Reading Comprehension Development and Difficulties: An Overview

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Reading Comprehension: What's Involved?

A major challenge for the beginner reader is to learn to read the printed word. Slow, inaccurate, and effortful word decoding means that, in early reading development, cognitive resources such as attention and working memory are directed to decoding the words on the page rather than extracting meaning from text (Perfetti, 1985). As a result, the young child's reading comprehension will be limited by his or her word-reading ability. However, understanding text involves more than accurately decoding the words on the page. To illustrate the knowledge, skills, and cognitive resources involved in understanding text, read the passage in Table 1, and ask yourself the following questions: Where was Bobby? What was ruined? Why did Bobby start to cry?

The language skills that contribute to successful reading and listening comprehension and enable you to answer these questions develop before literacy instruction begins. Infants and children are surrounded by complex language in the form of fictional and personal narratives from storybooks, watching television, and talking about past events with family and others, etc. (Dickinson & Snow, 1987). Through these activities, vocabulary is learned, grammatical constructs are acquired, and higher-level skills important for understanding beyond the word or sentence level are developed.

In the field of reading research, vocabulary and grammar have been described as foundational (Lepola, Lynch, Laakkonen, Silven, & Niemi, 2012) or lower-level (Hogan, Cain, & Bridges, 2012) skills because words make up sentences that describe events which, in turn, form connected prose. In the example in Table 1, knowledge of key words is essential to understand each sentence and the events that take place. Having the knowledge of more than the most frequently used meaning of "wave" is essential to understand the critical event (the wave wrecking the sandcastle) that takes place in the second sentence. Vocabulary shares a particularly strong relationship with reading and listening comprehension both concurrently (Oakhill, Cain, & Bryant, 2003; Vellutino, Tunmer, Jaccard, & Chen, 2007) and longitudinally (Muter, Hulme, Snowling, & Stevenson, 2004; Oakhill & Cain, 2012). Recent work indicates that between first and fourth grade, growth in vocabulary knowledge in part explains growth in reading comprehension (Quinn, Wagner, Petscher, & Lopez, 2015).

Growth in vocabulary knowledge in part explains growth in reading comprehension, but different aspects of language knowledge and skill may be important at different points in development.

Understanding sentences is clearly critical to understanding connected text. Some sentences are more difficult to understand than others, such as the final sentence in our example, which requires the reader (or listener) to "wait" for the main clause. However, several studies indicate that grammar is only a modest predictor of reading comprehension level, when compared with vocabulary (Muter et al., 2004; Oakhill et al., 2003; Vellutino et al., 2007). Obviously, some of the predictive power of grammar will be shared with vocabulary, because both are language skills. Another reason for the modest association between performance on measures of grammar and measures of reading comprehension in these studies is due to the way that grammar has been assessed, often with a single measure, whereas grammar extends from morphology (word structure) through to comprehension of complex multiclause sentences. A more comprehensive assessment that includes the different aspects of grammar may be a stronger predictor of reading comprehension ability. We should also be mindful that different aspects of language knowledge and skill may be important at different points in development. As children get older and reading skills develop, the texts used to assess reading comprehension become longer, and more complex, containing grammatical structures such as embedded relative

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TABLE 1. Text to illustrate some of the knowledge and skills involved in reading comprehension

Bobby was busy with his bucket and spade. The sandcastle was nearly complete. Then a huge wave crashed onto the shore. On seeing that his day's work had been ruined Bobby started to cry.

clauses that are common in written text but not in everyday conversation (Scott, 2009). Thus, grammatical knowledge may be a stronger predictor of text comprehension in older than in younger readers because it is more critical for constructing meaning from complex extended texts.

Most reading material is longer than a single word or sentence. To understand passages, even short ones as in our example, readers and listeners need to integrate the meanings of successive clauses and sentences. Several higher-level language skills are related to this process: integration and inference, knowledge and use of text structure, and evaluation of how well you understand a text (typically referred to as comprehension monitoring) (Oakhill & Cain, 2012; Oakhill et al., 2003). Collectively, these have been referred to as higher-level language skills (Perfetti, Landi, & Oakhill, 2005). They each aid the reader (or listener) to construct a memory-based representation of the text's meaning that encodes the state of affairs described by the text, referred to as a mental model or situation model (Johnson-Laird, 1983; Kintsch, 1998).

Inference and integration are essential to understand passages because not all details are stated explicitly by the author. These skills predict reading comprehension outcomes in beginner readers.

Inference and integration are essential to understand passages, whether short or long, because not all details are stated explicitly by the author. As shown in our example text in Table 1, readers and listeners need to combine the meanings of sentences and draw on general knowledge to make full sense of text. Integration across sentences can be signalled by cohesive devices such as pronouns (*he, she, it*, etc.), which refer back to previously mentioned characters, objects, and events. Understanding the role of "it" in our example enables us to know what was ruined. Another cohesive device used to signal integration between clauses and sentences is an interclausal connective. These are words such as *before, after, because, so,* etc., that indicate temporal and causal relations between events. These cohesive devices guide readers (and listeners) to establish meaningful links between different clauses and sentences in a text. Readers also need to draw on the context of the text and their general knowledge to make full sense of events. They might use context to select the appropriate meaning of a word with multiple meanings, such as "wave" or "spade," or to infer a character's motivation for a particular action, such as why Bobby started to cry (note that the text does not state explicitly that the sandcastle was ruined). Inference and integration skills are associated with standardized measures of listening comprehension in 4- to 6-year-olds (Florit, Roch, & Levorato, 2011) and predict reading comprehension outcomes in beginner readers (Kendeou, van den Broek, White, & Lynch, 2009; Oakhill & Cain, 2012).

When reading or listening to text or when engaged in social communications, we evaluate our understanding. If something is not clear, then we might re-read to check for sense or, in conversation, we can ask the speaker for clarification. Reading researchers typically assess comprehension monitoring skill by inserting inconsistencies into short texts to see if children can detect that something "does not make sense." For example, if we changed the final sentence in our example to "Bobby smiled with delight," it would be difficult to integrate the meaning of that sentence with the previous text. The ability to evaluate our understanding in this way develops early: Preschoolers can detect if there are sense violations concerning characters, actions, and events in familiar and also scripted stories (Skarakis-Doyle, 2002; Skarakis-Doyle & Dempsey, 2008), and this ability is related to reading and listening comprehension in young readers (Kim, 2015; Oakhill & Cain, 2012).

Another skill that is important for constructing a coherent mental model of the text's meaning is knowledge and use of text structure. By text structure we mean the arrangement of ideas and how they are related. In a well-formed narrative, events are structured in a meaningful way, with settings and characters introduced, an initiating event to motivate the plot, typically a problem that has to be overcome, and its resolution, as in our example (A. H. Paris & S G. Paris, 2003; Shapiro & Hudson, 1997). Expository (or informational) texts can follow a greater range of structures, including description, sequence, problem/solution, compare/contrast, and cause/effect (Freedle, 1979). Knowledge of both narrative and expository text structures emerges in preschool (Lynch et al., 2008; Pappas, 1993; Stein & Policastro, 1984) but is refined over many years, most probably influenced by exposure to a range of more complex texts and varied genres through schooling and leisure-time reading. Knowledge and use of text structure is related to the developing reader's comprehension and recall of written text (Oakhill & Cain, 2012; Richgels, McGee, Lomax, & Sheard, 1987). Knowledge and use of story structure can be assessed through a reader's ability to explain the purpose of story titles, and the types of information provided in the beginnings and endings of stories, as well as their ability to re-order a set of randomized sentences into a meaningful story. Performance on these measures when aged 7 years predicts children's reading comprehension ability on a standardized measure 4 years later, and their initial reading comprehension ability and other key predictors of reading comprehension such as word reading and vocabulary knowledge (Oakhill & Cain, 2012).

This list of lower- and higher-level skills that support reading comprehension demonstrates the complexity of the activity of comprehension: Readers need to retrieve the sense of each individual word, construct the meanings of sentences, and integrate these into a meaningful representation of the state of affairs described in the text. As noted, these language skills and processes are clearly interconnected. Words are the building blocks of sentences, and sentences describe the unfolding

events or ideas in a text; however, the lower-level skills of vocabulary and grammar and the higher-level skills that support comprehension of passages are also separable. By the age of 8 to 9 years, a child's performance on measures of vocabulary, grammar, and higher-level language skills can be distinguished statistically (Language and Reading Research Consortium [LARRC], 2015a), meaning that these different aspects of language are not one and the same thing. Further, from the earliest stages of reading development, each dimension of language predicts outcomes in reading comprehension over time, in addition to measures of a child's general cognitive ability (Muter et al., 2004; Oakhill & Cain, 2012; Silva & Cain, 2015). These findings suggest that each of these dimensions of language is important to reading comprehension.

As word-reading skills become more efficient and fluent with increasing age, greater cognitive resources are available for processing the meaning of the text, and language comprehension becomes more strongly predictive of reading comprehension than word reading.

Thus, when we consider reading comprehension and the skills that support its development we must include language-comprehension skills as well as word-reading skills. Although these language skills develop early, we have noted that word reading is the critical limiter of reading comprehension in the early stages of reading development. However, across time this relationship changes. As word-reading skills become more efficient and fluent with increasing age, greater cognitive resources are available for processing the meaning of the text, and language comprehension becomes more strongly predictive of reading comprehension than word reading (Catts, Hogan, & Adlof, 2005; LARRC, 2015b). In the next section, we consider how weaknesses in these language skills are related to poor reading comprehension.

Children With Poor Reading Comprehension

With adequate schooling, the majority of children develop good literacy skills. However, a considerable proportion of children (around 16% in grades 2 through 10) can be classified as poor readers (Catts, Compton, Tomblin, & Bridges, 2012). Within the framework of the simple view of reading, two primary sources of reading difficulty have been proposed. Some children will experience poor reading comprehension because inefficient or inaccurate word-reading skills limit their ability to extract meaning from text (Perfetti, 1985). These children might be considered to have a classic poor-reading profile, characterized by word-reading difficulties. In contrast, other children have reading comprehension difficulties despite intact word-reading skills because their language comprehension is weak (Cain, Oakhill, & Bryant, 2000a; Cain, Oakhill, Barnes, & Bryant, 2001). Figure 1 illustrates these different reader profiles, which have been empirically validated (Catts et al., 2012; Stothard & Hulme, 1995). Because the latter group has developed age-appropriate word-reading skills, their reading comprehension difficulties have been described as "unexpected" or "specific" to comprehension rather than to reading ability more broadly (Cain & Towse, 2008). Their difficulties with passage-level comprehension are evident when text is read aloud to them (Cain et al., 2001; Megherbi & Ehrlich, 2005), indicating a difficulty with language comprehension in general.

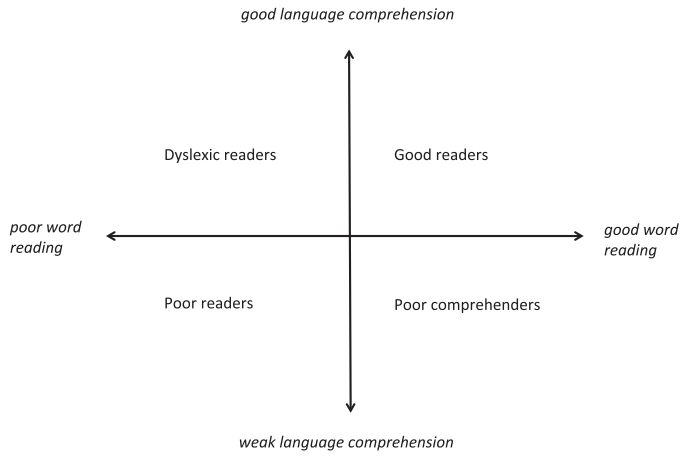

Figure 1. This diagram illustrates the types of poor reader predicted by the simple view of reading. Good language comprehension skills exist on a continuum from weak to good; the same is true of word-reading skill. Good readers are children in the top right hand quadrant who have both good language comprehension and good word-reading skills; poor comprehenders are children with good word-reading skills in the presence of poor language comprehension; children with "classic" dyslexia have specific difficulties with the word-reading component, but may have intact language comprehension; poor readers have weaknesses with both components of the simple view of reading.

Children with poor reading comprehension have been selected in a variety of ways, using percentiles or standardized score cutoffs for achievement in word reading and reading comprehension (Adlof, Catts, & Lee, 2010; Cain et al., 2000a) or regression techniques to identify children with poor reading comprehension relative to word reading, vocabulary and IQ (Tong, Deacon, Kirby, Cain, & Parrila, 2011). Despite the range of techniques and assessments used to identify poor comprehenders for research studies, there is certain consistency in the findings as to their skill strengths and weaknesses. When compared with same-age good comprehenders, children with intact word reading but poor reading comprehension show weaknesses across a range of language tasks. These include difficulties on measures of semantic processing (Nation & Snowling, 1999), morphosyntactic knowledge (Tong, Deacon, & Cain, 2014), grammar (Stothard & Hulme, 1992), and inference making, comprehension monitoring, and knowledge and use of story structure (Cain, 2003; Cain & Oakhill, 1999; Oakhill, Hartt, & Samols, 2005). In contrast, their phonological processing skills, critical for word decoding in an alphabetic orthography, are usually intact (Cain, Oakhill, & Bryant, 2000b; Stothard & Hulme, 1995). Weak verbal working

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memory is another characteristic associated with poor reading comprehension (Carretti, Borella, Cornoldi, & De Beni, 2009), which might explain some of their difficulties, particularly with higher-level skills such as integration and inference making.

A summary of skill strengths and weaknesses is provided in Table 2. Of note, it is not the case that poor comprehenders do not understand the tasks that we use to assess these skills in research studies. As Table 2 illustrates, they show equivalent performance to good comprehenders on some assessments, but show weaker performance when the items tap language comprehension and the verbal memory skill important for processing text. It should be noted however, that not all poor comprehenders show weaknesses on all measures in a single study. For example, studies that have examined the performance of poor comprehenders on a range of tasks find that not all of them do poorly on measures of vocabulary knowledge (Cain & Oakhill, 2006; Nation, Clarke, Marshall, & Durand, 2004), or inference making (Cain & Oakhill, 2006). The heterogeneity found between readers in these studies may be, in part, due to the measures used. Typically, only a single assessment of each skill is administered because of constraints on the time available for testing but, as illustrated in Table 2, performance is typically poor when the language or cognitive demands of the task are high. Thus, a range of varying tasks for each specific skill that accumulatively tap language and cognitive skills may provide a more accurate picture of whether or not a child has a weakness in each specific skill, or under what conditions difficulties arise. This variability may also be due to the degree of weakness experienced by each child. As discussed later, poor comprehenders' difficulties often do not reach the clinical threshold for a diagnosis of language impairment. It may be that significant difficulties only become evident when the cognitive system is taxed, a range of knowledge stores must be accessed and processes are engaged simultaneously as a text unfolds. Thus, a modest vocabulary weakness may not lead to comprehension problems for well-structured, explicit texts, but may hinder comprehension when precise vocabulary knowledge is important to generate inferences for less explicit texts. This is illustrated by our example text, where knowledge about buckets and spades, waves and the shore is required to infer that the events took place on a beach.

Poor comprehenders' difficulties often do not reach the clinical threshold for a diagnosis of language impairment. Significant difficulties may only become evident when the cognitive system is taxed, a range of knowledge stores must be accessed and processes are engaged simultaneously as a text unfolds.

Early Identification of Poor Comprehenders

Learning to read begins before formal reading instruction (Scarborough, 2003) because the oral language skills that develop during the preschool years serve as a foundation for both word reading and reading comprehension. Therefore, accurate identification of preschoolers at risk of poor reading comprehension, which is desirable to enable early and appropriate intervention to minimize the possibility of reading failure, may be possible. A handful of retrospective longitudinal studies that have examined preschool indicators of later reading comprehension difficulties speak to this point.

The first study reported by Catts and colleagues (Catts, Adlof, & Weismer, 2006) identified average readers, poor decoders, and children with poor reading comprehension in

TABLE 2. Areas of skill strength and weakness typically associated with poor comprehenders

Skill	Relative strength	Relative weakness	Illustrative study
Phonological skills	Rhyme production and phoneme deletion	Phonological awareness task (odd one out) with high memory load	(Cain et al., 2000b)
Vocabulary	Semantic priming of function-related words (broom-floor)	Semantic priming of category coordinates (cat-dog)	(Nation & Snowling, 1999)
Grammar	Inflectional morphology	Derivational morphology	(Tong et al., 2011)
Integration and inference making	Ability to answer questions about explicit details in text	Ability to answer questions that require an inference from text	(Cain & Oakhill, 1999)
Comprehension monitoring	Detection of anomalous words when inserted in text	Detection of anomalous phrases and contradictory information	(Oakhill et al., 2005)
Knowledge and use of text structure	Production of stories when supported by prompts	Production of stories from a topic title	(Cain, 2003)
Working memory	Spatial working memory	Verbal working memory	(Nation, Adams, Bowyer-Crane, & Snowling, 1999)

grade 8 in the United States and then compared the groups on measures of oral language and reading-related skills administered in kindergarten, grade 2, and grade 4. The children identified as poor reading comprehenders in grade 8 showed age-appropriate performance on phonological processing tasks in the early grades, in contrast to the poor decoders. In contrast, they were consistently weak on standardized measures of oral vocabulary, grammar, and passage-level comprehension in kindergarten, grade 2, and grade 4. This study demonstrates that poor comprehenders have problems with the oral language skills important for comprehension in preschool before formal reading instruction begins, but have relative strengths in phonological processing skills. Thus, early in development the distinction between the skills and knowledge that serve word reading and those that serve reading comprehension is evident.

Another retrospective study comparing good and poor reading comprehenders reported a similar pattern of performance (Nation, Cocksey, Taylor, & Bishop, 2010). The poor comprehenders were selected when aged 8 (year 3 of UK schooling, equivalent to U.S. grade 2) and their performance on a range of earlier language and literacy measures was compared with that of typical readers. In general, the poor comprehenders were significantly poorer than a group of typical readers on standardized measures of vocabulary, sentence processing, and listening comprehension when aged 5, 6, and 7 years. However, they did not show pronounced weaknesses; their mean standardized scores on these measures ranged from 88 to 98. In contrast, the good and poor comprehenders did not differ on the majority of the measures related to word reading: letter knowledge and phonological processing skills (the exception being a sound-matching task where their performance was significantly poorer than the typical reader group). At an earlier time point in development, Justice and colleagues examined a longitudinal dataset to retrospectively compare the language production and comprehension skills of fifth-grade poor comprehenders when aged 15, 24, 36, and 54 months old with another group categorized as poor decoders and one that was composed of average readers (Justice, Mashburn, & Petscher, 2013). The poor comprehenders obtained lower scores than the average readers on the earlier language measures, although the differences did not always reach statistical significance.

Taking a slightly different approach, Elwér and colleagues examined a large sample (N=926) of children from a longitudinal study and identified two groups in fourth grade on the basis of their decoding (real and nonword reading) and oral language (vocabulary and listening comprehension) skills, rather than reading comprehension (Elwér, Keenan, Olson, Byrne, & Samuelsson, 2013). In accordance with subtypes of poor reader in the simple view of reading (see Figure 1), the poor oral comprehenders had adequate decoding but weak oral language and the poor decoders had weak word-decoding skills but adequate oral language. The researchers then compared the two groups' performance on reading-related skills in earlier grades. There was considerable developmental stability in the classification of these groups: The poor oral comprehenders had poorer oral language and memory skills than the poor decoders in the earlier grades, whereas the poor decoders had weaker phonological processing skills. Furthermore, preschool measures of skills related to word reading (specifically rapid naming of letters and numbers) and reading comprehension (vocabulary) were good predictors of whether a child was classified as a poor oral comprehender or a poor decoder in fourth grade.

Studies indicate that children who are classified as poor comprehenders in the early grades of schooling have oral language weaknesses in preschool. However, these studies also indicate some difficulties in the use of classification in preschoolers.

Together, these studies indicate that children who are classified as poor comprehenders in the early grades of schooling have oral language weaknesses in preschool. Further, the persistent differences between groups at each time point suggests a degree of stability in the development of these skills and classification. However, these studies also indicate some difficulties in the use of classification in preschool. First, in these retrospective studies, the differences with comparison groups in the earlier grades were not always significant. Second, Elwér et al. (2013) found less stable *prospective* prediction of poor-reader subtypes in later grades when they identified children "at risk" of being a poor comprehender or poor decoder on the basis of preschool literacy skills. Third, the performance on standardized measures in many of these studies did not necessarily reach a clinical threshold of weakness, but could instead be described as "modest" difficulties (for example, all mean scores on standardized oral language measures in the Nation et al. study were above 87). Fourth, some children may have a "late-emerging" reading difficulty. Their performance on early measures of language and literacy may appear adequate, with apparent difficulties emerging in the later grades (Catts et al., 2012). One reason for this may be the changing nature of text. Reading assessments for beginner readers typically use short and early acquired words and sentence structures, and have a shorter sequence of ideas with a fairly linear structure. As texts become more complex and challenging, requiring more complex representations of meaning to be constructed, reading comprehension difficulties might emerge.

Despite those limitations, these studies do not rule out the possibility of identifying children at risk of poor reading comprehension in later years or providing support where there is concern. This work on early identification demonstrates that the oral language skills that support later reading comprehension can be differentiated from those that support word reading in preschool, and that children who are weak in these skills are more likely to have later reading comprehension difficulties than those who show adequate performance on early language measures.

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Poor Reading Comprehension: Broader Implications

As we have seen, the oral language comprehension skills that support later reading comprehension develop in preschool. Further, there is some evidence that children classified as poor reading comprehenders have a history of weak oral language. In this section, we consider the consequences of reading and listening comprehension difficulties across development.

There are a handful of studies that have identified children with poor reading comprehension and examined their development during the first few years of reading. These studies provide an indication of the broader implications of poor reading comprehension. In one study, good and poor comprehenders were identified when aged 7 to 8 years and tracked until they were 10 to 11 years (Cain & Oakhill, 2011). At the outset of the study, the two groups did not differ significantly on measures of written and receptive vocabulary, but there were significant differences between the groups four years later. Another study focused on morphological awareness and included a group of poor comprehenders and also one of average comprehenders, selected in grade 5 (Tong et al., 2011). The researchers then compared the two groups on measures of morphology in grade 5 and also earlier in grade 3 (collected as part of a larger longitudinal study). In grade 3, the groups did not differ on a task that assessed derivational morphology; however, group differences were apparent in grade 5. Together, these studies suggest that difficulties beyond reading comprehension may emerge during development. Knowledge of vocabulary and morphology was not poorer than control groups at the earlier time point in each study, but was significantly poorer a few years later.

The language of books is richer than speech. As a result, book reading affords greater learning opportunities. Shared book reading and similar activities, even before reading instruction begins, may help build language skills and knowledge.

One reason for these emerging difficulties is that vocabulary and morphology, like reading comprehension, are examples of developmentally unconstrained knowledge or skills (S. G. Paris, 2005). An example of a constrained skill is letter knowledge: There are a finite number of letters to be learned and these are usually all learned over a short period of time. Vocabulary is a good example of an unconstrained skill: The number of words to be learned is large (if not literally infinite) and we acquire new words across our lifetime. These emerging differences in unconstrained skills can be explained as Matthew Effects (Stanovich, 1986), whereby weaker readers develop at a slower pace than poorer readers across time. The concept of Matthew Effects is appealing, but there has been limited support for it to date. However, recent evidence suggests that Matthew Effects are more likely to be found for unconstrained skills, such as vocabulary, than for constrained skills (Duff, Tomblin, & Catts, 2015).

Why should these differences emerge? One proposal is that these differences develop over time because of differential exposure to print. The language of books is richer than speech in terms of vocabulary and syntax and text structure (Cunningham & Stanovich, 1998; Scott, 2009). As a result, book reading affords greater learning opportunities. There is now a wealth of research demonstrating how measures of leisure time reading are related to growth in vocabulary and other types of knowledge critical to reading comprehension in children as well as adults (Cunningham & Stanovich, 1998; Echols, West, Stanovich, & Zehr, 1996). Indeed, it has been proposed that vocabulary growth occurs largely through incidental learning from print, once children become independent readers (Nagy, Herman, & Anderson, 1985). Thus, if poor comprehenders engage in less reading than good comprehenders (or read simpler, less challenging texts) their language skills may develop more slowly.

Early Support and Targeted Interventions

This review of reading comprehension development and difficulties offers several conclusions and recommendations. First, we have seen that reading comprehension draws on a range of language skills and knowledge, and that critical oral language comprehension skills develop in preschool. Second, children with poor reading comprehension often have a history of weak oral language. Third, poor reading comprehension may itself result in reduced language and knowledge growth. One recommendation is that the language skills and knowledge that are critical for good reading comprehension should be supported early in development. This can occur through rich and meaningful interactions with print during shared book reading and similar activities, before reading instruction begins. Further, although the very early assessment of language comprehension will not identify all children at risk of reading comprehension failure, it is clear that we do not have to wait for reading comprehension to fail before identifying potential poor comprehenders and providing targeted interventions.

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