

Children's text comprehension: from theory & research to support & intervention

Article (Accepted Version)

Oakhill, Jane (2021) Children's text comprehension: from theory & research to support & intervention. *Pedagogical Linguistics*. ISSN 2665-9581

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/102495/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

Copyright and reuse:

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

Children's text comprehension: From theory & research to support & intervention

Jane Oakhill

School of Psychology, University of Sussex, UK

Abstract

This paper first considers what is meant by good reading comprehension and makes a distinction between the product of reading comprehension and the processes that are required to attain that product. It goes on to consider how less-skilled comprehenders can be identified and provides a summary of the research into how less-skilled and skilled comprehenders differ in terms of the skills and processes that they apply during text comprehension. Finally, the implications of these research findings for instruction are considered, and generalizable research-based recommendations for teaching reading comprehension strategies are considered.

1. Introduction

Good reading comprehension is important not just for understanding written texts, but also for learning more generally, and so is a crucial ingredient for later academic success. In this paper, I outline the different abilities and processes that contribute to good reading comprehension and explore the implications of these findings for effective pedagogy. Much of the research in this area has been conducted with children learning to read in alphabetic languages and, in particular, English-speaking children, but it should be evident that the findings are relevant across all languages and orthographies.

1.1 The Simple View of Reading

The reader may be familiar with the Simple View of Reading, originally proposed by Gough and Tunmer (1986) (see Figure 1), which makes it clear that successful reading (in any language) is comprised of two distinct constructs: word recognition and language comprehension, which come together multiplicatively to contribute to overall reading ability. Thus, if a child cannot read any words and/or if a child has no language comprehension ability, their reading comprehension will be zero. The Simple View of Reading does not imply that reading, or learning to read, is “simple” but rather that variation in reading ability can be captured (simply) by variation in these two components. In this paper, I consider the specific skills that contribute to the language comprehension strand, and the implications for teaching those skills to support for reading comprehension.

Insert Fig 1 about here.

The Simple View of reading is often presented schematically, which makes it clear that there can be different reading profiles, including three distinct poor reader profiles (see Figure 2).

The group that will be the focus of this paper are those in the bottom right quadrant:

children who have good word reading skills, but poor language comprehension, i.e., children with a specific reading comprehension deficit. Such children (often simply termed ‘less-skilled comprehenders’) have difficulties with reading comprehension, despite having age-appropriate word reading skills. Often, their difficulties do not become apparent before the 3rd or 4th year of schooling, because they are perceived as ‘good readers’ (i.e., good at word decoding) and the material they are being asked to read in the early years of school may not make complex demands on comprehension. But, as the texts they are expected to read and understand become increasingly complex, some children who initially seemed quite competent at reading can turn out to have reading comprehension problems (see, e.g., Catts, Compton, Tomblin & Bridges, 2012). It should be noted that such children also tend to have difficulties in the case of listening comprehension of written texts, though not in spoken language comprehension more generally. The important differences between these two forms of oral comprehension are outlined below.

Insert Fig 2 about here.

2. What constitutes good comprehension and how are skilled and less-skilled comprehenders selected?

Whatever the modality in which a text is presented (i.e., whether written down or read aloud), successful comprehension involves the construction of an integrated representation of the overall meaning of that text. This integrated representation of the meaning of a text has been termed a *mental model* (Johnson-Laird, 1983) or a *situation model* (Kintsch, 1998). The crucial question to be addressed here is why it is that some young readers have so much difficulty in achieving such a representation. One thing that should be made clear at this point is that the term “comprehension” can mean different things. Comprehension the product is something that can be measured (e.g., by means of a comprehension test) and is

concerned with the overall quality of the mental representation of the text. However, performance on a comprehension assessment can tell us very little about why a particular child's comprehension is good or not so good, or what can be done to improve a particular individual's comprehension ability. Thus, the research I will outline below has taken a different perspective on comprehension, in that it has focused on the identification of the comprehension processes that contribute to the overall product – an integrated representation of the text as a whole. It is important to understand these processes that work together to support comprehension, because it is by changing the processes that we can intervene to support and improve comprehension and, therefore, have an impact on the product.

In the following sections, I consider the skills and processes that are needed to support effective text representation. The comprehension processes discussed below are central not only to reading comprehension but also to listening comprehension, with an important caveat: listening comprehension in this context is intended as the understanding of a text read out loud, and not listening in the sense of everyday conversations and interactions. Written text and spoken language interactions differ in many important respects: in particular, written texts contain different and typically rarer vocabulary items, and more complex syntax than do spoken utterances and, of course, one cannot interact with and interrogate a written text in the way that one can an interlocutor.

Before moving on to discuss the skills and abilities that differentiate between skilled and less-skilled comprehenders, it is also important to consider how such groups are selected, and the ways in which they do not differ. Despite the fact that there is typically a high correlation between word reading and comprehension, it is possible to find children who have comprehension problems despite their good word reading. Such children are

selected using tests that provide separate age-related scores for word decoding and text comprehension (and the children are provided with help with words that they do not know, or misread), so that word recognition and comprehension measures are not confounded in the way that they are in many reading comprehension assessments. In our own studies, we have also administered assessments of receptive vocabulary and have matched the groups on this measure (though such tests may not reflect the full picture re. vocabulary – see below). Typical groups of good and poor comprehenders are shown in Table 1. Of course, children with word reading problems might also have comprehension problems of a similar nature, but they will not be considered here.

Insert Table 1 about here

3. In what ways do skilled and less-skilled comprehenders differ?

It is important first to consider what less-skilled comprehenders do not have problems with. An obvious possibility is that less-skilled comprehenders simply do not remember the content of the text that they are required to understand, but this explanation was ruled out in an early study (Oakhill, 1984) in which it was found that less-skilled comprehenders still have difficulties answering questions about a text when it is there for them to refer back to. Neither do skilled and less-skilled comprehenders differ in the speed and automaticity with which they can recognise words, and do not (in contrast to children classified as dyslexic) differ on tests of short-term memory (see Oakhill, 2020, for a summary).

3.1 Inference and Integration

The idea that text comprehension is an integrative and constructive process dates back at least as far as the seminal studies of John Bransford and colleagues in the 1970s (see, e.g., Bransford & Franks, 1971; Bransford & Johnson, 1972). These studies provided clear evidence that readers do not retain the precise wording of texts for long but, rather,

integrate information from different sentences, and construct meaning from a text by interpreting it in relation to what they know about the world. These decades-old studies are still very relevant to our understanding of text comprehension today and form the basis of influential theories of text comprehension (for instance, Kintsch's theory is termed the "Construction-Integration Model" of text comprehension). The important point is that skilled readers go beyond the literal meaning of sentences; they connect up the ideas in the text, and "fill the gaps" with inferences. Indeed, only a fraction of our understanding is licensed by what is stated explicitly in a text. A good story will create opportunities for the reader to make inferences to work out what is going on. Even a very short text (three sentences) can be a rich source of inferences (slightly adapted from Rumelhart & Ortony, 1977):

Mary heard the ice-cream van coming.

She remembered her pocket money.

She rushed into the house to get it.

You almost certainly spontaneously made links between those sentences so that they were no longer independent sentences, but a short, coherent, text. *She* in the second and third sentences refers back to *Mary* in the first sentence and, thus, provides a link between the sentences. Similarly, *it* in the final sentence refers back to *Mary's pocket money*. These links that you made to connect these sentences require local cohesion inferences (often called bridging inferences). But you almost certainly made global coherence inferences as well: e.g., that Mary is a child, and that she wants to buy an ice cream. She needs her pocket money to pay for the ice cream and rushes into the house because she knows about the behaviour of ice-cream vans – they do not stay in one place for long - and that Mary might miss an opportunity to fulfil her goal if she does not hurry. Of course, the reasons for

Mary's thoughts and actions are not stated in the text but, like most readers, you most probably made those inferences very readily by drawing on background knowledge. Global coherence inferences such as these contribute to the meaning and coherence of the text overall and, as this example demonstrates, even a very short, apparently simple, text supports a number of inferences. These inferences are *necessary* to understand the essence of the text (Mary's motivations and behaviour). But it is certainly not the case that more inferences are better. Other inferences, such as an estimate of Mary's age, are *elaborative* in that they embellish the mental model, but don't directly support understanding of the text as presented. Such inferences might be helpful in some circumstances, but they could actually be detrimental to understanding because they are not licensed by the text, and might turn out to be not just irrelevant, but wrong (as well as being time-consuming and distracting).

There are now numerous studies to show that skilled and less-skilled comprehenders differ in the extent to which they make many necessary local cohesion and global coherence inferences (Cain & Oakhill, 1999; Cain, Oakhill, Barnes & Bryant, 2001; Oakhill, 1984). However, they do not have problems answering literal questions from text (a further demonstration that their verbatim memory for the text is not at issue). Neither can these differences in inference ability be attributed to differences in background knowledge between the groups. Cain and Oakhill (1999) checked to ensure that all children had the relevant background knowledge to make the specific inferences required. It seemed that the poorer comprehenders were simply not activating that knowledge and using it to support their understanding of the text. Furthermore, when knowledge is carefully controlled for, less-skilled comprehenders still make fewer inferences than good comprehenders (Cain et al., 2001). Thus, many problems with inference making do not

occur simply because less-skilled comprehenders lack the relevant knowledge. Of course, relevant knowledge is important, but the activation of that knowledge, and the speed with which that knowledge can be activated, are also critical for good comprehension.

One reason that less-skilled comprehenders might make fewer inferences during reading is that they may have a lower “standard for coherence” so that they are less likely to make active attempts to ensure that the text they are trying to understand coheres as a whole (van den Broek, 1997). This standard for coherence can vary both between readers and within readers (e.g., depending on the purpose of reading). For instance, when adults are required to read to study for a test they generate more inferences than when required to read for entertainment (van den Broek, Lorch, Linderholm, & Gustafson, 2001). Thus, it seems that skilled readers set goals, and can adjust their standards for coherence according to those goals. However, there is evidence that less-skilled comprehenders are less likely than their skilled counterparts to adjust their reading strategies according to the goals they are set (Cain, 1999). This ability to monitor for coherence is also linked to comprehension monitoring more generally, which will be discussed below.

3.2. Vocabulary and Word Meanings

It goes without saying that a certain level of vocabulary knowledge is essential in order to understand a text. The strong relations between vocabulary knowledge and reading comprehension have long been recognised (e.g., Carroll, 1993; Davis, 1944, 1968; Thorndike, 1973). Some authors estimate that about 90% of the words in a text need to be known for a reader to have a good chance of understanding it adequately (Nagy & Scott, 2000). But there is not a simple unidirectional relation between good vocabulary and good text comprehension. Good reading comprehension is also an important source of vocabulary knowledge. A skilled reader can often work out, or refine, the meanings of

unknown words from the context (see Cain, Oakhill & Bryant, 2004, for evidence that more skilled comprehenders are better at using context to infer the meanings of unknown words). Avid readers add new items to their vocabularies throughout their lifetimes and, similarly, existing vocabulary is refined through reading. Once children become fluent readers, written text is a major source of new vocabulary (Cunningham, 2005; Nagy & Scott, 2000).

Thus, the relation is reciprocal: vocabulary development and reading comprehension can have mutually beneficial effects (e.g., Seigneuric & Ehrlich, 2005). This mutual reciprocity between vocabulary and reading comprehension means that readers can enter either virtuous or vicious circles. If a child has limited vocabulary knowledge, their comprehension is likely to suffer, and without adequate comprehension (and concomitant exposure to text) their exposure to, and ability to acquire, new vocabulary will be limited. On the other hand, a skilled reader who has a good vocabulary to begin with, is likely to read a lot more and will, therefore, have more opportunities to learn new vocabulary. Indeed, we have shown that children's reading habits (amount of voluntary reading) and reading comprehension skill at age 8 are strong predictors of vocabulary skills even eight years later (Cain & Oakhill, 2011). These positive circles are frequently referred to as the Matthew Effect in reading, which captures the idea that the rich get richer (Stanovich, 1986).

So, we can see that comprehension ability, amount of reading and appropriate inferences from context can influence vocabulary acquisition. But we also have evidence that vocabulary knowledge – and in particular the quality of that vocabulary knowledge – can influence inference making and text comprehension more generally. The issue here is that “knowing” a word is not all or none. Indeed, it is difficult to specify what it means to ‘know’ a word, because such knowledge can span from fairly superficial recognition –

knowing that it is a word in a particular language – to being able to explain the word’s meaning in depth and providing appropriate examples of usage. Measures of vocabulary knowledge at *shallow levels* are also known as measures of vocabulary *breadth*. Such measures typically require simple recognition or production of single words as in the *British Picture Vocabulary Scale* (BPVS: Dunn, Dunn, Whetton, & Pintillie, 1992). As mentioned above, it is not difficult to match good and poor comprehenders on such measures. Depth of vocabulary, in contrast, can be conceptualised as what is known about those words (so it presupposes a certain level of vocabulary breadth), but also the relations and associations between individual words and concepts. It is typically measured by tasks that require knowledge of multiple meanings or word definitions. Some researchers have differentiated between these different ‘levels’ of vocabulary knowledge and have explored their relations to reading comprehension (Ouellette, 2006; Tannenbaum, Torgesen & Wagner, 2006).

More recently, we have found that a measure of depth of vocabulary is predictive of children’s ability to make global coherence inferences, even after breadth of vocabulary knowledge has been taken into account (Cain & Oakhill, 2014). We hypothesised that the availability of associative links between words and concepts – the consequence of a rich (deep) vocabulary – can aid comprehension by supporting inference making. We also showed that it is not only the knowledge of vocabulary that is important, but the speed with which information about a word can be accessed. Thus, rich and well-connected semantic representations will permit the rapid activation not only of word meanings, but also of concepts, which in turn will support reading comprehension. There is further evidence from a very different paradigm that supports this notion. We have found that comprehension skill is related to children’s ability to automatically derive themes from word lists, even though the task is simply to recall (or recognize items from) a word list. Weekes, Hamilton,

Oakhill & Holliday (2008) used the DRM (Deese, Roediger, McDermott) false memory paradigm, in which the task is to listen and remember a series of lists such as:

- *rest, bed, snooze, dream, tired, blanket.*

The results showed that, although good comprehenders did not have a better or poorer memory for the word lists overall, they were more likely than the less-skilled comprehenders to falsely claim that *sleep* had been in the original list. This finding was attributed to their propensity to derive themes from the lists – i.e., each of the words in the list above is associated with the concept of sleep.

3.3. Monitoring comprehension

Comprehension monitoring refers to the ability to think about one's own comprehension: whether or not it is progressing well, and whether there are there any problems.

Comprehension does not always happen seamlessly so effective readers need to be able to not only assess their understanding of what they have read, but also be able to have strategies available if they detect a problem with their comprehension. Problems with comprehension might arise for a number of different reasons. For example, a reader might simply have a lapse of attention, or they may realise that they lack relevant knowledge: they might not know the meanings of critical words or they may lack the relevant background knowledge that they need to make sense of the text to make an appropriate inference. Readers who monitor their understanding will have the opportunity to fix any lapses in understanding providing they have the resources to do so. Thus, comprehension monitoring can be viewed as a two-stage process: first realising that you do not understand and, second, knowing what to do to remediate that lack of understanding.

Young readers and those with specific comprehension difficulties often fail to adequately monitor their comprehension, which is typically assessed by means of error-

detection tasks (see, e.g., Markman, 1979). For example, a study by Oakhill, Hartt and Samols (2005) showed that children identified as less-skilled comprehenders have difficulties in spotting internal inconsistencies in texts, and have particularly marked problems when the inconsistencies are not in adjacent sentences in the text (i.e., the information that had to be integrated in order for the inconsistency to become apparent is separated by several sentences). A possible explanation of this finding is that less-skilled comprehenders do not set up an adequate text representation (or mental model) as they are reading, so that information later in the text is not necessarily recognized as being in conflict with information presented earlier because the representation of the earlier text was inadequate or incomplete (see Oakhill, 2020, for a fuller discussion of this point).

3.4. Understanding of text structure.

If a reader is able to identify the underlying structure of a text, they can use the structure to guide and inform their developing mental model of the text and perhaps make predictions about how it will unfold and even what inferences might be justified (or not). Text structures can be regarded as signals to text genre, which can support communication and comprehension. There are typical genres for many different types of text: for letters and postcards, for fairy tales and other narratives, for information about nutritional facts (labels), for brief scientific reports (journal papers), meal choices (menus), etc. Text genres are useful once they have been learned because the reader will quickly know what to expect from the text and where to read for certain types of information.

An alternative perspective on text structure is to consider the underlying logical structure across genres (e.g., Meyer & Freedle, 1984). So, texts could, for example, be grouped according to whether they fall under the heading of *description*, *sequence*, *compare and contrast* or *problem/solution*. Although these structures have typically been

observed and taught in relation to informational (expository) texts, they also apply to narratives, though a narrative might include a number of different, but related, structures like a temporal sequence that includes a problem/solution.

The understanding of text structure can encompass a number of different aspects and has, accordingly, been studied in different ways with different types of task. This range of tasks is also noteworthy because some of the tasks do not require any reading (e.g., understanding and retelling a story from a picture sequence; telling a story orally based on a given title). One fairly obvious way to explore children's understanding of text structure is to ask them to reorganise a set of jumbled sentences to create a well-ordered and coherent story (a "story anagram task"; Oakhill, Cain & Bryant, 2003), and the findings showed that skilled and less-skilled comprehenders differ on this task. Another important aspect of understanding text structure is to appreciate why the title of a text and any subheadings might be helpful as guides to comprehension (as clues to what a text, or a specific section of a text, is about) and, indeed, less-skilled comprehenders are less good at picking out the main point of a picture story from a set of alternatives (Yuill & Oakhill, 1991).

The quality of children's story production is also linked with their reading comprehension and reading difficulties (Cain, 2003; Shapiro & Hudson, 1997). Furthermore, in an oral story production task (where they are given a topic on which to base their story), less-skilled comprehenders produce less well-structured stories; their stories have poorer global coherence and often lack a main point (Cain & Oakhill, 1996). The link between story structure awareness and reading comprehension is further supported by other findings. For example, less-skilled comprehenders have been found to be less likely than their peers to produce continuations of stories that fit in with the structure up to that point (Englert & Thomas, 1987).

4. Pedagogical applications: Implications for teaching reading comprehension.

Of course, it should be borne in mind that almost all of the studies outlined above are correlational, in that they consider differences between groups. As such, they do not show that there is a causal link between any of the skills discussed and reading comprehension. There is evidence that simply reading a lot can improve knowledge and verbal intelligence (see, e.g., Stanovich, 1993) and so it may be the case that better comprehenders are better at many things simply because they read a lot (with good comprehension) and so get lots of practice at making inferences and monitoring their comprehension and they are exposed to more and more varied examples of different text structures, and so on. Thus, the skills discussed could be considered as by-products of being a good comprehender and reading a lot.

However, we do in fact have evidence that the skills and abilities outlined above are causally implicated in the development of good reading comprehension (Oakhill & Cain, 2012). In that longitudinal study we found that: inference making, comprehension monitoring, understanding story structure and vocabulary skills were all predictive of later reading comprehension from ages 7-8 to 10-11, over and above the autoregressive effect of reading comprehension. Thus, the contribution of these skills is not simply because of their early association with comprehension. Whatever these skills are contributing over and above concurrent comprehension accounts for later comprehension. There is, thus, good evidence that they are causal factors (see de Jong & van der Leij, 2002, for fuller discussion of this point), and training in these skills should improve reading comprehension. Of course, training studies in themselves are a further test of causal direction. If particular skills are causally implicated in (rather than being simply incidentally related to) reading

comprehension, then training those skills should improve comprehension, and we have evidence that it does (see, e.g., Yuill & Oakhill, 1988).

A further important point emerged from the longitudinal study (Oakhill & Cain, 2012): there was a dissociation between predictors of word reading and predictors of reading comprehension with almost no overlap. This finding supports the conclusion that reading comprehension does not necessarily develop automatically once word decoding is proficient, but that it is dependent on different skills, and may need specific teaching.

Thus far, I have been mostly discussing studies that have explored differences between skilled and less-skilled comprehenders. But, of course, comprehension skill is on a continuum, and almost all children can benefit from some direct instruction in reading comprehension. In the final sections of this paper, I consider what can be done to support reading comprehension in the classroom.

5. Teaching Reading Comprehension

There are several different research-based programmes (both paper-based and computer- or tablet-based) that have been demonstrated to improve reading comprehension. In this paper, I do not wish to focus on specific training programmes but, rather, consider in principle how the different aspects of comprehension outlined above could be trained in order to support reading comprehension. It is also important to understand the research base and principles so that one is not dependent on a particular programme or materials but can, rather, teach flexibly with whatever resources are available.

Below, the teaching of each of the components is considered in turn, but that is not at all meant to imply that they should be taught independently. As mentioned above, there are many mutually-supportive links between these skills (e.g., vocabulary can support inference making and vice-versa, monitoring skills might signal that an inference is required,

a good understanding of how texts are structured can support inferences, and so on). Thus, it is likely that the best way to teach these skills is to encourage their use in the understanding of rich texts to which the various strategies can be applied in concert to support understanding. This mutual interdependence between the components of reading comprehension also means that weaknesses in just one component can weaken comprehension significantly. In the next sections, I outline how the individual components might be supported, but will then consider the importance of ensuring that they are used in synchrony to understand text.

In order to assess and support reading comprehension, the teacher must be able to understand the component skills and must be able to identify which strategies are most appropriate at which points in a text (see Oakhill, Cain, & Elbro, 2014, for a more detailed account). By choosing interesting and complex texts to discuss with their class, the well-informed teacher will be able to use the opportunities afforded by such texts to help students become better comprehenders (and, one would hope, also more engaged and enthusiastic readers).

5.1 Teaching Vocabulary

Evidence shows that reading comprehension can be improved by substituting the more difficult words in a text with easier ones (Kameenui, Carnine & Freschi, 1982). However, the adaptation of texts in this way is clearly not a reasonable strategy in the longer term: it is not practicable and it will not help children to increase their vocabulary through reading. Thus, a more viable and helpful approach is to help children develop and expand their vocabularies through reading.

A number of studies have explored different methods of teaching vocabulary to children, but the immediate results of vocabulary training are moderate, and the transfer

effects to reading comprehension are even less substantial and are the exception rather than the norm (NRP, 2000). However, there are some promising ways in which the interplay between vocabulary knowledge and reading comprehension may be improved.

There are two main approaches to teaching vocabulary. The first is simply to help children learn the meanings of specific words. The other is to help children become better at *figuring out the meanings of new words* through use of context and morphology in particular. These methods are described in more detail below.

5.1.1. Teaching specific words. It can be helpful to select, or encourage children to select, key words in a text that they do not know or are unlikely to be sure of. The teacher can then explain, and/or encourage the children to hypothesise about, the meanings of these words, and to link them to relevant topic knowledge *before* they start reading the text. Studies have shown that such strategies can improve text comprehension. For example, Carney, Anderson, Blackburn and Blessings (1984) found that teaching relevant vocabulary to 5th grade students had an effect on learning of, and memory, for a social studies text, and Medo and Ryder (1993) found that vocabulary instruction helped 8th grade students to make causal connections in an informational text, and that this support was effective across a wide range of ability levels.

Other words that are frequently targeted for direct teaching are those that children are likely to encounter frequently in texts from a variety of content areas; words such as *coincidence, absurd, hasty, perseverance* (these are termed "tier two words": Beck, McKeown & Kucan, 2005). These are neither the most frequent and early-acquired words ("tier one" words, such as *clock, baby, happy*) nor infrequent, topic-specific words ("tier three" words, such as *osmosis, nucleus, archeologist*). Tier 2 words are particularly

important to teach because they are transferable and useful and can provide access to more complex topics and discussions outside of the everyday.

Based on the research thus far, some methods and strategies for teaching vocabulary are likely to be more helpful than others. First, as would be expected given the research outlined above on the relations between vocabulary and reading comprehension, the successful teaching of vocabulary needs to be aimed at deeper levels of vocabulary knowledge. Hence, children should be encouraged to think about how new words relate to other words. So, for example, it is not very helpful to learn that a 'platypus' is an animal. It is much more useful to know, more specifically, that a platypus is a mammal, and to know in which ways it is a typical mammal, and how it differs from most other mammals. In this way, the child's knowledge about this word will be linked to many other words and concepts in a "semantic network" (or meaning network). The broader implication is that vocabulary teaching should take place in a rich context (Beck, Perfetti & McKeown, 1982; NRP, 2000), and the formation of connections (networks) between words should be actively encouraged. Second, when children are given opportunities to identify and use new words, e.g., with their classmates and teacher, their vocabulary learning is likely to be enhanced (Coyne, McCoach & Kapp, 2007). Third, vocabulary learning can be supported by repetition, as shown in the survey of training studies by Stahl and Fairbanks (1986). So, for example, pre-reading activities with key words should be followed up by activities that reinforce that learning during reading of texts containing those words, and follow-up activities on later occasions. For younger children, simply re-reading of storybooks will provide them with important opportunities to rehearse the meanings of new words (Biemiller & Boote, 2006).

5.1.2. Teaching children to acquire new vocabulary. Biemiller (2005) has argued that it is possible for children to learn 10 new words a week through a well-structured

vocabulary training programme. But that would add up to only about 400 new words a year, which is only a fraction of the number of new words that a child would typically acquire in a year. So, children must be learning the meanings of words without direct teaching. Even if more words could be taught directly, it would be difficult for the teacher to predict which key content words the children might need to know in the longer run. Thus, some more recent programs aim to teach children ways in which they can acquire new word knowledge in the course of their independent reading.

There are two main ways in which children can be helped to learn the meanings of new words. These methods are not mutually exclusive; rather, they may supplement each other. One way is to help children to derive meanings from the text context. Children can be taught to search the context for clues about the meaning of the unknown word ("what sort of thing is it?"), for defining characteristics ("how would you describe it?") and for likes and opposites ("do you know of something similar or the opposite?"). For instance, Tomesen and Aarnoutse (1998) found that such direct instruction was helpful in improving the vocabulary learning of both poor and average readers

Another way to support learning of unknown word knowledge is through the use of morphology. Morphemes are the smallest units of meaning in words: prefixes, roots, suffixes, inflections, e.g., *mis/read/ing/s* (see Bowers & Kirby, 2010). The same root morphemes occur in several different words, e.g., the root *read* is part of *reads*, *reader*, *unread*, *reading* etc., and derivations and inflections can be applied to whole classes of words. So, learning to recognise a morpheme in one word is potentially helpful for recognising and understanding many new words in which the same morpheme occurs. For example, if you know that the morpheme *eval* relates to "age" then you will see that *medieval* means "middle age," *primeval* means "first age" and you can probably work out

the meaning of *coeval*, if you don't already know it. Several studies have shown that teaching morphology to children has significant effects not only on the development of their vocabulary, but also their reading comprehension. Such effects are enhanced if teaching does not just focus on the analysis of single words but is combined with comprehension instruction (see Bowers, Kirby & Deacon, 2010).

One successful programme, designed to improve vocabulary (RAVE-O: Barzillai, Morris, Lovett & Wolf, 2010), focuses on training understanding of meaning in the context of the other linguistic properties of the word to be learnt. That is, it emphasises the interrelations between the orthographic, phonological, morphological, semantic and syntactic aspects of reading (the overall "lexical quality" of the word (e.g., Perfetti, 2007; Perfetti, Yang & Schmalhofer, 2008). The idea behind such training is that the more that is known about a word (i.e., its phonemic and orthographic structure, its semantics, syntactic uses, and morphological roots and affixes), the more efficiently the word can be decoded, retrieved, and understood. This type of integrated training was shown in Barzillai et al's study to improve second and third grade poor readers' vocabulary knowledge. Not only was the training effective in the case of the words taught within the programme, but it also improved the children's knowledge of the meanings of untaught words, presumably because they were able to use what they had been taught to help them work out the meanings of unknown words. Importantly, these gains were maintained one year later.

5.2. Teaching Inference Making

There is evidence (cited above) that difficulties in inference making might arise for at least two different reasons: access to, and rapid activation of, relevant knowledge, and the reader's standards for coherence: see above (related to comprehension monitoring)¹.

Two main types of intervention that seek to raise awareness of when inferences are needed and also to show readers how to generate inferences from vocabulary and background knowledge have been trialled. These types of intervention, although they do not directly address the child's use of appropriate standards of coherence, are likely to influence such standards.

One effective way to raise children's awareness of the need to make an inference is to encourage them to question the text. For instance, in a recent classroom intervention, McMaster, van den Broek, Espin, White, Rapp, Kendeou, Bohn Gettler and Carlson (2012) compared three questioning techniques: wh-questions, which in this study were: *who*, *what*, *when*, and *where*; causal inference questions; and also a general questioning technique in which students were asked "How does the sentence you just read connect with something that happened before in the story?" Each of these methods resulted in gains in understanding, suggesting that different questioning protocols can be used to get students thinking about text and generating inferences. Another successful technique for teaching children how to make inferences from information in the text is to show them how to analyse the text for clues. Consider the sentence: '*Sleepy Jack was late for school again*'. *Sleepy* suggests that the character may have overslept, thus providing a reason for being

¹ Poor working memory has sometimes also been cited as a cause of poor inference making, but it does not emerge as an independent predictor of comprehension once other abilities are controlled for (Oakhill & Cain, 2012). In addition, interventions to improve working memory have met with limited success, and transfer to reading comprehension has not been demonstrated (Melby-Lervåg & Hulme, 2013).

late for school, that the character's first name, *Jack*, is used suggests that the character is a schoolchild and not a teacher who would most probably be introduced as Mr X, and *again* indicates that Jack is habitually late (perhaps because he has a tendency to over-sleep). Such interventions, combined with question generation, have been shown to result in gains in standardised assessments of reading comprehension (Yuill & Oakhill, 1988).

A different approach uses graphic organisers to make students aware of their own contributions to inferences and encourages them to draw on their background knowledge. For example:

"Frieda came bouncing down the stairs. John rushed to call an ambulance"

An obvious question is what reasoning connects these two sentences: *why* was an ambulance needed? The answer requires a (causal) inference that draws on information *both* from the text *and* the reader's background knowledge, as illustrated in Figure 3. That an inference is required to link the sentences becomes very clear if we change the second sentence: *"Frieda came bouncing down the stairs. John rushed to embrace her,"* where a different interpretation of *bouncing*, and a different inference, would be required to make sense of the text. In one study, 10- to 11-year-old children worked primarily with non-fiction texts and the use of graphic organisers to support inference making not only had a strong and significant positive impact on their inference making during reading more generally, but also had a long-term positive effect on their general reading comprehension (Elbro & Buch-Iversen, 2013). Graphic organisers, such as the above, can also be used to help clarify the structure of a text (see below).

Training children to generate mental images of the events in a text has also been shown to improve their inference ability and their reading comprehension more generally (Oakhill & Patel, 1991). This effect probably arises because the requirement to produce

mental images of the events in a text is likely to encourage the reader to integrate information across different parts of the text in order to make their image coherent. The requirement to produce mental images might also be supportive of monitoring for comprehension (see below).

Thus, ways to improve inference making involve training children in different techniques that make them aware of the need to generate an inference, and also how to make those inferences by analysing the text and drawing on their background knowledge.

5.2.1. What about knowledge and vocabulary in inference making? As discussed above, knowing the meanings of words is obviously crucial for reading comprehension, and vocabulary knowledge can support inference making in particular. However, comprehension takes place in real time, so it is not enough simply to know the meanings of words: one must also be able to access their meanings (and related relevant associations) rapidly. One way to support fast access to vocabulary might be to foster rich and well-connected semantic networks (see above). Our own work has shown that depth of vocabulary knowledge (what one knows about a word's meaning) is a stronger predictor of inference making than just breadth of vocabulary (how many words are known) (Cain & Oakhill, 2014). There is also evidence that skilled comprehenders are more likely than less-skilled comprehenders to activate meaning-related words automatically (Weekes, Hamilton, Oakhill & Holliday, 2008). Thus, vocabulary instruction that emphasises the links between related words might be particularly helpful in supporting comprehension.

5.3. Teaching Comprehension Monitoring

Good comprehenders can be characterized as active readers, who engage with a text during reading, and evaluate their own comprehension both during and after reading. Thus, activities that encourage children to engage with the construction of meaning during

reading are likely to improve their comprehension monitoring. One way of training children to better monitor their comprehension is to present them with a specific task, such as pretending to be a detective. De Sousa and Oakhill (1996) found that children with comprehension problems were much better at detecting several different types of text inconsistency (nonsense words, internal inconsistencies, and conflicts with prior knowledge) when they were told to pretend to be a detective and to read statements from witnesses to a crime, compared to when they were simply reading passages with the aim of spotting errors. Interestingly, the children in the comparison group of good comprehenders were not influenced by the instructions, presumably because they were already good at comprehension monitoring, and so there was little scope to improve their skills. Merely alerting children to the fact that a text contains errors is often enough to improve their monitoring performance. This technique could be useful in modeling comprehension monitoring behaviour, to demonstrate to children the types of comprehension problems they might encounter in naturalistic texts, such as unfamiliar words, inconsistencies within the text, and conflicts with prior knowledge.

Another, more general, strategy that could be used to enhance comprehension monitoring could be to encourage children to stop and produce a summary at specific points during reading or listening activities. There is evidence that comprehension monitoring is related to summarization skills, and so the requirement to produce a summary can be used as a tool to identify whether or not comprehension is progressing adequately. Indeed, self-directed summarization was one of the techniques included by Palincsar and Brown (1984) in a package of skills designed to help children to foster and monitor their own comprehension. The poor readers who were taught in that way produced better

summaries than a control group, and also performed better on a transfer test of comprehension monitoring.

A rather different technique – encouraging children to visualize a story as a sequence of mental images – has also been shown to improve comprehension monitoring. This technique is relatively easy to teach to children older than about 9 (Pressley, 1976), and supports memory for stories not only in poor comprehenders but also in typically developing readers. It has been shown that poor readers who were taught to use mental imagery improved their ability to detect inconsistencies in a comprehension monitoring task (Gambrell & Bales, 1986), perhaps because the requirement to construct images helped the children to remember, and to compare, details from the stories. Although, at first gloss, use of imagery may seem very different from summarization techniques, to be successful both require imagery and summarization require the comparison and integration of information from different parts of a text.

5.4. Teaching Awareness and Use of Text Structure

There are at least three major ways in which readers can be helped to gain awareness of text structures. First, it is well documented that direct instruction in narrative structures is beneficial (e.g., Paris & Paris, 2007; Stetter & Hughes, 2010, provide an overview). Such instruction can provide children with information about how stories are typically structured. A typically-structured story would start with setting information (about the context and the main character(s)); then there would be some sort of interesting event, problem or crisis in the story, followed by one or more attempts to respond to this central event before a resolution is reached. When children know this structure, it becomes easier for them to orient themselves in similar stories, to predict events, and to produce well-organised summaries.

Second, it is possible to teach even children in the first grades about the logical structures of information texts. For example, children can learn to spot key words that signal a compare-contrast structure: *but, however, both, on the other hand*. They can learn to generate questions based on what they know about such structures, like “What two things are being compared in this paragraph?” “How are they alike?” “How are they different?” (see, e.g., Williams et al., 2007; 2009).

Third, readers can be taught how to use graphic organisers (see also above) to represent the logical structure of texts. Such organisers comprise simple compare-contrast tables, Venn diagrams, flow charts, tree diagrams, etc. Graphic organisers use the spatial orientation to represent logical relations (contrasts, causes and consequences, etc.) and thus they make the logical structure directly visible to the reader.

6. Strategies working together

It should be apparent by now that there are numerous interrelations and interdependencies between these various skills. Furthermore, there is no strong evidence that teaching single components of reading comprehension separately will lead to large and sustained gains in comprehension. It may be that each of the components has only a relatively modest influence on reading comprehension in general. But it is also likely that bringing a number of strategies to bear on the understanding of a text will be a much more rewarding and engaging exercise for a child than is practising the use of one strategy at a time. A more productive method is to teach the components of comprehension in an integrated fashion driven by wanting to understand a specific text for a specific purpose.

7. Moving to independence

We also need to bear in mind that it is not simply a matter of teaching the relevant strategies, but that children also need to be encouraged to take responsibility for their own

comprehension. They will not, of course, always have a teacher at hand to remind them of the relevant strategies that they should apply when they are trying to understand a text. They need to become independent readers by internalizing and automatizing the comprehension skills that they have learned. The teacher needs to support this move to independence by offering a gradual “release of responsibility.” So, at first, the teacher might spend a lot of time modelling their own comprehension strategies as they read: making the implicit explicit to their pupils. For instance, the teacher could use examples where the link between sentences is not clear and suggest some possible links that he/she is considering. Or they could comment on unfamiliar words and verbalise how they are trying to infer the meanings of those words; they could talk about possible inconsistencies (which might require an inference); they could highlight conflicts with, and additions to, their prior knowledge. Then, the teacher can move on to scaffolding the children’s use of strategies, to support and guide their comprehension. Finally, the teacher can gradually remove that support so that the children, through extensive practice, achieve mastery of the strategies and use them automatically during their reading for comprehension.

References

- Barzillai, M., Morris, R., Lovett, M. & Wolf, M. (2010), Poster presented at the annual meeting of the Society for Scientific Studies in Reading.
- Beck, I. L., McKeown, M.G., & Kucan, L. (2005). Choosing words to teach. In A. Hiebert & M. Kamil (Eds.), *Teaching and learning vocabulary: Bringing research to practice* (pp. 209-222). Mahwah, NJ: Erlbaum.
- Beck, I., Perfetti, C., & McKeown, M. (1982). Effects of long-term vocabulary instruction on lexical access and reading comprehension. *Journal of Educational Psychology, 74*, 506-521.
- Biemiller, A. (2005). Size and sequence in vocabulary development: Implications for choosing words for primary grade vocabulary instruction. In A. Hiebert & M. Kamil (Eds.), *Teaching and learning vocabulary: Bringing research to practice* (pp. 223-242). Mahwah, NJ: Erlbaum.
- Biemiller, A., & Boote, C. (2006). An effective method for building meaning vocabulary in primary grades. *Journal of Educational Psychology, 98*(1), 44-62.
- Bowers, P. N., & Kirby, J. R. (2010). Effects of morphological instruction on vocabulary acquisition. *Reading and Writing, 23*(5), 515-537.
- Bowers, P. N., Kirby, J. R., & Deacon, S. H. (2010). The effects of morphological instruction on literacy skills A systematic review of the literature. *Review of Educational Research, 80*(2), 144-179.
- Branford, J. D., & Franks, J. J. (1971). Abstraction of Linguistic Ideas. *Cognitive Psychology, 2*(4), 331-350. DOI: 10.1016/0010-0285(71)90019-3

- Bransford, J. D., & Johnson, M. K. (1972). Contextual prerequisites for understanding: Some investigations of comprehension and recall. *Journal of Verbal Learning and Verbal Behavior*, 11(6), 717-726.
- Cain, K. (1999). Ways of reading: how knowledge and use of strategies are related to reading comprehension. *British Journal of Developmental Psychology*, 17(2), 293-309. <https://doi.org/10.1348/026151099165285>
- Cain, K. (2003). Text comprehension and its relation to coherence and cohesion in children's fictional narratives. *British Journal of Developmental Psychology*, 21(3), 335-351.
- Cain, K., & Nash, H. M. (2011). The influence of connectives on young readers' processing and comprehension of text. *Journal of Educational Psychology*, 103(2), 429-441.
- Cain, K., & Oakhill, J. V. (1999). Inference making and its relation to comprehension failure. *Reading and Writing. An Interdisciplinary Journal*, 11(5-6), 489-503.
- Cain, K., & Oakhill, J. V. (2011). Matthew effects in young readers reading comprehension and reading experience aid vocabulary development. *Journal of Learning Disabilities*, 44(5), 431-443.
- Cain, K. & Oakhill, J. V. (2014). Reading comprehension and vocabulary: Is vocabulary more important for some aspects of comprehension? *L'Année Psychologique/ Topics in Cognitive Psychology*.
- Cain, K., Oakhill, J. V., Barnes, M. A., & Bryant, P. E. (2001). Comprehension skill, inference making ability and their relation to knowledge. *Memory and Cognition*, 29(6), 850-859.
- Cain, K., Oakhill, J. V., & Bryant, P. E. (2004). Children's reading comprehension ability: Concurrent prediction by working memory, verbal ability, and component skills. *Journal of Educational Psychology*, 96(1), 671-681.

- Carney, J. J., Anderson, D., Blackburn, C., & Blessing, D. (1984). Preteaching vocabulary and the comprehension of social studies materials by elementary school children. *Social Education, 48*(3), 195-196.
- Carroll, J. B. (1993). *Human Cognitive Abilities: A Survey of Factor-Analytic Studies*. New York: Cambridge University Press.
- Catts, H. W., Compton, D., Tomblin, J. B., & Bridges, M. S. (2012). Prevalence and nature of late-emerging poor readers. *Journal of Educational Research, 104*(1), 166-181.
- Coyne, M. D., McCoach, D. B., & Kapp, S. (2007). Vocabulary intervention for kindergarten students: Comparing extended instruction to embedded instruction and incidental exposure. *Learning Disability Quarterly, 30*(2), 74-88.
- Cunningham, A. E. (2005). Vocabulary growth through independent reading and reading aloud to children. In E. H. Hiebert & M. L. Kamhi (Eds.), *Teaching and learning vocabulary: Bringing research to practice* (pp. 45-68). Mahwah, NJ: LEA.
- Davis, F. B. (1944). Fundamental factors of comprehension in reading. *Psychometrika, 9*(3), 185-197.
- Davis, F. B. (1968). Research in comprehension in reading. *Reading Research Quarterly, 3*(4), 499-545.
- de Sousa, I., & Oakhill, J. V. (1996). Do levels of interest have an effect on children's comprehension monitoring performance? *British Journal of Educational Psychology, 66*(4), 471-482.
- de Jong, P. F., & van der Leij, A. (2002). Effects of phonological abilities and linguistic comprehension on the development of reading. *Scientific Studies of Reading, 6*(1), 51-77.

- Dunn, L. M., Dunn, L. M., Whetton, C., & Pintilie, D. (1992). *British Picture Vocabulary Scale*. London: NFER-Nelson.
- Elbro, C., & Buch-Iversen, I. (2013). Activation of background knowledge for inference making: Effects on reading comprehension. *Scientific Studies of Reading, 17*(6), 435-452.
- Englert, C. S., & Thomas, C. C. (1987). Sensitivity to text structure in reading and writing: A comparison between learning-disabled and non-learning disabled students. *Learning Disability Quarterly, 10*(2), 93-105.
- Gambrell, L. B., & Bales, R. J. (1986). Mental imagery and the comprehension-monitoring performance of fourth- and fifth-grade poor readers. *Reading Research Quarterly, 21*(4), 454-464.
- Gough, P. B., & Tunmer, W. E. (1986). Decoding, reading, and reading disability. *Remedial and Special Education, 7*(1), 6-10.
- Johnson-Laird, P. N. (1983). *Mental models: Towards a cognitive science of language, inference, and consciousness*. Cambridge, MA: Harvard University Press.
- Kintsch, W. (1998). *Comprehension: A paradigm for cognition*. New York: Cambridge university press.
- Markman, E. M. (1979). Realizing that you don't understand: Elementary school children's awareness of inconsistencies. *Child Development, 50*, 643-655.
- McMaster, K. L., van den Broek, P., Espin, C. A., White, M. J., Rapp, D. N., Kendeou, P., Bohn Gettler, C. M., & Carlson, S. (2012). Making the right connections: Differential effects of reading intervention for subgroups of comprehenders. *Learning and Individual Differences, 22*(1), 100-111.
- Medo, M. A., & Ryder, R. J. (1993). The effects of vocabulary instruction on readers' ability to make causal connections. *Literacy Research and Instruction, 33*(2), 119-134.

- Meyer, B. J., & Freedle, R. O. (1984). Effects of discourse type on recall. *American Educational Research Journal*, 21(1), 121-143.
- Nagy, W. E., & Scott, J. (2000). Vocabulary processes. In M. Kamil, P. Mosenthal, P. D. Pearson & R. Barr (Eds.), *Handbook of reading research. Vol. III* (pp. 269-284). Mahwah, NJ: Erlbaum.
- National Reading Panel. (2000). *Teaching children to read: An evidence-based assessment of the scientific research literature on reading and its implications for reading instruction*. Washington, DC: The National Institute of Child Health and Human Development (<http://www.nichd.nih.gov/publications/nrp/smallbook.htm>).
- Oakhill, J. V. (1984). Inferential and memory skills in children's comprehension of stories. *British Journal of Educational Psychology*, 54, 31-39.
- Oakhill, J.V. (2020). Four Decades of Research into Children's Reading Comprehension: A Personal Review, *Discourse Processes*, DOI: 10.1080/0163853X.2020.1740875
- Oakhill, J. V., & Cain, K. (2012). The precursors of reading ability in young readers: Evidence from a four-year longitudinal study. *Scientific Studies of Reading*, 16(2), 91-121.
- Oakhill, J. V., Cain, K., & Bryant, P. E. (2003). The dissociation of word reading and text comprehension: Evidence from component skills. *Language and Cognitive Processes*, 18(4), 443-468.
- Oakhill, J.V., Hartt, J., & Samols, D. (2005). Levels of comprehension monitoring and working memory in good and poor comprehenders. *Reading and Writing*, 18, 657-686
- Ouellette, G. P. (2006). What's meaning got to do with it: The role of vocabulary in word reading and reading comprehension. *Journal of Educational Psychology*, 98(3), 554-566.
- Palinscar, A. S., & Brown, A. L. (1984). Reciprocal teaching of comprehension-fostering and comprehension-monitoring activities. *Cognition and Instruction*, 1(2), 117-175.

- Paris, A. H., & Paris, S. G. (2003). Assessing narrative comprehension in young children. *Reading Research Quarterly, 38*(1), 36-76.
- Perfetti, C. A. (2007). Reading ability: Lexical quality to comprehension. *Scientific Studies of Reading, 11*, 357–383.
- Perfetti, C. A., Yang, C.-L., & Schmalhofer, F. (2008). Comprehension skill and word-to-text integration processes. *Applied Cognitive Psychology, 22*, 303-318. doi: 10.1002/acp.1419
- Pressley, G. M. (1976). Mental imagery helps eight-year-olds remember what they read. *Journal of Educational Psychology, 68*(3), 355-359.
- Rumelhart, D.E., & Ortony, A. (1977). The representation of knowledge in memory. In R.C. Anderson, R.J. Spiro & W.E. Montague (Eds.), *Schooling and the acquisition of knowledge* (pp. 99-135). Hillsdale, NJ: Erlbaum
- Seigneuric, A., & Ehrlich, M. F. (2005). Contribution of working memory capacity to children's reading comprehension: A longitudinal investigation. *Reading and Writing, 18*(7-9), 617-656.
- Shapiro, B. K., & Hudson, J. A. (1997). Coherence and cohesion in children's stories. In J. Costermans & M. Fayol (Eds.), *Processing interclausal relationships: studies in the production and comprehension of text* (pp. 23-48). Mahwah, NJ: Lawrence Erlbaum Associates.
- Stahl, S. A., & Fairbanks, M. M. (1986). The effects of vocabulary instruction: A model-based meta-analysis. *Review of Educational Research, 56*(1), 72-110.
- Stanovich, K.E. (1993). Does reading make you smarter? Literacy and the Development of Verbal Intelligence *Advances in Child Development and Behavior, 24*, 133-180

- Stanovich, K. E. (1986). Matthew effects in reading: Some consequences of individual differences in the acquisition of literacy. *Reading Research Quarterly*, 21(4), 360-407.
- Stetter, M. E., & Hughes, M. T. (2010). Using story grammar to assist students with learning disabilities and reading difficulties improve their comprehension. *Education & Treatment of Children*, 33(1), 115-151. doi: 10.1353/etc.0.0087
- Tannenbaum, K. R., Torgesen, J. K., & Wagner, R. K. (2006). Relationships between word knowledge and reading comprehension in third-grade children. *Scientific Studies of Reading*, 10(4), 381-398.
- Thorndike, R. L. (1973). Reading as reasoning. *Reading Research Quarterly*, 9(2), 135-147.
- Tomesen, M., & Aarnoutse, C. (1998). Effects of an Instructional Programme for Deriving Word Meanings 1. *Educational Studies*, 24(1), 107-128.
- van den Broek, P. W. (1997). Discovering the cement of the universe: The development of event comprehension from childhood to adulthood. In P. W. van den Broek, P. J. Bauer & T. Bourg (Eds.), *Developmental Spans in Event Comprehension and Representation* (pp. 321-342). Mahwah, NJ: Lawrence Erlbaum Associates.
- van den Broek, P. W., Lorch, R. F., Linderholm, T., & Gustafson, M. (2001). The effects of readers' goals on inference generation and memory for text. *Memory and Cognition*, 29(8), 1081-1087.
- Weekes, B. S., Hamilton, S., Oakhill, J. V., & Holliday, R. E. (2008). False recollection in children with reading comprehension difficulties. *Cognition*, 106(1), 222-233.
- Williams, J. P., Nubla-Kung, A. M., Pollini, S., Stafford, K. B., Garcia, A., & Snyder, A. E. (2007). Teaching cause-effect text structure through social studies content to at-risk second graders. *Journal of Learning Disabilities*, 40(2), 111-120.

Williams, J. P., Stafford, K. B., Lauer, K. D., Hall, K. M., & Pollini, S. (2009). Embedding reading comprehension training in content-area instruction. *Journal of Educational Psychology, 101*(1), 1-20.

Yuill, N. M., & Oakhill, J. V. (1988). Effects of inference awareness training on poor reading comprehension. *Applied Cognitive Psychology, 2*(1), 33-45.

Yuill, N. M., & Oakhill, J. V. (1991). *Children's problems in text comprehension: An experimental investigation*. Cambridge: Cambridge University Press.

Table 1. Typical groups of good/poor comprehenders. (age is shown in years,months)

	Chronological age	Word reading age	Comprehension age	Vocabulary (max = 45)
Skilled comprehenders	7,8	7,8	8,3	38
Less-skilled comprehenders	7,8	7,10	6,7	37

Note: word reading and comprehension ages were derived from the Neale Analysis of reading Ability; Sight vocabulary scores from the Gates-MacGinitie Reading Test.

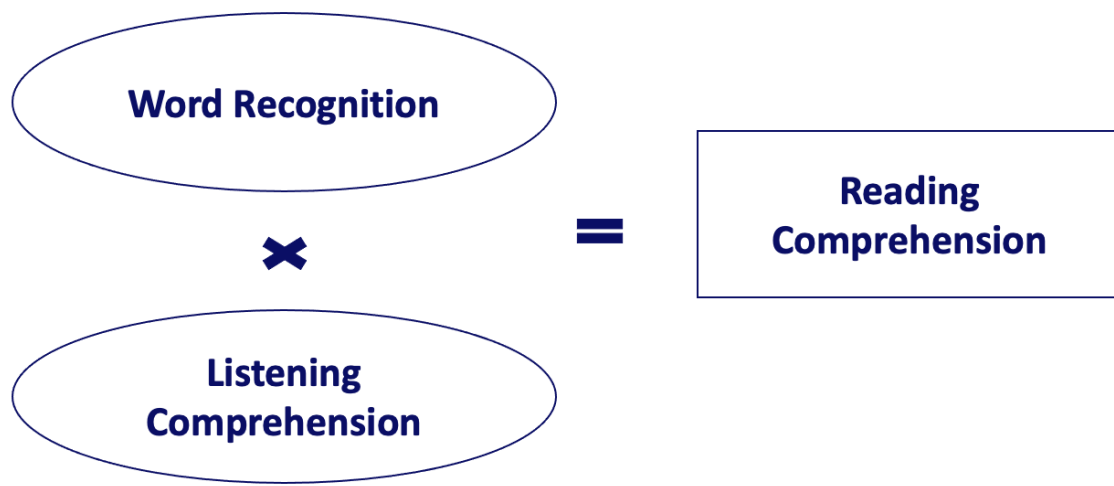


Figure 1. The Simple View of Reading (Gough & Tunmer, 1986) describes reading comprehension as the product of word reading and listening comprehension and the relative contribution of each to reading comprehension across development.

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

Figure 2. The Simple View of Reading.

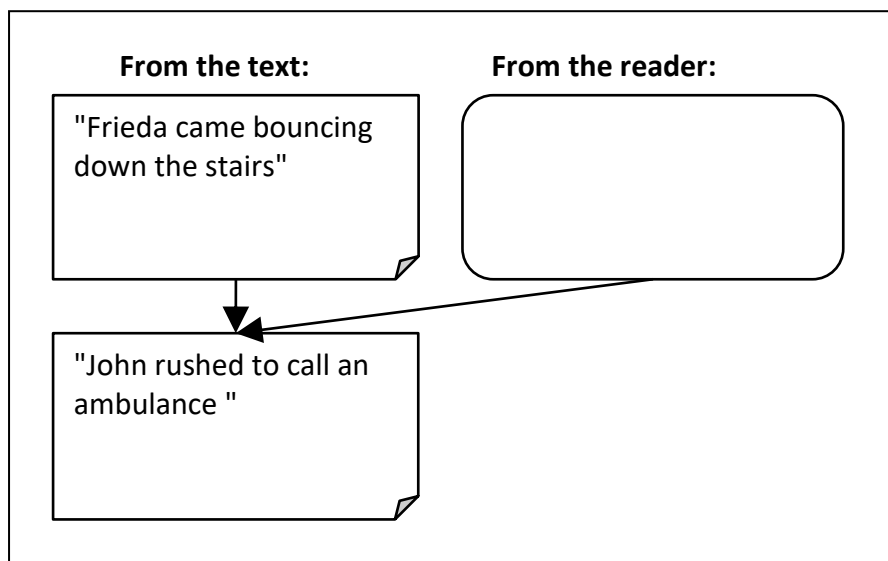


Figure 3. A graphic organiser can elucidate the contributions from both the text – and the reader, e.g., ‘Frieda was seriously hurt, and required medical attention.’

Corresponding Author:

Jane Oakhill

School of Psychology, Pevensey 1

University of Sussex

Falmer

East Sussex

BN1 9QH

United Kingdom