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PART I

FOUNDATIONS OF READING

Part I comprises six chapters that, together, explain how comprehension works, how it can develop over time, and how various cognitive abilities contribute to reading comprehension. This section draws heavily on research in cognitive psychology and educational psychology; the explanation of reading comprehension presented relies on research primarily carried out in first-language (L1) contexts. The major research findings that explain reading comprehension rest primarily on research with learners reading in English as their L1, although there is also considerable and growing research on L1 reading comprehension in several Indo-European languages (e.g., Dutch, German, Greek) as well as in Hebrew, Korean, Japanese, and Chinese.

One consequence of the emphasis on L1 reading comprehension research is that this section is primarily oriented to reading ability more generally rather than to a specific explanation of second-language (L2) reading comprehension. There are, in fact, many differences between L1 and L2 reading, and they are addressed in various ways in Part II of this book. However, the basic comprehension process is one that generalizes across L1 and L2 contexts, even if local processing details might vary across different L1s and across L1 and L2 contexts. Complex comprehension abilities are shared across the human species, and these abilities apply to more than reading (e.g., listening comprehension, visual comprehension); so it should not be surprising that basic cognitive processes operate in consistent ways across modalities, across languages, and across multiple languages. This recognition of both the universal cognitive architecture for comprehension and specific variations in its operationalization in different language and multilanguage contexts has already been argued persuasively (Geva & Wang, 2001; Koda, 2007).

It is important, to note, however, that this generalization of the basic cognitive comprehension architecture is not equivalent to saying that reading abilities are the same in every language or multilanguage context (see Chapters 7 and 8). The cognitive processes underlying reading comprehension interact with specific orthographic systems,

specific social contexts, and, in many cases, multiple orthographic and social contexts. The result is that the basic cognitive processing system adapts to make maximal use of the available information from the orthographic system(s), the linguistic system(s), and the social contexts. (How cognitive processing for comprehension adapts to different language and social contexts is the purpose of Part II.)

Chapter 1 introduces reading comprehension abilities and defines reading in terms of component skills that underlie and support comprehension. These component skills, in effect, define reading comprehension. Reading abilities are also described in terms of goals for reading. There are many ways in which people engage in reading, and different reading tasks call for distinct combinations of component skills. It is important to identify these variations in reading and explain how reading comprehension represents the core ability across these different goals for reading. Chapter 1 also connects reading skills development with learning theory more generally because learning and comprehension are intimately related, and both have major implications for how reading is learned and should be taught.

Chapters 2 and 3 explain how reading comprehension emerges from the specific cognitive skills applied to a written text. Chapter 2 focuses on lower-level processing skills that convert the orthographic, morphological, lexical, and syntactic patterns on the page to mental resources that build comprehension. Chapter 3 focuses on higher-level processes of comprehension and describes how cognitive resources are used to build text comprehension. By the end of Chapter 3, the reader should have a strong sense of how text comprehension emerges from the various component skill processes.

Chapters 4 and 5 explore in greater detail the underlying cognitive and neurocognitive abilities that have been identified in Chapters 2 and 3. They also address a number of issues that have arisen around reading comprehension; these issues include not only the contributions of implicit and explicit learning, but also the nature of automaticity, attention, inferencing, memory systems and neurological processing. A major goal of Chapters 4 and 5 is to integrate interpretations of these issues with the view of reading comprehension developed in Chapters 2 and 3.

Chapter 6 describes a number of efforts to present overall theories of reading abilities in terms of “models of reading.” Such models provide ways to synthesize research findings, present coherent interpretations of reading abilities, and offer agendas for future research. For a model of reading to contribute significantly to our understanding of reading, it must offer descriptions that can be tested and validated by further investigations.

Each chapter concludes with implications for instruction. Because the first section is very much foundation-oriented, implications reflect larger connections between research findings and instructional practices. Nonetheless, the connections are important for readers interested in instructional implications.

1 *The Nature of Reading: Defining Reading*

It is only because these (reading) processes have become automatic and unconscious, thanks to years of practice, that we are under the illusion that reading is simple and effortless. (Dehaene, 2009, p. 8)

Reading is something many of us take for granted. We read with what appears to be little effort and little planning (Dehaene, 2009). And it is remarkable that so much of the world's population can read. A little more than 86 percent can read to some extent (UNESCO, 2016, ages 15–64; World Bank, 2016). They can read basic forms, read advertisements, read newspapers, and use basic reading skills in their work and daily lives when needed. Some percentage of these people can read at a much higher level of comprehension, learning new conceptual information from texts, synthesizing new information from multiple texts, critiquing information in texts, and using their comprehension skills to reinterpret texts (e.g., NAEP, 2020: 35 percent of 4th grade and 8th grade in the United States read at proficient or advanced levels). Universal literacy is an ideal goal that is an ongoing priority among UNESCO, nation states, and many nongovernmental organizations, and efforts need to be made to reduce illiteracy levels.

It is also important to recognize that many people around the world read in more than one language. Large populations of people have learned to read in second or third languages for a variety of reasons, including interactions within and across heterogeneous multilingual countries, large-scale immigration movements, global transportation, advanced education opportunities, and the spread of languages of wider communication. As the nature of reading is explored more fully in this chapter, and the true complexity of reading emerges, the large number of readers who can function well in more than one language will seem remarkable. (And it is remarkable.) In almost all cases, these readers have learned to read in their first language (L1), but they have also learned to be second-language (L2, subsuming both second and foreign language) readers, often under very different (and sometimes difficult) circumstances. In Chapters 1 to 6, we focus on

research describing those who *can* read and who can read well. What is it that we do to comprehend a text? What specific skills and abilities do we use, and in what ways? How do we read differently for different purposes? As teachers and researchers, how do we define reading? What makes a person a fluent reader?

1.1 Ways We Read and Why We Read

As fluent readers, we read many different types of texts, some that we consciously intend to read, and some that we just seem to pick up or encounter. We read throughout the day in modern societies because print is all around us, and we use it in many more ways than we are aware of. We read magazines during the day, whether relaxing or waiting in some office. We read newspapers, flyers, and ads. We also read at night before going to sleep. But we read much more than this. We read when we look at products while shopping. We read posters, billboards, and displays when we travel on public transportation. We read forms in order to fill them out. We read when we receive and send emails, text messages, tweets, and when we search the Web for information. We read when we are on social media. We read when we browse movie titles for video streaming. We read when we look at the TV guide (in print or on the TV screen). We read (and reread, and reread) whenever we write anything.

In more formal settings, we expect to read in academic contexts or in workplace environments as part of learning or engaging in our jobs. Many of us also engage in reading that may be quite demanding in educational, professional, and occupational settings. In these latter settings, a great deal of learning occurs; part of that learning requires that we read and interpret informational texts in line with the tasks that we engage in and the goals that we set (or are set for us). These settings often require us to synthesize, interpret, evaluate, and selectively use information from texts. Moreover, we often encounter competing or contradictory information. It is a fact of modern life that almost any issue or topic can be discussed, addressed, or argued from multiple viewpoints, and it is our task routinely to decide among these alternative sources of information. How we learn to negotiate this world of print and achieve our goals is a large part of many professional and academic lives.

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. The advent of the computer, the smartphone, and the Internet does 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.

A very large percentage of people around the world also learn to read an L2, usually as students in formal academic settings. Students may learn to read an L2 as a school subject with little further use outside the classroom. However, many students use their L2 reading skills to engage in advanced studies, get a good job, travel, gain access to information, become more cross-culturally aware, communicate with others, or be entertained. Moreover, events over the past 100 years have placed greater demands on people to become literate in an L2. The twentieth and early twenty-first centuries have been a time of massive migrations around the world as well as growth in the use of world languages (e.g., English, Chinese, Spanish, Arabic, French: see Gunderson & D'Silva, 2017). Many people have moved to new countries for various reasons. They and their children have had to, and continue to, learn to function in societies and school systems where their significant reading experiences are often primarily in an L2 (Gunderson & D'Silva, 2017). Modern societies are becoming more complex all the time. The level of expectation for a person to function well in a modern print environment is higher than ever before. This pressure will only continue to grow for people wanting to be active and successful participants in these societies. Electronic communication growth, rather than compensating for weak literacy skills, only amplifies the need for skilled reading abilities as well as the need for additional reading abilities in learning contexts (Ackerman & Goldsmith, 2011; Cobb, 2017; Salmerón et al., 2019; Stoller et al., 2018; Wylie et al., 2019).

Aside from massive waves of migration and relocation, the rise of English as a global language has had a major impact on educational systems around the world and the demands for reading in an L2. In countries around the world, school systems require students to learn English for access to information and for the eventual ability to compete economically and professionally. For good or for bad, this situation reflects a reality of the early twenty-first century (Crystal, 2019; Gunderson & D'Silva, 2017). Millions of students are expected to learn English as an additional language to some extent. Reading in English provides one of the few avenues for these students to develop their English L2 abilities to the point at which advanced academic curricular goals can be achieved.

It is evident that citizens of modern societies will benefit from being skilled L1 readers now and in the future. But it is also fair to say that, for millions of people, L2 reading skills represent a significant

concern as these people negotiate careers and seek advancement in modern economies. A person's future opportunities for success and prosperity will be even more entwined with skilled reading abilities. It is therefore an important societal responsibility to offer every person the opportunity to become a skilled reader, and in many cases this means becoming a skilled L2 reader.

There are many contexts in which people develop reading abilities. Students in K-12 (or equivalent) education systems are taught to read their L1 as a primary goal. Adults who, for whatever reason, did not learn to read as children, often learn to read their L1s through adult education and adult literacy classes, many funded by regional and national institutions, but others sponsored by local school systems or volunteer organizations. L2 students can also be divided into those who learn to read in a K-12 educational system and those who take adult education classes (for either vocational or academic purposes). Moreover, there is a real difference for adults who want to gain access to significant academic training versus those who need basic, or survival, L2 reading skills. There are also major distinctions among K-12 students who *are required* to learn to read in an L2 (as in many foreign language settings), those who *want* to learn to read in an L2 (in many second and foreign language settings) and those who *need* to read in an L2 (in mostly L2 settings).

No book can address all these major contexts equally well, and this book focuses much more on academic reading contexts, although this emphasis also includes reading for entertainment and general comprehension as they are central issues for the development of academic reading. While survival reading skills for adult literacy and citizenship goals are not explicitly addressed, many facets of the discussions in this book will be informative for these areas as well. Lest one think that this book is narrowly conceptualized, it is safe to say that the demands of reading development in academic contexts, as indicated by the earlier discussion, are varied and extensive. Even reading in contexts outside the academic classroom, such as daily encounters with newspapers and emails, or reading novels for entertainment, represent important aspects of the development of academic reading skills.

1.2 Reading for Different Purposes: Types of Reading

Comprehension processes are influenced significantly by the general reading goals that are assigned to the reader, as well as by the specific task or relevance instruction.... Common reading goals include reading to study, reading for entertainment, reading to search for information (skimming and scanning), reading to learn, reading to integrate information from multiple sources,

reading to evaluate, critique, and use information, and reading for general comprehension. (van den Broek & Kendeou, 2017, p. 287)

The combination of our daily encounters with texts and our needs to read in different ways in educational and professional settings requires that we read differently depending on the context and our goals (and motivations). When we read for different purposes, we engage in many types of reading, particularly in academics settings. Six major purposes are listed in Table 1.1.

Table 1.1 Academic purposes of reading

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1. Reading to search for information (scanning and skimming)
 2. Reading for quick understanding (skimming)
 3. Reading to learn
 4. Reading to synthesize information
 5. Reading to evaluate, critique, and use information
 6. Reading for general comprehension (in many cases, reading for interest or reading to entertain)
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-

There are certainly other ways to classify purposes for reading aside from the six listed here, and we acknowledge that this list does not identify every possible purpose (cf. Alderson, 2000; Britt et al., 2018; McCrudden et al., 2010; Urquhart & Weir, 1998). Our list does, however, make the point that, as fluent readers, we read for different purposes. Different purposes for reading also tend to impose differing levels of demand on the reader in order to maintain an appropriate *standard of coherence*. The concept of standard of coherence is very important for discussions of academic reading. It refers to our ability to establish a level of understanding that is acceptable for a specific reading purpose, and for the more specific goals of individual reading tasks (van den Broek & Kendeou, 2017). With respect to more specific tasks, reading will also vary, and sometimes considerably. For example, reading to learn may involve learning new content in subject matter courses, studying for a test, answering specific questions, writing a brief response paper, or identifying arguments that support a position. Each of these specific tasks, as well as the settings that makes these tasks relevant, will likely lead to somewhat different reading processes being foregrounded (Britt et al., 2018; Eason et al., 2012; McCrudden et al., 2010; Pearson, Palincsar, Biancarosa, & Berman, 2020; Yeari et al., 2015). We need to account for these differing purposes and tasks when we consider any definition of reading.

When we want to locate some specific information, we engage in *search processes* that usually include *scanning* and *skimming*

(cf. Guthrie, 1988; Guthrie & Kirsch, 1987). If we have read a chapter in a book and want to check when James Watt invented his version of the steam engine, we might first try to recall the context in which that discussion had occurred, then skim through the chapter to find the most likely pages, and then scan those pages for suitable information. Both skimming and scanning are processes carried out at very high speed (with high rates of words per minute [wpm], cf. Carver, 1992; Rayner et al., 2012, 2016). The combination of scanning (identifying a specific graphic form) and skimming (building a simple quick understanding of the text) allows a reader to search for information.

Skimming is also used for a variety of other reasons (and so may be seen as a superordinate purpose). We skim when we want to determine what a text is about and whether or not we want to spend more time reading it. We skim when we are expected to read a more difficult text so that we have a sense of where the text will lead us and what we may need to know to understand it. We skim when we need to work through many texts and want to make decisions about which texts to focus more attention on. We also skim when we are under intense time pressure and need to reach some decision about the usefulness of information in a text.

Reading to learn is often carried out in academic and professional settings. We read to learn when the information in a text is identified as important (often by a teacher or textbook) and when that information will be used for some task or may be needed in the future. Reading to learn places more processing demands on the reader because the reader is expected to remember the main ideas and many supporting ideas and be able to recall this information as needed for additional academic purposes (Chall, 1983 [stage 3]; Geva & Ramirez, 2015; Goldman et al., 2016; Millis et al., 2019; Pearson, Palincsar, Biancarosa, & Berman, 2020; Shanahan, 2014; Shanahan & Shanahan, 2014). We usually read to learn at a relatively slower speed (about 200 wpm; Carver, 1992), and usually for relatively shorter text segments at any one time. Reading to learn often involves close reading and rereading of text material. The effective reader organizes the content within a frame that is coherent and accurate with respect to the information presented in the text (Britt et al., 2018; Goldman & George, 2019). The reader also has to connect the text content with information established in the reader's long-term memory (i.e., prior knowledge). Reading to learn occurs whenever a reader has some motivation to recall and use the information at a later time (Grabe & Stoller, 2019). It is true that readers also learn when they read for general comprehension, but the expectations for using supporting information, for creating an organizing frame of