Throughout the text successful experimental and classroom-based interventions are highlighted. Practical ideas for use in the classroom and summary boxes detailing key points and explaining technical terms are included in each chapter.

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UNDERSTANDING AND TEACHING READING COMPREHENSION

A handbook

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1

WHAT IT'S ALL ABOUT

"Reading without reflecting is like eating without digesting."
Attributed to Edmund Burke, 1729–1797

The purposes of this chapter are:

- to introduce the concept of Mental Models as representations of text,
- to introduce the Simple View of Reading and the distinction between word reading and language comprehension,
- to explain the relation between word reading and reading comprehension,
- to distinguish between poor word readers and poor comprehenders.

The click of comprehension

Reading comprehension is important, not just for understanding text, but for broader learning, success in education, and employment. It is even important for our social lives, because of email, text, and social networking sites. Reading comprehension is a complex task, which requires the orchestration of many different cognitive skills and abilities.

Of course, reading comprehension is necessarily dependent on at least adequate word reading: readers cannot understand a whole text if they cannot identify (decode) the words in that text. Likewise, good reading comprehension will depend on good language understanding more generally. This requires comprehension of the individual words and the sentences that they form. However, comprehension typically requires the comprehender to integrate the sense of these words and sentences into a meaningful whole. To do so, construction of a suitable mental model is necessary. A mental model is a mental representation that is created from information in the real, or an imagined, world – i.e. a gist representation of what the comprehender has read (or heard, or seen). It might, but does not necessarily, include imagery. Try Activity 1.1 to get an idea of how important it is to be able to construct a coherent mental model to make sense of the words and sentences of the text.

You might have guessed what the text in Activity 1.1 is about, but if you are like most of the participants in Smith and Swinney's study (1992), you found it hard to make sense of. Now read the text again, but with the title "Building a snowman". Now you will find that the obscure references, to e.g. *substance*, and turns of phrase *elaborateness of the final product*, suddenly fall into place, and the whole makes perfect sense when you have the appropriate framework for a mental model. Smith and Swinney (building on much earlier work by Bransford & Johnson, 1972) showed that people who were asked to read the above text without a title took considerably longer to read it, and had worse recall of its content, than those who were given the title and were able to use the framework it provided to create an appropriate mental model.

Activity 1.1 The need for a mental model for understanding a text

Read the following short text and try to make sense of it:

> This process is as easy as it is enjoyable. This process can take anywhere from about one hour to all day. The length of time depends on the elaborateness of the final product. Only one substance is necessary for this process. However, the substance must be quite abundant and of suitable consistency. The substance is best used when it is fresh, as its lifespan can vary. Its lifespan varies depending on where the substance is located. If one waits too long before using it, the substance may disappear. This process is such that almost anyone can do it. The easiest method is to compress the substance into a denser mass than it had in its original state. This process gives a previously amorphous substance some structure. Other substances can be introduced near the end of the process to add to the complexity of the final product. These substances are not necessary. However, many people find that they add to the desired effect. At the end of the process, the substance is usually in a pleasing form.

The example illustrates two important points. First, it is very difficult to understand a text without an appropriate mental model. This model may draw not only on titles but also on pictures or, very often, on general knowledge. When information in the text is successfully integrated into a mental model, comprehension "clicks". Perhaps you experienced this "click of comprehension" when you had the title and re-read the text?

The second point is that reading a title or seeing a picture of the situation *after* you have read the text may help only a little. But if you had seen the title before the text, it would have made the text substantially more comprehensible. The point is that a framework for the construction of an appropriate mental representation makes the text much easier to understand, to reflect about, and to remember.

The Simple View of Reading

It is helpful to distinguish between two main components in reading: word decoding and language comprehension. *Word reading* (or decoding) refers to the ability to read single words out of context. *Language comprehension* refers to our ability to understand words, sentences, and text. These are the two key components in The Simple View of Reading (originally proposed by Gough & Tunmer, 1986).

The point of The Simple View of Reading is that variation in reading ability can be captured (simply) in only two components: word reading (decoding) and language comprehension. The name, The Simple View of Reading, is not intended to imply that reading (or learning to read) is a simple process but, rather, that it is a simple way of conceptualising the complexity of reading.

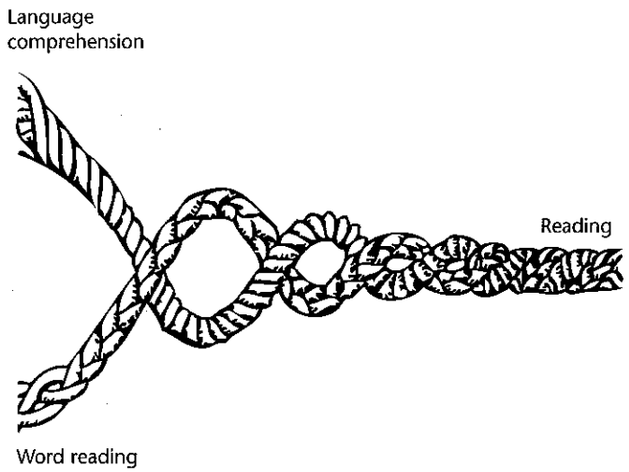

FIGURE 1.1 Skilled reading depends on abilities with both word reading and language comprehension (adapted from Scarborough, 2001).

More precisely, reading ability depends on the product of the two components: Reading = Word Reading × Language Comprehension (R = WR × LC), not just on the sum of the two. This means that if one of the components (either word reading or language comprehension) is zero, overall reading ability will be zero. Thus, if a child cannot read any words or if a child does not have any language comprehension skills, s/he cannot read.

An illustration of the necessity of both components – word reading skills and language comprehension – comes from a story about John Milton's strategy for reading Greek texts after he became blind. Milton got his daughters to learn to decode the ancient Greek alphabet. They were then able to read aloud the texts in ancient Greek to their father, but they could not understand them, because they did not have any knowledge of Greek, whereas Milton could understand, but not decode, the words. Thus, the daughters provided the word reading skills, and Milton provided the language comprehension skills.

The Simple View on development

Although word reading and language comprehension are largely separate skills, it should always be kept in mind that successful reading demands the interplay of both of these skills, and so they both need to be encouraged and supported from the onset of reading instruction. However, the two skills contribute differently to overall reading as the child develops. For the beginning reader, decoding is new, and children differ hugely in decoding ability. Language comprehension, on the other hand, is quite well developed, especially considering the undemanding books that beginning readers are typically presented with. So in beginning readers, the variation in reading ability is almost identical to the variation in word reading.

In the early school years, children need to establish fluent and automatic word reading, which, although not sufficient for good reading overall, is obviously necessary. However, for most children, this is a time-limited task: the child needs to reach the level of competence at which word reading becomes a "self-teaching mechanism" (Share, 1995) (see Box 1.1). The ability to comprehend texts (including the ability to appreciate texts in different content areas and genres), however, is a skill that will continue to develop throughout adult life.

The language comprehension that provides the foundation for reading comprehension develops before children have any formal reading instruction. When they come to school, children are already very competent comprehenders and producers of spoken language without having had formal instruction in these skills (see Box 1.1). Thus, when children become competent at decoding, it is their competence in language comprehension that will determine their overall reading ability. So in more advanced reading, good language comprehension will be more crucial than word recognition.

Box 1.1 The importance of being taught to decode words

Unfortunately, learning to read words does not usually come naturally to children, in contrast to learning to speak. Humans have used speech to communicate for tens of thousands of years, but reading is, in the historical context, a relatively new skill and it is only in the last hundred years or so that the majority of people in Western societies have been able to read and write. Thus there is no reason to expect that the ability to read would have evolved and have innate roots as the ability to speak is generally assumed to (e.g. Pinker, 1994). Indeed, in many cultures still, the ability to read is the exception, rather than the norm. Learning to read is a matter of learning to crack a code.

In English, children need to be taught the relations between letters or letter combinations (graphemes) and the sounds (phonemes) in the language. This is very different from learning a whole new language – it is simply a way of coding the language they already know and speak. This point has an important consequence. There is no logic to the idea that learning to read should come "naturally" to children if they are placed in a literate environment, just like learning to speak. Children learning to read simply have to learn to map the written form of a language they already know well, onto its spoken form. As Gough and Hillinger (1980) put it: Learning to read is an "unnatural act".

Luckily, children do not need to be taught every single written word or all conventions of the orthographic system. The point of the "self-teaching mechanism" (see e.g. Share, 1995) is that children are able to learn to identify new words on their own once they master the basic letter-sounds and how they blend to form spoken words. Of course, in order for the self-teaching mechanism to kick in, children need to be presented with books at an appropriate level for their ability: i.e. books that are sufficiently challenging (with some words that they have not come across before), but not too difficult.

The alphabetic code in English is notoriously difficult, but even the spelling of irregular words, like *island* or *sword*, is far from random. Almost all the letters correspond to sounds in the spoken word, with the exception of one silent letter in each of these words. So these irregularities should not be used as a justification for teaching children by a whole word method. When taught by a whole word method children do not become independent readers unless they extract the letter-sound rules for themselves – which they take an exceedingly long time to do (Brady, 2011; Seymour & Elder, 1986).

Some teachers are concerned that if children are taught by a sounding out/phonics approach, typically using decodable books (which might not have the most exciting storylines), then they might become overly focused on decoding, at the expense of comprehension. However, there is no evidence for this concern. In fact, children who have early, intensive training in phonics tend not only to be better at word reading later, but also to have superior comprehension skills (see e.g. National Reading Panel, 2000).

Even though children typically have a high level of communicative competence when they start school they do not have all the language skills in place that they need for text comprehension. It is a common misconception that, in order to develop competence in reading, beginning readers would need only to be taught to decode the written word, and then their language comprehension skills would kick in and they would be able to understand written texts just as well as they understand oral language. This is a misconception because it ignores the fact that written texts are, in important ways, different from spoken interactions (see "Written vs. spoken language" below), and written texts typically require memory abilities and other cognitive skills that are not so crucial in understanding everyday interactions.

The Simple View on reading difficulties

Recently, the Simple View is often presented schematically, as in Figure 1.2. This representation makes it clear how children with specific comprehension problems can, for example, be differentiated from children who have specific word reading problems (i.e. dyslexics) or generally poor readers (sometimes called "garden variety" poor readers in the literature).

	Language comprehension	
Word reading	Poor	Good
Poor	Generally poor reader	Dyslexic
Good	Poor comprehender	Good reader

FIGURE 1.2 A double dissociation between word decoding and language comprehension. Problems with one component may occur independently of problems with the other.

A consideration of the quadrants in more detail reveals three distinct types of poor reader (though of course in real life, these distinctions might not always be so clear-cut). First, children with dyslexia have severe problems learning to read words. They need much more time and structured instruction than other children to learn the basic orthographic system – how letters typically sound – and how to use the system to blend letter-sounds into recognisable words. Children with dyslexia do not typically have problems with spoken language comprehension. They have difficulties with text comprehension because of their problems with word reading. In many cases of dyslexia, word reading continues to be slow and attention demanding. This puts limitations on the mental resources that could otherwise have been spent on comprehension (Perfetti, 1985) so dyslexics might also have some level of reading comprehension problem.

Poor comprehenders have difficulties with reading comprehension, despite developing good word reading skills and having no other apparent language or cognitive problems. Their problems are not usually apparent or detected before the 3rd or 4th year of schooling, because reading books in the early years are very undemanding in terms of language comprehension plus, as mentioned above, in the early years children's reading competence is typically limited by their ability to read the words. As reading books become increasingly complex, poor comprehenders may experience unexpected reading difficulties (e.g. Catts, Compton, Tomblin, & Bridges, 2012), and their teachers may be surprised and disappointed by the drop in these children's reading abilities. These children with *specific reading comprehension problems*, i.e. the poor comprehenders, will be the focus of much of this book.

Some children have problems with the development of both word reading and language comprehension; they are termed generally poor readers. Children with early language impairments have a higher risk than other children of developing such general reading problems (Bishop, 2001), though the particular combination and extent of the language impairments may also lead to isolated problems with word decoding (Catts et al., 2012).

Activity 1.2 A simple view of your own reading

In your own experience, when have you found yourself in each of the four quadrants of the "Simple View" diagram above? For example, have you experienced being able to decode the words of a text but had real difficulties with comprehension, or not paid attention to the meaning of the text?

- For each of the three quadrants that represent some aspect of reading difficulty try to list at least one example of your experience as that type of reader.

There are at least four different sets of research findings that support the Simple View:

1 As discussed above, it is possible to have problems with word decoding but not with comprehension, and it is possible to have problems with comprehension but not with word decoding. This pattern is termed a "double dissociation".

2 Research studies have shown that different underlying language skills predict word reading and comprehension in the primary school years, not only within an age group (Oakhill, Cain, & Bryant, 2003), but also across time (Muter, Hulme, Snowling, & Stevenson, 2004; Oakhill & Cain, 2012).
3 As described above, studies have found that decoding and language comprehension are differentially important for reading throughout the school years: decoding is more strongly related to differences between good and poor readers in the early school years, whereas language comprehension is more important in accounting for differences in reading ability later on (Gough, Hoover, & Peterson, 1996, gives an overview).
4 Finally, decoding and language comprehension are selectively associated with other cognitive factors. For example, topic knowledge and depth of vocabulary (how much is known about words) are strongly associated with language comprehension but only marginally relevant for word reading (Gough et al., 1996). On the other hand, size (or breadth) of vocabulary is also important for word decoding because it is easier to decode known than unknown words (Ouellette, 2006).

Activity 1.3 The Simple View can help to gain insight into children's reading

The Simple View of Reading is useful for making well-grounded predictions about children's abilities.

Imagine that one of your pupils has a problem with reading. You give the boy a reading comprehension test (which requires that he answer questions about a text he has just read silently) and find that he is indeed performing a year below age expectancy. You suspect that he might have a problem with word reading, and find that he is even more behind (2 years) on a text of single-word reading.

- Following The Simple View of Reading, what would you predict for the boy's language comprehension? Is it likely to be about a year delayed, like text reading? Would you expect it to be as badly affected as the word decoding of the boy? Would you expect some other level of performance?

Written vs. spoken language

The Simple View raises issues about what is meant by "language comprehension". What is typically meant by "language comprehension" is not the ability to understand everyday spoken language and to participate in conversations about everyday events. Rather, what is intended is the ability to understand texts that were designed to be read – i.e. stories or other texts. This skill is more difficult, and more complex, than understanding everyday spoken interactions or oral narratives, for several reasons:

First, a text cannot be interrogated in the way that a partner in a conversation can be, and it does not adapt in response to a puzzled look or indication of lack of comprehension by the listener.

Second, a written text does not come with all the prosodic information that is so important for the understanding of spoken language, such as intonation patterns. In spoken language, a rising tone can indicate a question. A pause can indicate a change of subject or line of argument. The newcomer to written language has to learn to interpret the meanings of question marks and other punctuation, the significance of paragraphs, headlines, and references.

Third, a written text, even if it is read aloud, is not everyday language – it is a more formal and complex form of language. So, for example, a speaker might say "I've left my handbag in the car, and it's got my reading glasses in it" and not "My handbag, which I left in the car, contains my reading glasses". If the speaker did produce an utterance like the latter, we might say that s/he "talks like a book"! Everyday spoken language does not typically contain embedded relative clauses ("which I left in the car") and has simpler vocabulary ("got ... in it" rather than "contains").

Fourth, written texts are much less anchored in the situation in which they are read than spoken dialogues are. In an oral discussion, words like *here, over there, left, ahead, you, we, now, in a few minutes* (deictic expressions) all make immediate sense because the speaker and the listener share the same situation – the same "context for understanding". Part of the wonder of written texts is that they can convey meaning across time and distance in a way that spoken language often fails to do (see Box 1.2). So, for example, we can read the novels of Jane Austen and can derive a very accurate impression of the lives, concerns, and social milieu of people living in that era. But these wonders come at a price. The price is de-contextualisation: the writer and the reader do not share context. This means that the writer has to carefully define what is here and now, and the reader has to pick up the clues and reconstruct the here and now as part of the mental model of the text.

Box 1.2 Chinese whispers

An example of how spoken text can become distorted is the party game of "Chinese whispers" in which a spoken instruction is passed from one person to another, and becomes distorted as it progresses because of slight mis-hearings and mis-interpretations. A, probably apocryphal, example comes from an era (the 1940s) when military orders had to be sent via a series of radio relays. Each radio operator would listen to a command and then repeat it to the next operator in the series. The story goes that the original order: "Send reinforcements. We're going to advance" had been transformed to: "Send three and fourpence. We're going to a dance", by the time it reached its intended recipient.

Fifth, spoken messages are created on the fly, and so are full of pauses (often filled with "ah", "erm", and "actually"), revisions, repetitions, self-interruptions etc., all signs of the working of the mind of the speaker. By contrast, written language is usually much more dense. For fluent readers, written language carries much more information per word, and per unit of time. The risk is that some points will be lost, even when written language is read aloud slowly.

For these and other reasons, reading a text is more difficult than understanding everyday oral communications. Furthermore, the demands of text increase, and diverge further from the demands of oral communication, as children become older. In particular, there is a shift from "learning to read" in the early years of school (where the emphasis will be on learning to decode and recognise written words, and the texts will be fairly simple linguistically and related to everyday experiences) to "reading to learn" (where the emphasis will be on understanding and learning from increasingly difficult texts). A further issue at this developmental juncture is that background knowledge may be first-hand (i.e. from experience) or second-hand (i.e. from being told, or reading about, situations). Beginning readers probably rely more on their first-hand experience to help them interpret text, and early reading books typically feature characters and storylines that will be close to the reader's own experiences. However, older readers will not only be expected to bring their (first-hand) background knowledge to bear when they are understanding a text, but will also be expected to extract new knowledge from text and then, in turn, use that newly learned information to support further comprehension. As mentioned above, there are some indications that comprehension problems might manifest themselves in some children only once the reading requirements become more demanding, and the emphasis shifts to learning from text, rather than simply understanding texts about familiar situations (Catts et al., 2012; Chall, Jacobs, & Baldwin, 1990; Leach, Scarborough, & Rescorla, 2003).

On the other hand, written texts are open books, not talking heads. Written texts can be browsed, skimmed, skipped, they lend themselves to looking up information, re-reading, and to comparisons across sentences and pages and between texts. Potentially, written texts are much more at the reader's disposal for browsing and selection than is spoken language. However, such non-linear reading requires knowledge of text organisation, of different types of texts (genres), and of strategies to make good use of that knowledge, an issue to which we return in Chapter 5.

Summary

Common sense dictates, and research has found, that the many complex skills in reading can be divided into two categories: those that support word reading (decoding) and those that support language comprehension. The so-called Simple View of Reading maintains that word reading and language comprehension are largely independent sets of skills, but both are absolutely necessary for reading, i.e. text comprehension.

The Simple View of Reading is useful and relevant not only to researchers, but also to practitioners. It makes it clear that the two main components of reading do not necessarily develop in tandem, but that distinctly different approaches may be needed to develop word recognition skills from those that are required to foster the development of text comprehension skills, and that the two components can be assessed separately. One important implication of this perspective is that attention needs to be paid to the teaching of both these aspects of reading. Thus, teachers will need to be aware of not only the cognitive processes that underlie word reading skills, but also those that are important in comprehension.

In recent years, and in particular since the adoption of a "National Curriculum" in the UK (England), a good deal of attention has been given to how to teach children to read

words, through the teaching of phonics in particular. Children who fail to learn to read will be identified and given additional teaching. However, although comprehension skills are extensively covered in the curriculum, there is still considerably less attention given to how to teach children to read with understanding, and how to identify children who are having problems with comprehension. As well as being aware of the contributory skills, teachers also need to take account of the specific demands of written language.

Glossary

Reading, **reading comprehension**, and **text reading** all refer to the same thing: prototypical reading for meaning. In the Simple View *reading* means reading with comprehension, that is, the product of *word reading* and *language comprehension*. In daily language, *reading* can refer to many components of prototypical reading, e.g. reading words aloud, interpreting texts or patterns and scales, even clouds and thermometers.
Word reading (word decoding) is the identification of single, written words – either by letter-sound associations or by recognition of the unique letter sequence.
Language comprehension is using identified words to build a mental representation of the contents of a text. In this book, language comprehension is mostly about understanding written language. This ability is closely linked with understanding spoken language.

Suggested answers to activities

Activity 1.1 The need for a mental model for understanding a text
See the main text after the activity.

Activity 1.2 A simple view of your own reading

- Specific problems with comprehension: reading in a second language; reading a text with unknown key words, e.g. about a completely unfamiliar topic; reading a familiar book aloud to a child while thinking of something else.
- Specific problems with decoding: reading degraded, illegible text, e.g. from a screen in sunlight, poor photocopy or very small print, e.g. "the small print" in an insurance document or printouts that have two or four pages of text printed on the same page; reading in a foreign orthography, e.g. Greek or Cyrillic (Russian).
- Combined problems: reading a text (e.g. medical) with long, unfamiliar words about an unfamiliar topic where you have little/no background knowledge.

Activity 1.3 The Simple View can help to gain insight into children's reading
The boy's language comprehension must be much better than his word decoding ability. Otherwise, general reading ability – the product of word decoding and comprehension – could not be *better* than word decoding. In fact, you should expect language comprehension to be at *a higher level than the boy's general reading ability*. There would be no immediate need for intervention against poor comprehension. But you would need to look further into signs of dyslexia.

2

SKILLS AND PROCESSES

> "And I've realised something about people who read. People who read: it's not quietness. It's not passivity. They are having conversations with the writer, with the characters, are part living in that other situation."
>
> *From The White Lie, Andrea Gillies (2012, p. 81)*

The purposes of this chapter are:

- to explain how mental models are set up though the interaction of input from the text and readers' knowledge,
- to introduce the component processes that underpin the representation of text.

The mental model of the text

The importance of language comprehension in reading was outlined in Chapter 1. But what is meant by language comprehension was not explained nor what processes are involved in deriving an adequate representation of a text.

It has been known for many years that what readers remember of a text is not the wording (the "linguistic form") but the meaning. A clear demonstration of this phenomenon comes from the work of Sachs (1967), who was probably the first person to investigate what people remember from sentences. She asked people to read a series of sentences, and then tested their memory for them, such as *"He sent a letter about it to Galileo, the great Italian scientist."* After only a few minutes, people became very unsure about the exact wording of the sentences they had read, and got completely confused between the original sentence and others with the same meaning, such as, *"He sent Galileo, the great Italian scientist, a letter about it."* Or, *"A letter about it was sent to Galileo, the great Italian scientist."* However, they were still very good at knowing that they had not read a sentence such as: *"Galileo, the great Italian scientist, sent him a letter about it"*, in which the meaning is changed (so that Galileo sends, rather than receives, the letter). Thus, Sachs concluded that after only a very short period of time, people forget the exact way that something was phrased (the "linguistic form") but are still very good at remembering the meaning. Of course, people are able to remember the exact wording when it is important (in the case of many jokes, for example) but in general, they do not.

Thus, a good reader derives an overall representation of the meaning of the text. Some authors have termed this representation a "mental model" (Johnson-Laird, 1983) or a "situation model" (Kintsch, 1998) of the text. Though there are some differences between these two accounts, what they have in common is the view that the representation of the text goes beyond the literal version. Of course, such representations are derived from other sorts of input as well – we also have representations of spoken information, of