability of Interface between Viewer/Reader and Text	• Text content is presented in a fixed linear format determined by the creator. • Rhetorical structure is typically consistent within the text. • Font, pitch (size), shape, and colormay vary across texts but remain static within texts.	• Digital document design separates content from how it is displayed, making text flexible in how it appears to the viewer or reader • Navigation through digital spaces is never fixed nor necessarily linear; viewers and readers determine how they move within and across digital spaces. • Font, pitch, shape, and color may vary widely across texts and even within texts. • Digital spaces may house audio and video input, as well as traditional print. • Digital spaces allow for content (and the form of that content) to expand, change, contract, and disappear at the discretion of the creator. • The viewer/reader may encounter advertisements, dead links, and access to a potentially endless amount of information completely irrelevant to his or her purpose.
Transparency of (and Accessibility to) External Content	• Content can be previewed in its entirety before reading.	• Hyperlinks allow texts to be linked for access to other spaces created or controlled by the creator—or to spaces and content created entirely by others. • The actual content of hypertext is invisible to the viewer/reader beneath multiple layers of information.
Explicitness of Intertextual Relations	• Intertextual connections are often implicit and rely heavily on the reader's pre-existing knowledge (exceptions would include footnotes and in-text citations).	• Intertextual connections tend to be highly explicit, external, physical, and readily available via hyperlinks.
Single vs. Multiple Modalities	• Internal signposting (e.g., heading and subheading systems) indicate topic shifts, signal new content, and introduce visual displays to enhance reader comprehension and add meaning.	• Icons, emojis, interactive images, diagrams, maps, and animations provide visual representations of hyperlinks (rather than relying solely on textual representations).
Accessibility to to Ideology and Bias	• Because traditional print sources are static, the ideologies and biases that they convey (whether explicit and or implicit) may be accessible to readers who already have background knowledge.	• Hyperlinks to multimedia sources (e.g., Webpages, blogs, podcasts, videos, etc.) can give viewers/readers immediate access to content that directly or indirectly supports specific ideological orientations and agendas.

Adapted from Johnson, 2014

discourse and the processes by which it is created" (p. 17). To synthesize salient insights into written discourse and how people construct it, we propose the following global principles, which are informed by research and theory in NLS, critical literacy, and digital literacy and which we can apply to our work as literacy educators:

- Literacy is both a cognitive and a social activity, which we can describe in terms of *literacy practices* played out during *literacy events*.
- Literacies are multiple and associated with different participants, purposes, social relations, modalities, settings, institutions, and sources of knowledge that support literate knowledge.
- Literacy events reference socially-constructed symbol systems that facilitate communication, create meaning, and represent the world. These systems require users to understand, use, and even reshape conventions (genres, discourse structure, grammar, vocabulary, spelling).
- As symbolic systems that draw on writing and speech, literacies enable people to represent and cognize about themselves, others, and the world around them.
- Literacy requires problem-solving. When they read and write, people have to discern relationships that connect words to their parts and to larger units of meaning (e.g., collocations, phrases, clauses, and so on). In establishing these connections, readers and writers link texts to other texts, to the "real" world, and to imagined worlds.
- Literacy entails knowledge of language and the ability to use it, as well as cultural understanding, belief systems, attitudes, ideals, and values that influence how people behave and function in literate communities.
- Literacy events shape us and our literacy practices as we engage in literacy events over our lifetimes. Literacy events and artifacts (i.e., texts of all sorts) have a history and take on meaning within and across literate communities.
- Literacy in the digital era requires people to use and produce representational forms (i.e., linguistic and multimodal messages) in multiple forms of media. To become proficient in using these forms, people have to learn when, where, and how texts and genres combine harmoniously to achieve their intended communicative purposes.

(Sources: Barton, 2007; Barton & Lee, 2013; Burnett et al., 2014; Crockett et al., 2011; Duckworth & Ade-Ojo, 2015; Dobson & Willinsky, 2009; Dudeney et al., 2013; Frey et al., 2010; Gee & Hayes, 2011; Gunderson & D'Silva, 2017; Kern, 2000; Mills, 2016; Park & Warschauer, 2016; Pullman, 2016; Spiro et al., 2015; Warschauer, 2015; Willingham, 2017)

WRITING, WRITING SYSTEMS, AND READING

> Writing has a very magical quality—not because of anything divine about its origins, but because it greatly increased our brain's capacities.
>
> Dehaene (2009, p. 173)

> . . . the creation of writing was one of the greatest achievements in human history. The development of modern civilization could not have occurred without the massive increase in the creation, retention, and transmission of information that writing afforded. Without writing, there would be no printing press, lightbulb, computer, or Internet.
>
> Seidenberg (2017, pp. 31–32)

As a defining function of literacy, reading is a chief focus of this chapter. Of course, without writing, reading would be neither possible nor necessary. Literate people may overlook the fact that reading and writing do not actually come about naturally or organically in the way that oral and aural skills do. Before reviewing models of L1 and L2 reading, we will consider factors that set reading apart from other skill areas. First, though, we would like to stress the interdependence of language proficiency and literacy: Literacy "is a delivery system for oral language" (Gee & Hayes, 2011, p. 54), and writing "is an extension of speech" (Willingham, 2017, p. 15). In outlining a model of how children and adolescents develop language skills, language awareness, and literacy, Ravid and Tolchinsky (2002) observed that the reciprocity of speech and writing in literate communities makes language and literacy "a synergistic system where certain features (e.g., basic syntax) originate in the spoken input" (p. 430). At the same time, knowledge of complex syntax and specialized vocabulary can emerge from learners' encounters with written input, resulting in a productive interplay in which writing and speech favorably influence each other (Berman & Ravid, 2009; Morrow, 2012; Morrow & Gambrell, 2011; Tolchinsky & Rosado, 2005). Nonetheless, because written language exhibits properties that are distinct from speech (Biber, 1988, 1995, 2009; Wolf, 2007) and because texts may predetermine the range of meanings that they express, "spoken language and written language can rarely be *the same*" (Smith, 2004, p. 42, emphasis added). Written texts can sometimes imitate and even replicate speech, as we will discuss below, but writing—whether in traditional print or digital form—does not amount to "speech written down" (Bazerman, 2007; Dehaene, 2009; Grabe & Kaplan, 1996; Olson, 1996; Olson & Cole, 2006; Powell, 2012; Seidenberg, 2017; Wolf, 2007).

It was once believed that the first writing system emerged in the fourth century BCE (about 5300 years ago) in Mesopotamia (modern Iraq and Syria) among the Sumerians and Akkadians, and that the Egyptians developed a writing system soon thereafter. Written texts dating to the third century BCE have also been located in the Indus valley (modern Pakistan and India). Recent archaeological evidence, however, indicates that writing was introduced at least three times near the end of the fourth millennium BCE, and at least three more times in diverse locations around the globe somewhat later. The Chinese *sinographic* system of *logographic* characters can be traced to about 1400 BCE (the Shang Dynasty, around 3400 years ago) in China; Mesoamerican writing systems can be traced to about 700 BCE (2700 years ago) in what is now Mexico and Central America. These writing systems likely took shape initially as accounting mechanisms designed to maintain

records of agricultural harvests, financial transactions, property boundaries, and tax payments —all of which served the purposes of preserving information over time and transmitting messages from one place to another (Chrisomalis, 2009; Dehaene, 2009; Ong, 2015; Powell, 2012; Robinson, 2007; Rogers, 2005; Willingham, 2017; Wolf, 2007).

As a tool and technology that "increases human control of communication and knowledge," writing "uses a written symbol to represent a unit of language and not an object, event, or emotion directly" (Birch, 2015, p. 18). A key property of writing is *displacement*, which also characterizes spoken language. Displacement allows people to use the symbols of speech (i.e., sounds, syllables, words, etc.) and writing (i.e., letters, syllabic symbols, characters, etc.) to refer to content and contexts that are removed from the immediate situation of the speaker or writer. That is, a linguistic message is *displaced* from the thing, person, event, state, emotion, or circumstance that it represents. Writing came about through a series of discoveries about displacement. The first of these discoveries or "epiphanies," as Wolf (2007) called them, was that a simple drawing or piece of clay indented with a series of cross-hatched lines could represent meaning *symbolically*. Not linked to speech, a line drawing of a bird or fish could allow one person to convey the meanings "bird" or "fish" to another person (as in Egyptian *hieroglyphs*); three cross-hatched lines on a clay token could symbolize a meaning equivalent to three bushels of grain (as with Sumerian *bullæ*). This kind of iconic representation is sometimes called *primary symbolization* or *semasiography*, which requires people to construct and retrieve abstract meanings based on visual approximations (images or symbols).

The second epiphany involved secondary symbolization, which happens when a symbol for something such as "bird" represents the sound of the word or phrase, rather than its meaning. Of course, a bird-like image can express both word meaning and its sound, creating an ambiguity problem. The need to distinguish phonetic (sound) markers from semantic (meaning) markers made "reading" more challenging for people who knew the symbol and "required more elaborate cerebral circuitry" as secondary symbolization developed (Wolf, 2007, p. 34).

Secondary symbolization precipitated a third and crucial epiphany: the discovery that words comprise discrete sounds (*phonemes*) and that *graphemes* (e.g., individual letters) can signify these sounds. The result is *lexigraphic writing*, in which "signs are attached to necessary forms of speech" (Powell, 2012, p. 259). We often call this third stage in the evolution of writing the *alphabetic principle*, "the stunning realization that all words are actually composed of tiny individual sounds and that symbols can physically signify each of these sounds for every word" (Wolf, 2007, p. 26). The alphabetic principle (also called the *phonographic principle*) made it possible for a spoken word in any language to be represented in writing (Dehaene, 2009; Hoosain, 1995; Olson, 1996; Powell, 2012). Moreover, each of these three revolutionary breakthroughs required the brains of literate people to adapt in order to memorize, recognize, decode, and process written symbol systems. The human brain had to become "a beehive of activity" (Wolf, 2007), as processing a written message activates vision and visual association areas (for handling visual images), as well as frontal, temporal, and parietal regions (for handling sounds, meanings, grammatical relations, and links among semantic meanings) (Helms-Park, Dronjic, & Tucker, 2016; Seidenberg, 2017; Willingham, 2017).

In addition to requiring new and extraordinarily complex neurological activity, writing practices and conventions are always deeply "socially contextualized," unlike oral language,

which entails a comparably universal array of cognitive and metacognitive skills (Grabe & Kaplan, 1996; Harris, 2009). Some scholars have controversially argued that the development of reading and writing skills should be as intuitive and organic as acquiring speech. Smith (2004), for example, asked: "[W]hy should language written in an alphabetic script be particularly difficult? The answer is that it isn't. Reading print is no more complex than reading faces . . ." (p. 3). He concluded that "reading print is as natural as reading faces" and, by extension, speech (p. 5). Such claims overlook a crucial fact: Whereas oral language emerges among virtually all human populations, writing is always (and only) transmitted by and within certain cultures—but not by or within *all* cultures. As we have noted, learning to use a writing system unquestionably relies on linguistic competence, but it also requires specialized knowledge and skills that may not be as "natural" as acquiring speech (Berman & Ravid, 2009; Bialystok, 2001; Chrisomalis, 2009; Taylor & Olson, 1995; Tolchinsky, 2009; Wolf, 2007). As Pinker (1997) noted, "children are wired for sound, but print is an optional accessory that must be painstakingly bolted on" (p. ix). The human brain is not actually "wired" to read print (Helms-Park et al., 2016; Seidenberg, 2017; Willingham, 2017; Wolf, 2007). In describing the "reading paradox," Dehaene (2009) noted "the indisputable fact that our genes have not evolved in order to enable us to read" and that, although the human brain "was not designed for reading," it efficiently "recycles some of its circuits for this novel cultural activity" (p. 8).

This special expertise entails using graphical elements (written symbols) to mediate thought and language—itself a symbolic system. Three elements distinguish written language from speech: script, sound, and semantics (Hoosain, 1995; Powell, 2012; Willingham, 2017; Wolf, 2007). The ability to understand or create a written text may allow people to *re-present* or recreate a spoken message (in the case of phoneme- and syllable-based writing systems). Alternatively, knowing a writing system may enable people to re-present or recreate a message with little or no reference to sounds (in the case of logographic writing systems). Table 1.2 presents a very partial comparative list of writing system categories and scripts used by speakers, readers, and writers of selected modern languages.

Although a careful study of the world's writing systems is not practical here, it is useful for L2 reading teachers to recognize the underlyingly uniform properties exhibited by writing systems around the world and their direct influence on how readers read (and learn to read). Noting that writing systems are directly influenced by constraints on our neural circuitry, Dehaene (2009) identified three universal visual features that all scripts share: (1) "highly contrasted contours"; (2) "an average number of about three strokes per character"; and (3) a reduced inventory of shapes "that constantly recur," even in unrelated, distant cultures (p. 175). To appreciate the complexity of writing and the diverse features highlighted in Table 1.2, we should also understand distinct features that are relevant to making comparisons across systems. Perfetti and Dunlap (2008) specified three levels of description:

- A *writing system* represents units of oral language with physically perceptible (visual or tactile) symbols known as *graphemes*. In *alphabetic (phonographic) writing systems* such as the Roman, Greek, and Cyrillic alphabets, for instance, speech

Table 1.2 Comparison of Selected Lexigraphic Writing Systems and Scripts

Category	*Language*	*Script Name*	*Text Direction*	*Sample Transcription*
Logographic + Logosyllabic (Opaque)	Chinese	Sinograms (*Hanzza,* or *Hanzi*)	Left to right, horizontal; right to left, horizontal; right to left, vertical, top to bottom	老師讀了很多書
Logographic + Syllabic (Opaque and Transparent)	Japanese	*Kanji, Katakana, Hiragana*	Right to left, horizontal; vertical, top to bottom	先生は多くの本を読む
Alphasyllabic (Transparent)	Hindi	*Devanāgarī*	Left to right, horizontal	शिक्षक कई किताबें पढ़ता है
Alphasyllabic (Transparent)	Korean	*Hangul* (*Hangeul*)	Left to right, horizontal (since 1980s); right to left, horizontal; vertical, top to bottom	선생님은 많은 책을 읽습니다.
Alphasyllabic (Transparent)	Thai	Thai alphabet	Left to right, horizontal	ครูอ่านหนังสือหลายเล่ม
Consonantal-Alphabetic (Opaque)	Arabic	Arabic alphabet	Right to left, horizontal (numerals written left to right)	يقرأ المعلم العديد من الكتب
Consonantal-Alphabetic (Opaque)	Hebrew	Hebrew	Right to left, horizontal	המורה קורא ספרים רבים.
Alphabetic (Transparent)	Russian	Cyrillic alphabet	Left to right, horizontal	Учитель читает много книг
Alphabetic (Transparent)	Greek	Greek alphabet	Left to right, horizontal	Ο δάσκαλος διαβάζει πολλά βιβλία
Alphabetic (Transparent)	Spanish	Roman alphabet	Left to right, horizontal	*El profesor lee muchos libros.*
Alphabetic (Opaque)	French	Roman alphabet	Left to right, horizontal	*Le professeur lit beaucoup de livres.*
Alphabetic (Opaque)	English	Roman alphabet	Left to right, horizontal	*The teacher reads many books.*

Adapted from: Birch, 2015; Ferris and Hedgcock, 2014

units are mainly phonemic or phonetic (based on individual sound units). In syllabic systems such as Japanese *Kana* and Korean *Hangul,* speech units are mainly syllables. In *logographic* and *morphographic* (meaning-based) systems such as Chinese *Hanzza*, the relevant speech units consist of meaning-bearing constituents such as morphemes (word parts), whole words, and sometimes even word clusters. Perfetti and Dunlap (2008) and Birch (2015) helpfully recommended comparing these categories in terms of the *granularity* of the speech units on which writing systems rely. A millet grain, like a phone or phoneme, is smaller than a grain of rice, whose size is analogous to that of a syllable. A grain of maize (corn), analogous to a morpheme or word, is larger than both a grain of millet and a grain of rice.

- *Orthography* (often called "spelling") refers to how users of a particular language implement a writing system. The Cyrillic alphabet, for instance, allows readers of Russian, Serbian, and Mongolian to read texts according to those languages' orthographies. The Roman alphabet yields quite different orthographic systems in modern European languages such as Danish, Dutch, English, French, German, Italian, and Spanish (to name but a few). Although diverse orthographies can use the same set of graphemes (in other words, the same technology), orthographies vary widely with regard to how graphemes map onto speech. The correspondence between symbol and speech may be highly predictable, or *transparent* (as in Spanish and Thai). On the other hand, the symbol–speech mapping may be comparably less predictable, or *opaque* (as in English, French, Arabic, and Hebrew).
- *Script* describes the font and distinct visual features that represent an orthography. *Devanāgarī* script is used to write Hindi; *sinograms* (*Hanzza*) represent Mandarin, Cantonese, Mandarin, and many other Chinese varieties; both *Hanzza* and *Hangul* represent Korean. Scripts can appear in different styles (e.g., block, cursive, and so forth) and can be written in a variety of directions (e.g., left-to-right, right-to-left, vertically, and so on). You are now reading—in a rightward direction—a Roman-based script (the Roman or Latin alphabet) in a font known as Bembo.

As we can see, scripts derive from a range of linguistic and non-linguistic units, such as meaning, syllables, phonemes (sounds), phonemic and phonetic features (e.g., voicing, tone), and combinations thereof. The categories that scholars have developed to compare and contrast writing systems, orthographies, and scripts are neither absolute nor mutually exclusive: Writing in a single language can actually involve complementary categories, as Table 1.2 indicates. For example, Japanese writing involves three systems whose main properties are both logographic (*Kanji*) and syllabic (*Katakana* and *Hiragana*). Modern Korean writing is often classified as an *alphasyllabary* (or *abugida*), as *Hangul* script represents syllables and individual sounds (sometimes called *syllabographs*); the transparency of these features greatly facilitates learnability. Modern Korean also incorporates *Hanja*, logographic symbols derived from Chinese sinograms (*Hanzza*) (Birch, 2015; Powell, 2012; Rogers, 2005).

L2 students may know a writing system that differs significantly from that of the target language, though teachers should not assume that knowing a different writing system necessarily inhibits L2 reading development (Akamatsu, 2003; Cook & Bassetti, 2005; Koda, 1993, 1995, 2008, 2016). Nonetheless, they should not presuppose that mastery of an L1 writing system is necessarily transferable to a developing L2 writing system (Bialystok, 2001; Koda, 2005b, 2016; Lin & Li, 2015; Mori, 1998; Yeung, Siegel, & Chan, 2013). A few basic features and contrasts are worth noting as we consider how writing systems themselves might influence reading, writing, thinking, and memory. For example, *logographic* systems—unlike the phoneme-based (alphabetic) system used by speakers of English and other European languages—rely on *graphs* (symbols) that represent words or even concepts. Arabic numerals, mathematical symbols, and other non-phonemic *logograms* (e.g., @, #, %, &, ¢, $, £, €, ¶, and so on) do not actually have speech equivalents: They cannot be pronounced, but they have names (e.g., "&" is called an *ampersand*, and so on). These logograms can be used by readers and writers of any language.

Chinese characters (*Hanzza*), the basis for Japanese *Kanji* and Korean *Hanja*, represent a widely-used logographic system thought to contain about 60,000 forms that should perhaps be called *sinograms* (Birch, 2015) or *morphographs* (Helms-Park et al., 2016). The terms *sinogram* and *morphograph* are perhaps more accurate, as over 80 percent of the symbols in the Chinese lexicon are made up of a *radical* or *signific* (one of about 200 root symbols that represent an element of meaning such as a word), plus a phonetic complement, which signals how the word can be pronounced. Many sinograms indicate approximate meanings and pronunciations, requiring readers to "guess or memorize the appropriate sound of the phonetic complement" and "associate the [graph] with a word that they already know" (Mair, 1996, p. 201). Phonetic complements can be variably pronounced, and many sinograms can represent multiple meanings but a single sound. Chinese script also lacks grammatical clues such as markers for tense, aspect, and so forth. Consequently, novice readers of Chinese must learn to link spoken syllables and words with sinograms that express a particular meaning (Birch, 2015; Helms-Park et al., 2016; Leong, 1995; Li, Gaffiney, & Packard, 2002).

Experts estimate that a reader of Chinese needs an inventory of about 6600 sinograms to grasp most text types; in order to read a scholarly or literary text, one needs an inventory of about 30,000 symbols (Mair, 1996)! Clearly, Chinese writing places high demands on memory. At the same time, although some spoken varieties of Chinese (e.g., Mandarin, Taiwanese Mandarin, Cantonese, Shanxi) may be mutually unintelligible, literate speakers of these varieties can communicate in writing using the same set of 60,000 (or so) characters, many of which may have changed little since their introduction four millennia ago. For a literate Chinese speaker learning English, some aspects of reading English texts may seem relatively easy, while processes such as word analysis, morpheme identification, and phoneme–grapheme correspondence might require developing novel skills and strategies (Birch, 2015; Koda, 2008, 2013, 2016; Leong, 1995; Venezky, 1995; Yeung et al., 2013).

Similar adjustments may be required for literate speakers of languages with *syllabic* or *alphasyllabic* (hybrid) scripts, but for different reasons. Logographic, morphographic, and sinographic symbols represent concepts, things, morphemes, and words; syllabic scripts represent sounds and sound clusters. Some syllabic systems (e.g., Mesopotamian, Egyptian,

Korean *Hangul*) evolved from logographic systems and still bear logographic traces. Others (e.g., Japanese *Kana* and the Cherokee and Tamil syllabaries) were devised to associate a single symbol with a consonant–vowel (CV) or consonant–vowel–consonant (CVC) sequence, syllabic units with natural beats and rhythms. Like the alphabetic graphs (letters) in a phonemic system, syllabic graphs are essentially indivisible: Symbols represent singular units that cannot be dissected into discrete consonants and vowels (Birch, 2015; Dehaene, 2009; Helms-Park et al., 2016). The 47-symbol Japanese *Kana* comprises two subsystems: *Katakana* graphs allow for transcription of foreign borrowings, whereas *Hiragana* expresses grammatical functions. By themselves, *Kana* graphs enable writers of Japanese to represent any speech form. This feature may account for why Japanese schoolchildren learn *Kana* symbols at a very early age (Helms-Park et al., 2016; Koda, 2016; Morton & Sasanuma, 1984; Steinberg, 1995). As Table 1.2 indicates, Japanese texts are written using *Katakana* and *Hiragana* graphs, in combination with Chinese-derived *Kanji* logographs. Literacy in Japanese thus requires a specialized mastery of three interrelated writing systems that activate a range of memory, recognition, decoding, and interpretation skills (Koda, 1995, 2008, 2013, 2016; Mori, 1998; Seidenberg, 2011).

Japanese is not unique in drawing on two or more scripts in its writing system. Korean and Thai writing systems, for example, involve a combination of syllabic and alphabetic features. In the same way that Chinese script is not completely logographic in nature, syllabic writing systems can also include alphabetic elements. Alphabetic systems are based on the alphabetic principle, which holds that an arbitrary symbol (graph or letter) can signify a single sound (consonant or vowel) and that these symbols can be arranged in a sequence to form a word. With minor adjustments (e.g., the use of *diacritical marks* such as accents [´, `, ˆ], umlauts [¨], tildes [˜], cedillas [ç], and so on), a single alphabet containing a surprisingly small number of alphabetic symbols can potentially be used to write any language, although some alphabets are designed to capture the phonological and phonemic features of particular languages or language groups. The Roman (Latin) alphabet is used to transcribe in English, German, Spanish, Indonesian, Swahili, and many other languages; the Cyrillic alphabet is used to transcribe Russian, Ukranian, Bulgarian, Serbian, and numerous Slavic languages; the Greek alphabet is used by speakers of Greek. Inherently tied to speech as they are, alphabets require readers to know the corresponding spoken language, as well as its morphological patterns and vocabulary (see Chapter 4). In other words, to read a text written in an alphabetic orthography (spelling system) such as English, German, Russian, or Greek, one must be able to relate spoken words to written words, and vice versa. In contrast, one could conceivably develop a modest reading ability in Chinese without developing speaking and listening skills by learning a large number of meaning-based sinograms. One could not learn to read in Chinese through *Pinyin* ("spell sound"), a Roman alphabetization system introduced in 1958. *Pinyin* is currently used in early Chinese education and in teaching Chinese as a foreign language, but not by literate adults as a vehicle for encoding and communicating (Powell, 2012).

An "ideal" phonographic writing system would involve one-to-one phoneme-grapheme correspondence, a purpose for which the International Phonetic Alphabet (IPA) was developed. The IPA is actually a *script* designed by linguists to achieve 100 percent transparency for the purposes of unambiguous, detailed phonemic and phonetic transcription

(International Phonetic Association, www.internationalphoneticassociation.org/). Though based largely on the Roman and Greek alphabets, the IPA is neither a writing system nor an orthography: The IPA aims to represent *speech* in any language but not to represent meaning.[5] Real phonographic writing (alphabetic, syllabic, and alphasyllabic) involves diverse representation systems, as phoneme–grapheme and syllable–grapheme correspondence varies considerably across orthographies and naturally evolves over time (Daniels & Bright, 1996; Hoosain, 1995; Olson, 1996; Perfetti & Dunlap, 2008; Powell, 2012; Robinson, 2007; Rogers, 2005). As we noted earlier, alphabetic and syllabic systems that represent consonants, vowels, and syllables can be classified as *transparent*, *opaque*, or somewhere in-between—depending on how closely they adhere to the one-to-one alphabetic principle. For example, some linguists consider the orthographies of Korean (which uses *Hangul* script), Serbian (which uses the Cyrillic alphabet), as well as Finnish and Turkish (which use the Roman alphabet) to be transparent because their close sound–symbol correspondence enables readers to predict pronunciation easily based on spelling and "sound out" words. The orthographies of Greek, Italian, and Spanish (which use the Greek and Roman alphabets, respectively) are thought to be a little less transparent; German and Swedish (written in Roman script) reflect even less phonological regularity.

Continuing this comparison, French and Danish (which are also transcribed in the Roman alphabet) are considered less transparent (more opaque) than German and Swedish. English orthography is yet more opaque than French and Danish orthography, as readers of English cannot rely on one-to-one phoneme–grapheme mappings when it comes to pronunciation (Birch, 2015; Helms-Park et al., 2016; Koda, 1999; Powell, 2012). Phonological irregularity requires learners to master both the predictable sound–symbol correspondences and the irregular features, which must be stored as part of the reader's lexical knowledge base (vocabulary) (see Chapter 4). Even more opaque on the continuum are the consonantal orthographies (also called *abjads*) of Arabic, Hebrew, and Aramaic, which require readers to insert vowels, mainly with diacritical markers. Although the 28 consonant graphemes of Standard Arabic generally match one-to-one with corresponding consonants (and a small subset of vowels), the absence or near-absence of vowels can lead to considerable ambiguity, as readers may have to guess a word's grammatical function from the syntactic context (Bauer, 1996; Birch, 2015; Powell, 2012). On the transparency continuum, logographic systems such as Chinese *Hanzza*, Japanese *Kanji*, and Korean *Hanji* are considered to be highly opaque, for the reasons discussed above.

This continuum is informed by research on the Orthographic Depth Hypothesis (ODH), which proposes that regular, or *shallow*, orthographies such as Serbian and Spanish encourage readers to analyze words phonologically (i.e., at the intraword level) (Birch, 2015; Defior, Cary, & Martos, 2002; Katz & Frost, 1992; Perfetti & Dunlap, 2008). In contrast, the ODH maintains that in *deep* (phonologically irregular) orthographies such as English and French, "phonological information may not always be obtained before a letter string has been identified as a lexical entry. Phonological information extraction in those systems may occur after a word's lexical identity is established via memory search" (Koda, 2016, p. 80). Learning a deep orthography thus requires readers to rely less on phoneme–grapheme correspondence and more on morphological analysis and the lexico-semantic information encoded in individual words (Koda, 1999, 2007b,

2016; Wolf, 2007). Variation across writing systems and orthographies can naturally pose a range of challenges for novice L1 and L2 readers (Aro, 2006; Birch, 2015; Helms-Park et al., 2016; Koda, 1995; Joshi & Aaron, 2006; Seidenberg, 2011; Trabasso, Sabatini, Massaro, & Calfee, 2005; Verhoeven, 2013). Unsurprisingly, learners acquiring languages with transparent orthographies develop decoding skills more quickly and easily than do learners acquiring languages with opaque orthographies (Lervåg & Aukrust, 2010; Wolter & Helms-Park, 2016). Nonetheless, even when acquiring an L2 whose orthography is similar to that of the learner's L1 (e.g., a Spanish speaker learning English), knowledge of L1 orthography may be of limited help. For example, Koda (2013) reviewed investigations of interlingual transfer effects among learners acquiring languages with similar and dissimilar orthographies; she concluded that interlingual transfer may be less frequent and influential than is often believed, although L2 learners who can build on their L1 orthographic knowledge tend to demonstrate stronger word recognition and analysis skills. We delve more deeply into the role of such lexico-semantic knowledge in reading in Chapter 4, which provides guidelines for incorporating vocabulary building and analysis into reading instruction.

Complementary to the ODH is the Syllable Complexity Hypothesis (SCH), which proposes that languages with complex syllable structures (i.e., numerous and diverse consonant clusters and vowel sequences) pose greater reading and learning difficulties than languages with relatively simpler syllable structures. In their study of literacy development among learners of numerous modern European languages, Seymour, Aro, and Erskine (2003) discovered that complex syllable structures were measurably harder for learners to decode, posing particular challenges for beginning-level readers. Their research revealed that achieving reading proficiency in English was more difficult and it took about two and a half times longer than it took for learners to achieve reading proficiency in languages with simpler syllable structure. Participants learned to read most quickly in Finnish, with its simple syllable structure and high orthographic transparency; Greek, Italian, and Spanish took relatively more time and effort, followed by German, Norwegian, Icelandic, Dutch, Swedish, and Danish. The results reported by Seymour et al. supported the gradient of difficulty predicted by the SCH and aligned remarkably well with the continuum of transparency predicted by the ODH.

The research implications of the ODH and SCH are potentially wide-ranging and highly relevant to L2 literacy instruction. First, even a basic knowledge of how writing systems, orthographies, and scripts vary can help us appreciate the extent to which writing is socially and culturally embedded (see Table 1.2). Second, research on writing systems and how they are learned reveals that readers process written messages differently in their encounters with different orthographies (Geva & Siegel, 2000; Harris & Hatano, 1999; Koda, 2005b, 2008, 2013, 2016; Muljani, Koda, & Moates, 1998; Perfetti & Dunlap, 2008). Thus, we can reasonably assume that L1 orthography is likely to influence L2 reading processes and strategies. In addition, understanding L2 readers' "L1 literacy skills and orthography may help explain possible L2 difficulties in word recognition, fluency, and reading rate" (Grabe & Stoller, 2011, p. 42). The remainder of this chapter examines these and other aspects of the reading process that are especially relevant to the learning and teaching of L2 reading skills.

READING PROCESSES: FUNDAMENTALS

> I wish you to gasp not only at what you read but at the miracle of its being readable.
>
> Vladimir Nabokov, *Pale Fire*

The process of reading is, indeed, miraculous for its remarkable efficiency and apparent ease, which belie its underlying complexity. Somehow, people learn to read well without knowing how they do it. Most reading processes are subconscious: "We are aware of the result of having read something—that we understood it, that we found it funny; that it conveyed a fact, idea, or feeling—not the mental and neural operations that produced that outcome" (Seidenberg, 2017, pp. 3–4). Our survey of the dimensions of literacy emphasized interactions amongst the social, cultural, and cognitive functions of literate knowledge and practices. In reviewing the unique properties of writing as a culturally-transmitted communication system, we likewise touched on the roles that writing systems play in the learning and teaching of reading. We now turn our attention to reading as both a cognitive process and a defining function of literacy. We urge readers to view reading against a sociocultural backdrop that considers not only the global and local contexts where reading and reading instruction take place, but also readers' many purposes for reading (Tracey, Storer, & Kazerounian, 2010). At the same time, we should point out that pedagogies informed by NLS and multiple literacies are not substitutes for systematic *reading* instruction. As Seidenberg (2017) recently cautioned, the prevailing emphasis on multiple literacies "devalues the importance of reading and teaching reading at a time when they need *more* attention, not less" (p. 277, italics added).

The International Literacy Association (ILA) estimated that about 6.4 billion people (88 percent of the world's population of 7.2 billion) were functionally literate in 2014 (www.literacyworldwide.org/why-literacy), leading us to wonder just how such an impressive number of persons can overcome the heady challenges of mastering a writing system. Theory, research, instructional practice, and educational policy have contributed to current accounts of what it means to "read," how novices become readers, and how educators can guide students toward functional literacy. These are key themes of this book, and the remainder of this chapter will explore efforts to define the reading process before reviewing influential conceptualizations of reading and reading development. Rather than working our way through a catalogue of formal theories or models, we will review these conceptualizations in terms of how they relate to three guiding metaphors, known as *bottom-up*, *top-down*, sand *interactive* approaches (see Table 1.4). In considering how research findings compare and contrast, we will concentrate on capturing the unique demands placed on the L2 reader, as well as reading skills and strategies thought to be learnable and teachable.

Before examining theoretical insights into reading processes, we would like to explain why a theoretically grounded approach is indispensable in teaching L2 reading. "When teachers become aware of the full range of theories from which their educational practices can radiate," wrote Tracey and Morrow (2017), "their repertoire of teaching skills can greatly expand" by equipping them with "complementary instructional interventions from a wide variety of theoretical orientations" (p. 5). We agree, as our own practices as L2 literacy educators have been richly informed by advances in reading research. We also agree with Bernhardt's (2005) premise that "a theory is only as good as its practical application" (p. 142). We urge teachers to draw on the research base in formulating their own theories and in decision-making about curricula, materials, instruction, and

assessment. Our experience as teachers and teacher educators supports Grabe's (2004) observation that "doing what works" can inhibit progress and effective teaching. Practitioner knowledge is not always open to competition from new ideas other than fashions and bandwagons, and years of practice can easily become fossilized (Grabe, 2009b). We encourage teachers to search for reliable evidence that might support a particular instructional model in order to avoid relying too heavily on practitioner lore. To be effective teachers, we should question and strengthen our practitioner knowledge by seeking rigorous research support for how we plan and deliver reading instruction.

We should further recall that, like literacy itself, formal theories and research-based models are always sociohistorically embedded and limited with respect to their potential application in local classroom contexts (Alexander & Fox, 2004; Tracey & Morrow, 2017). Similarly, the implications of any empirical study depend on the characteristics of the setting, participants, tasks, materials, and time frame of the research, making comparisons across studies difficult. Thus, we should take a cautious approach to "translating" any theory or empirical conclusion into classroom practice. Moreover, our survey of influential models and metaphors is necessarily informed by L1 research, which has in many respects led the way in shaping L2 reading research (Bernhardt, 2011; Grabe, 2009a, 2009b, 2011; Grabe & Stoller, 2011). First, considerably more research has been carried out with L1 readers than with L2 readers. Second, L2 insights often converge with L1 reading research findings, permitting us to draw useful implications from L1 research findings in general, and particularly from research on instructional interventions (Grabe, 2009b, 2017). Proctor, Carlo, August, and Snow (2005) argued that "there appear to be more similarities than differences between [L1 and L2 learners] in the arena of component skills' contribution to reading achievement" (p. 247). Wolter and Holms-Park (2016) similarly concluded that "L1 and L2 speakers develop reading skills in the same way" (p. 138). Unquestionably, L1–L2 distinctions must be recognized, as noted in Table 1.5 and discussed in Chapter 2. Nonetheless, L1 and L2 reading abilities are similar enough in terms of cognitive processing that L2 researchers and practitioners can judiciously draw on L1 instructional research when appropriate (Grabe, 2009b, 2017; Grabe & Stoller, 2011).

Defining and Exploring Reading Processes

For millennia, scholars have pondered the origins and processes of reading, one of the oldest areas of inquiry in the field of psychology. Recent breakthroughs in psycholinguistics, cognitive science, and neuroscience have unraveled the principles governing the brain's circuitry for reading. Indeed, "the brain's black box is cracked open," thanks partly to advanced brain imaging technology and a much clearer understanding of theoretical models that were, until recently, largely speculative (Dehaene, 2009, p. 1). Contemporary research has supplied us with definitions of reading that will inform our discussion in the remainder of this chapter, as well as the instructional tools introduced elsewhere in the book. To ground our discussion of leading models of reading, we present a selective but varied list of definitions, sequenced in rough chronological order and grouped partly by theoretical orientation. We will briefly examine these definitions of reading with a view toward representing the complexity of evolving conceptualizations of the reading process.

1. Reading means reconstructing "a reasonable spoken message from a printed text, and making meaning responses to the reconstructed message that . . . parallel [responses] to the spoken message" (Carroll, 1964, p. 62).
2. Reading means "dealing with **language messages in written or printed form**" (Urquhart & Weir, 1998, p. 14). "Reading is the process of receiving and interpreting information encoded in language form via the medium of print" (p. 22).
3. Reading is no different from "any other kind of thought, except that with reading, thought is engendered by a written text. Reading might be defined as thought stimulated and directed by written language" (Smith, 2004, p. 27).
4. "**Reading** can go from the mechanical uttering of the newsreader to the innumerable levels of interpreting any text. In the sense of understanding meanings, reading has always been applied to a wide range of phenomena, including the reading of barometers, tea-leaves and facial expressions" (Barton, 2007, p. 18).
5. Reading is "a complex, multifaceted pursuit requiring the continuous deployment and integration of multiple operations . . . [A]dept reading is a constellation of interfaced capabilities, ranging from mechanical mappings to more sophisticated conceptual manipulations, such as reasoning and inferencing" (Koda, 2005a, p. 227).
6. "Reading is a neuronally and intellectually circuitous act, enriched as much by the unpredictable indirections of a reader's inferences and thoughts, as by the direct message to the eye from the text" (Wolf, 2007, p. 16).
7. "L2 reading is a complex cognitive process where the reader, using previous knowledge, interacts with information in the text to construct and integrate meaning. . . ." (Pulido, 2009, p. 66).
8. "Reading . . . is the dynamic pursuit embedded in two interrelated systems—a language and its writing system—and its acquisition requires making links between the two systems" (Koda, 2013, p. 1).
9. Skilled reading consists of "an intricate interaction between various aspects of oral language proficiency, word decoding, reading fluency, higher-order language comprehension, inferencing skills, familiarity with various text structures, cultural and background knowledge, and the ability to apply various metacognitive comprehension strategies" (Fraser, Massey-Garrison, & Geva, 2016, p. 247).
10. For the 3.2 billion or more people with Internet access and emerging generations of digital natives, reading means reading online or in digital spaces, which activates text mapping skills that diverge from those required to read traditional print texts. Reading on the Internet requires following non-linear intertextual pathways. Navigating electronically networked text "diversifies the direction of significant connections to a potentially infinite degree, and reading comprehension processes are distinctively different [from] other forms of reading," often leading to "an open-ended cycle of linkages" (Mills, 2016, p. 87).

Advanced by Carroll (1964) and Urquhart and Weir (1998), definitions 1 and 2 straightforwardly assert that reading entails constructing meaning from written text, implying that meaning resides mainly (if not exclusively) in the input material. Carroll (1964) explicitly associates reading with the reconstruction of a spoken message. In definition 3, Smith (2004) stresses the cognitive dimension of reading, claiming that reading and thought are inseparable and implying automaticity. Definition 4 also implies that texts store information and stimulate cognition, with Barton (2007) portraying reading as an activity that goes beyond mediation around a text. In contrast, in definitions 5 and 6, Wolf (2007) and Koda (2005a) focus more directly on the cognitive and neurological operations involved in reading. In definition 7, Pulido (2009) similarly highlights mental operations while also characterizing the reader as both a decoder and meaning-maker. Definition 8 complements the preceding definitions: Koda (2013) spotlights the complex relationship between (oral) language and writing, arguing that successful reading involves connecting the two. In line with definitions 7 and 8, definition 9 presupposes that reading recruits oral language and the reader's pre-existing knowledge. Complementing preceding definitions, Fraser et al. (2016) acknowledge that reading skill involves not just cognition but also *meta*cognition, which includes the application of learnable strategies. In definition 10, Mills (2016) situates reading processes squarely in transactional spaces such as the Internet and mobile communication, where all reading is digital and non-linear, requiring the ability to navigate in a network of dynamic pathways (see Table 1.1).

None of the definitions examined above inclusively captures the complexity of reading, but we hope that the range of views sampled will provide insight into the multiple dimensions of what it means to be a reader. The following definition of reading, outlined by Perfetti and Adlof (2012), effectively binds the major threads addressed above and helpfully characterizes both L1 and L2 reading processes:

> Reading comprehension is widely agreed to be not one, but many things. At the least, it is agreed to entail cognitive processes that operate on many different kinds of knowledge to achieve many different kinds of reading tasks. Comprehension occurs as the reader builds one or more mental representations of a text message . . . Among these representations, an accurate model of the situation described by the text . . . is the product of successful deep comprehension. The comprehension processes that bring about these mental representations occur at multiple levels across units of language: word-level, sentence-level, and text-level. Across these levels, processes of word identification, parsing, referential mapping, and inference all contribute, interacting with the reader's conceptual knowledge.
>
> (p. 3)

Cognitive and Neurolinguistic Fundamentals of Reading

Drawing on a broad swath of empirical research, Perfetti and Adlof's (2012) definition of reading emphasizes the centrality of comprehension processes, an understanding of which can be extraordinarily helpful to teachers in planning and delivering effective instruction. An all-inclusive survey of that cognitive, psycholinguistic, and neuroscientific research would far exceed the scope of this book (see Further Reading and Resources