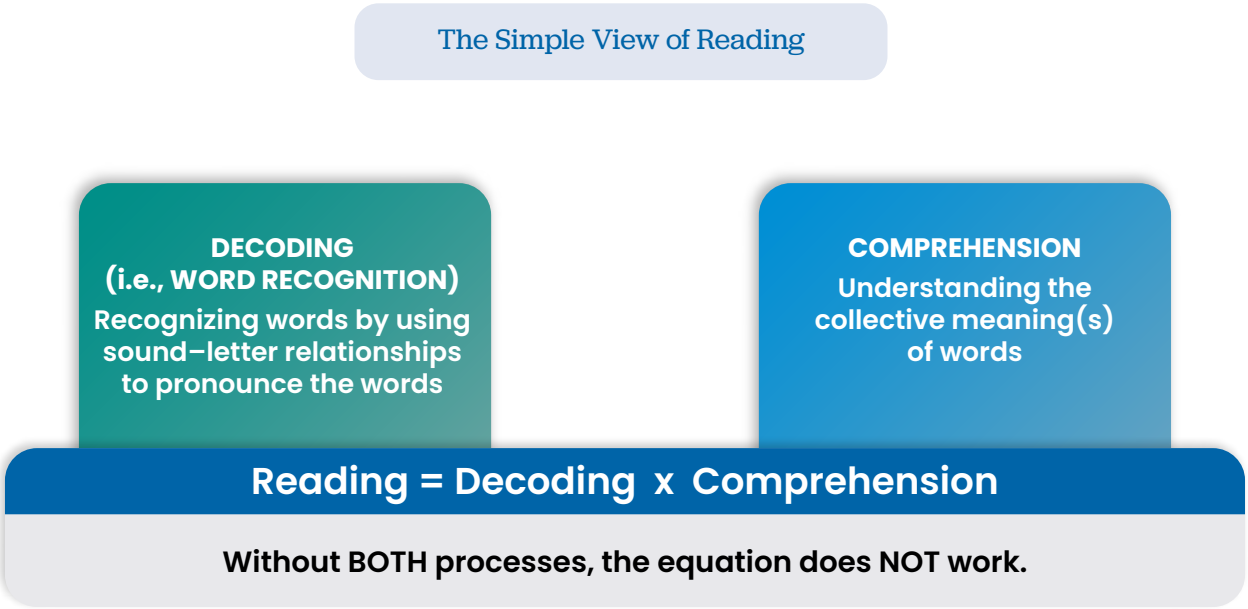
Whitepaper

The Research behind Word Reading and Readable Text

by i-Ready

Introduction



What is involved in skilled reading? The Simple View of Reading is a model that found that two behaviors predicted a person's ability to read: a) word recognition (i.e., pronouncing words) and b) language comprehension (i.e., understanding the meaning (Gough & Tumner, 1986). The Simple View is not a prescription for teaching reading considering many additional elements are involved, including phonemic awareness, phonics and morphology instruction, fluent coordination of word recognition, vocabulary, content knowledge, and many different types of comprehension (Duke & Cartwright, 2021).

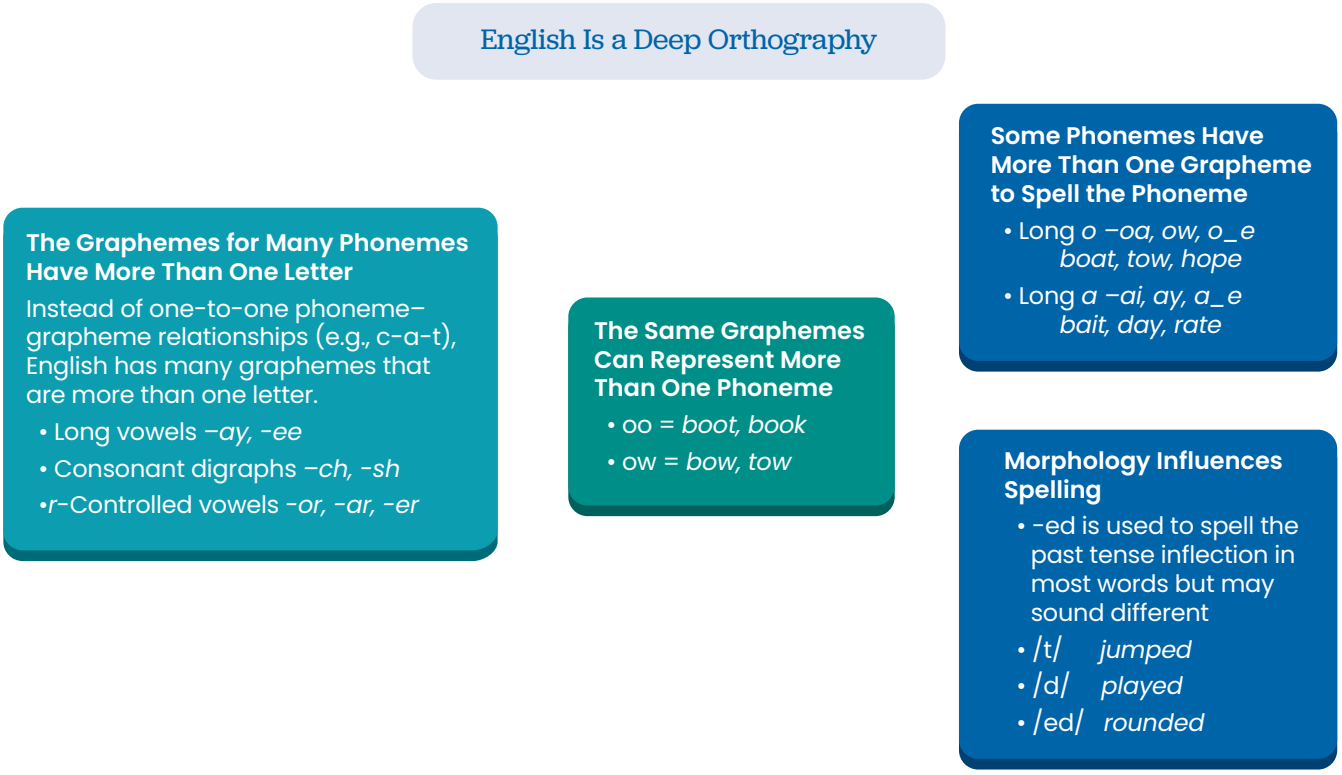
For beginners, word recognition is the major hurdle. For most beginners, the gap is word recognition. If they are native English speakers, they arrive at school understanding language but unable to use the alphabetic and morphological code to orally pronounce words. Accumulated research establishes that systematic, explicit phonics and morphology instruction is an essential part of a comprehensive literacy curriculum (National Reading Panel, 2000; Lonigan & Shanahan, 2009; Ehri, 2005; Castles et al., 2018).

For beginners who are Multilingual Learners, both word recognition and language are the hurdles. If students arrive at school with a first language other than English, we cannot assume grounding in the vocabulary and syntax of the English language. They may learn to decode words in English, but if the meaning of the decoded word is not known to them, it is essentially a "nonsense word." For example, Multilingual Learners can learn to decode the English word *cat*, but unless taught, they may not connect that pronunciation to its meaning in their first language (e.g., *cat* = *gato* = *chatte/chat* = *quita*). This would also be true for children whose first language is English when they decode words that are not in their expressive and receptive vocabularies (e.g., *lug*, *tusk*). Robust language instruction must be taught in equal parts and in congruence with phonics and morphology.

Why do beginning readers in English need special materials?

Across decades and even centuries, educators have developed special materials for beginning readers for four reasons. First, English is a deep orthography.[1] Second, it takes longer to learn all the graphemes in English, but third, readers cannot not wait to practice reading connected text until they've learned all the patterns. Lastly, texts can accelerate (or hinder) learning because texts provide a place to apply knowledge of words and how they work.

1. **English has a deep, complex orthography.** The English writing system is alphabetic, meaning that visual symbols (e.g., letters that form graphemes) represent speech sounds (i.e., phonemes), but English has some complexities. Unlike transparent languages like Spanish, for example, in which the relationship between letters and sounds is more consistent, English is "quasi-regular," "opaque," or "a deep orthography."[2] English is not random or pseudo-alphabetic but more complex.
2. **Children learning to decode English take longer to learn graphemes.** Children take longer to learn to decode English than languages with transparent orthographies like Spanish or Italian. In fact, English-speaking students in Grade 1 have 41%–62% accuracy with single-syllable words, while Italian students in Grade 1 reach levels as high as 92%. By their fourth year of schooling, English-speaking children have the same word-decoding skills as their counterparts reading more transparent languages (Willingham, 2017).



[1]Generally, the word orthography means "spelling system."

[2]The term "deep orthography" is used because it describes a system that is not random or only "half regular" but one that is more complex than some other alphabets and is influenced by morphology and positional patterns.

Essential Definitions

Word Frequency: A measure of how often a word occurs in printed English. For example, *the* is the most frequently occurring word. Linguists and educators measure word frequency by taking large samples of texts and calculating the number of times words occur in the sample. Word frequency estimates how likely a person is to have encountered the word before, predicts accurate word recognition, and is especially impactful in deep orthographies like English.

High-frequency words: *the, is, I, to*
(often see them)

Very infrequent words: *smock, ingots*
(rarely see them)

High-frequency words occur so often that in order to read even the simplest sentences, you must know them (e.g., *the, was, and, to*). Researchers have compiled lists of 200–300 high-frequency words for beginners (Dolch, 1936; Fry, 1980).

High-frequency words may have less regular spelling patterns (e.g., *have, of, to*) and for this reason, some educators have incorrectly asked students to memorize these wholistically as "sight words." Most high-frequency words conform to predictable spelling patterns.

Sight Word: A sight word is any word that is accessed automatically and directly through its spelling without decoding, or "sounding out." Sight words are automatically accessed because they have been previously decoded and orthographically mapped. Sight words are *not* high-frequency words and are *not* words that we teach readers to memorize wholistically. In fact, learning words wholistically by sight is not a reliable approach for cognitive storage (e.g., *look, book, took, tool*).

Regular Versus Irregular Words: Regularity refers to how consistently a grapheme represents a specific speech sound. Some patterns are highly regular and consistent across words (e.g., closed syllables such as *big, trick*), and others can vary depending on the word (e.g., *tow, how*). Still others are highly unusual (e.g., *aisle, meringue*). Regularity varies on a continuum (Colenbrander et al., 2020).

Highly regular: *ship, boy, say*
(Grapheme same sound in all words.)

Less regular/variable: *meat, head, great*
(Grapheme can represent two to three sounds.)

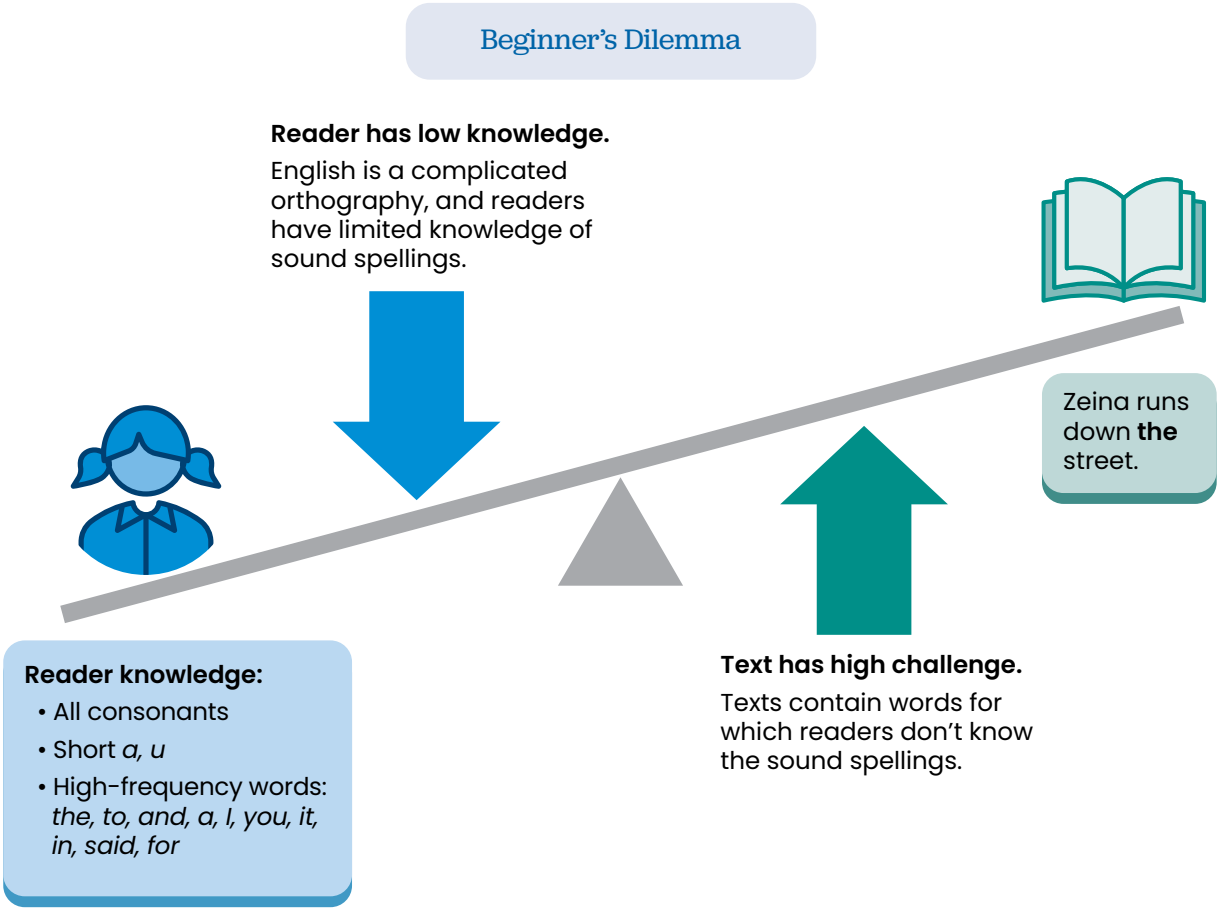
Highly irregular: *yacht, fuchsia*

Transparent Orthography: Orthography means "spelling," and a transparent orthography refers to a writing system in which there is a very consistent relationship between the letters and their corresponding sounds. Usually, each letter will represent a single speech sound in a transparent orthography. Similarly, each sound is consistently represented by the same letter or combination of letters. Languages like Spanish and Finnish are examples of transparent orthographies.

Deep Orthography: A deep orthography is a type of writing system in which the relationship between the letters and speech sounds is complex and may vary. In languages with deep orthographies, a single letter or combination of letters can represent multiple sounds, and the same sound can be represented by different letters or combinations. Readers must learn word-specific spellings, which increases the cognitive load of learning to read and can slow development. English and French are examples of deep orthographies.

3. **Children learning to read English cannot put off text reading until they learn all the graphemes.** If beginners in English are to read words in a connected text, they are placed in what might be called "The Beginner's Dilemma." They do not know enough patterns in English to decode the words they come across in text.

   Take, for example, a learner who knows all the single consonants, the short *a*, short *u*, and a few high-frequency words (e.g., *the, to, and, a, it, in, said, for*). In this example, even the simple sentence *Zeina runs down the street* becomes largely inaccessible. *Runs* is the only word the student can decode. To be orthographically mapped or retained in memory, students must practice decoding words without guessing or using pictures (Stanovich, 1980; Rayner, 1978; 1998).



4. **Beginning reading materials can facilitate or impede self-teaching.** Texts do not teach students to read, yet the materials we ask students to read may fuel or stall their reading development. If texts encourage memorization or do not have spelling patterns that students can access, then reading is a guessing game and learners must turn to memorization or pictures. If the texts include words that children do not have in their vocabularies, then reading is a decoding activity akin to pseudoword reading. Learning occurs through engaged exposure, practice, and extension. This is why text, and how it is structured, is so important.

   When students are taught grapheme–phoneme relationships, they can apply this information in texts to words they have not previously read before. For example, let's say that the reader has learned the short *i*, the graphemes for /t/, /b/, /g/, /r/, /m/, and /n/, and the closed syllable *CVC* pattern. They can read words like *tip, trim,* or *tin*, even if they have not seen those words before in print. Once students learn the system, the knowledge allows them to extend their abilities to read new words. This is called self-teaching.

The self-teaching hypothesis suggests that as readers learn letter sounds within an alphabetic system, they can use that information to decode words they have never seen before and then connect the pronunciation to words they have in their oral vocabularies (Share, 2004). Self-teaching does not mean that students teach themselves the system of letter sounds but, instead, that once the system is learned, that system can be applied to words the student has not decoded before.

Self-teaching is why students do not need to memorize whole words. Even in a deep orthography like English, it is faster and easier to learn the system and then apply that knowledge. This is also why students can read pseudowords that conform to typical patterns (e.g., *vig, piff*)—they know the system. In the beginning-to-read years, the opportunities a text provides for this self-extending system called self-teaching are pivotal.

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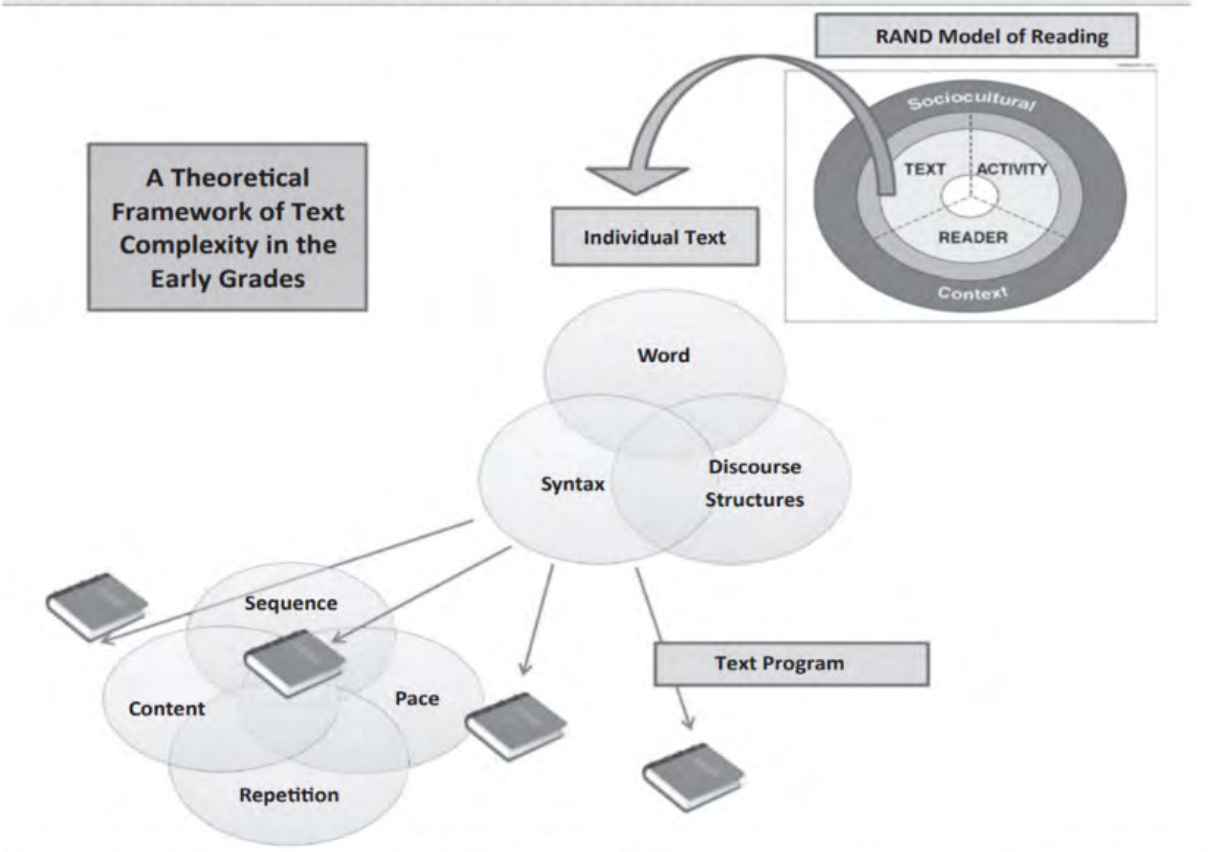
Model of Early-Grade Text

Beginning reading texts are used within the context of a comprehensive literacy curriculum situated within a sociocultural context for diverse readers. As shown in this model, reading involves a) readers, b) activities, and c) texts.

Figure. A Theoretical Framework of Text Complexity in the Early Grades



Note. Graphic (inset) reprinted from RAND Reading Study Group (2002). *Reading for understanding: Toward an R&D program in reading comprehension.* Santa Monica, CA: RAND. This copy is used with permission of the RAND Corporation.

Readers. The development of skilled reading takes place in a predictable way, but the rate at which readers progress through stages of development is different. Some readers learn to decode words quickly, and others take longer. Some readers come to school with a first language other than English. Some readers must face the difficulties associated with limited exposure to literacy-rich experiences at home.

Activities. What students *do* with a text, the activity, also varies. When a student is asked to read a text without a teacher nearby, the demands of the task are high. When a student is asked to listen to a text decoded by someone else, the activity requires careful listening but not word recognition. Texts used for instruction do not operate independently of readers or activities.

Texts. Text design occurs at one of two levels: the individual text level or the program level.

The individual text is usually what a student will read today, and the difficulty of that individual text exists at the word, syntax, and discourse-structure levels. Words receive a great deal of attention with beginners. Syntax refers to the complexity of sentences and the grammar in them. Difficult sentences are longer, have more dependent phrases and clauses, and often disrupt the typical subject–verb–object order. Discourse structures are the larger frameworks and text structures for organizing information (e.g., narratives, arguments, informational or descriptive, cause and effect).

Text program. The early-grade text program is not a curriculum or software but the collection of texts students read across a given time, a "text diet," consumed across one to three years. This collection, whether systematically organized or not, becomes a de facto curriculum. It is this text diet that shapes self-teaching. Texts may limit students in certain areas and advance them in others. For example, a series may build content knowledge with complex vocabulary (e.g., *chrysalis, butterfly*) but not support orthographic mapping or vice versa.

Text designs across weeks, months, and years should have some element of systematic design addressing development by organizing content with attention to the sequence of the content as well as its pacing and repetition.

Words: What Does Research Tell Us about Texts for Beginners?

One of the primary obstacles in becoming literate is word recognition. Thus, a great deal of research has examined text features that contribute to word recognition and support its acquisition. This section highlights word features that influence readers moving from those with the most compelling impact (e.g., decodabilty, word frequency) to those with less impact (e.g., imageability).

Word Decodability

Decodability refers to the degree to which a word in text is likely to be decoded or orthographically mapped by readers. Typically, researchers think about two questions to determine if words are decodable to a reader:

1. Does the word contain phoneme–grapheme relationships that the reader has been taught and patterns that match phonics lessons (Cheatham & Allor, 2012)?

   OR

2. Does the word have phoneme–grapheme relationships that are highly regular and consistent with one-to-one relationships (e.g., *tip, tug, best, bat*) (Saha et al., 2021; Menon & Hiebert, 2005; Vadasy & Sanders, 2009)?

Simpler words with more consistent patterns are easier to decode. When readers encounter words that are more decodable, that have simpler letter-sound correspondences (e.g., *trip* versus *trail*, *cat* versus *caught*) or more "transparent" spellings (i.e., one letter for each sound—*big* versus *eight*), they are more accurate in their word reading (Compton et al., 2004; Saha et al., 2021; Steacy et al., 2017; Vadasy & Sanders, 2009).

When readers receive systematic phonics instruction that is paired with decodable text, they tend to have improved word-reading accuracy and decoding (Cheatham & Allor, 2012; Juel & Roper-Schneider, 1985; Savage et al., 2018; Vadasy et al., 2005). It can be difficult to determine the precise contribution of text decodabilty because it often combines with other instructional variables, such as vowel flexing, mispronunciation correction (Savage et al., 2018), one-on-one tutoring (Jenkins et al., 2004), or a combination of different text types across classroom and intervention contexts (Jenkins et al., 2004; Pugh et al., 2023). Although there are policy requirements for early decodable texts to be 80% decodable, there simply is no magic number of the "correct" level of decodability.

Word Frequency

Word frequency denotes how often a reader might expect to see a word in printed English. Words that are very frequent include *the*, *it*, and *that*. Readers will see these words many times and will learn them more quickly than less frequent words such as *vex, dredge,* or *squall*. Word frequency influences readers more in deep orthographies and less in transparent ones (e.g., Finnish, Spanish). This makes sense if the system of coding is the same across words (e.g., *casa, papel, azul*) and you don't need to differentiate word-specific patterns—the system is consistent. But if the system has variation across words (e.g., *boat, hope, tow*), then you must acquire word-specific patterns to orthographically map words (Nation et al., 2007).

Word frequency consistently influences readers' abilities to accurately recognize words (Compton et al., 2004; Saha et al., 2021; Steacy et al., 2017). Readers are more accurate with the most frequent words than those that are not as frequent. For this reason, beginning reader materials prioritize the more frequent words early on (e.g., *the, a, of, it, is, you, to, at*). Imagine trying to write a sentence without *a, to*, or *the*. Readers must learn these words to access the syntax in even the simplest texts.

Many of the Most Frequent Words Are Not Content Words and Not Concrete

Many of the most frequent words in English are function words and not content words. Content words are those that carry the main meaning in a sentence. They are nouns (e.g., *nurse, chicken, map*), verbs (e.g., *told, dashed, verified*), adjectives (e.g., *blue, sad*), or adverbs (e.g., *quickly, happily*). Their purpose is to convey meaning.

Function words primarily serve grammatical purposes and make connections between content words. Function words are prepositions (e.g., *to, in, for*), conjunctions (e.g., *and, but*), pronouns (e.g., *he, they, she, me*), and helping verbs (e.g., *is, have*). Some say that function words are the "glue" of sentences because they hold things together.

Due to the nature of high-frequency words, they are hard for students to define or even picture in their minds. What mental image do you form when you see the word *to*? This means they are best understood within the context of sentences. High-frequency words should be introduced individually but also practiced repeatedly in sentences and texts.

Reading Recovery Levels Are **Not** Based on Word Decodability and Frequency

The Reading Recovery and Fountas and Pinnell text levels are based on a wide array of word and text variables (Fountas & Pinnell, 2002). Many wonder if these levels systematically increase based on word frequency or decodabilty. In other words, does a Level A book have words that are easier than a Level B book? Three studies tested this and consistently showed these levels do not have systematic attention to a) word decodabilty or b) word frequency (Cunningham et al., 2005; Hatcher, 2000; Hiebert & Tortorelli, 2022). Instead, the levels are differentiated by sentence length and word counts.

DECODABILITY OF WORDS *is not* **controlled for in Reading Recovery levels.**

For example, Level A books do not have words that are more decodable/easier than Level B books.

WORD FREQUENCY *is not* **controlled for in Reading Recovery levels.**

For example, Level C books do not have more high-frequency words than Level D books.

SENTENCE LENGTH AND COMPLEXITY *are* **controlled for in Reading Recovery levels.**

For example, Level D books have sentences that are shorter and less complex than Level E books.

THE NUMBER OF WORDS IN A BOOK *is* **controlled for in Reading Recovery levels.**

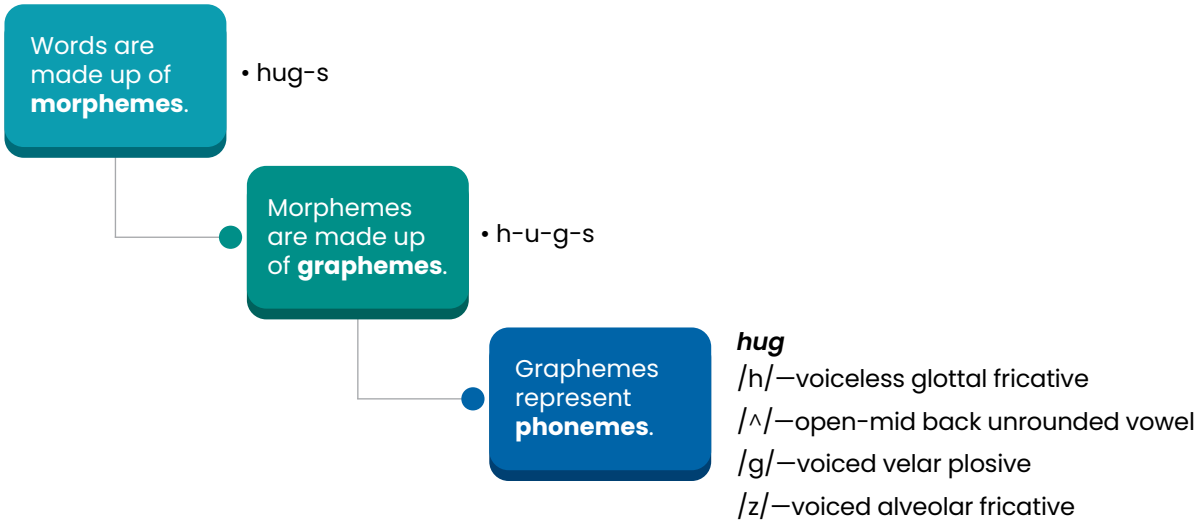
For example, Level E books have fewer words than Level F books.

(Cunningham et al., 2005; Hatcher, 2000; Hiebert & Tortorelli, 2022)

Words with Multiple Morphemes and Syllables

Phoneme–grapheme relationships are the first layer of English spelling, but there is a second layer—morphemes. Morphemes are the smallest units of sound that convey *meaning*. Morphemes can be entire words (i.e., free morphemes) such as nouns (e.g., *elephant, cotton*), verbs (e.g., *leap, jot*), adjectives (e.g., *purple, happy*), or adverbs (e.g., *sadly, loudly*). Morphemes can be word parts (i.e., bound morphemes) such as prefixes (e.g., *pre-, un-*), inflectional suffixes (e.g., *-ing, -ed, -s*), derivational suffixes (e.g., *-ize, -or, -ion*), and bound roots (e.g., *cred, vis*).

Note: Phonemes are simply speech sounds (e.g., */b/, /k/, /o/*). Except in the case of single-phoneme words, such as *I* and *a*, or the occasional single-phoneme morphemes, such as the */z/* in *bags*, single phonemes usually do not convey meaning.



Syllables are sound units usually made up of a vowel and consonants at the beginning or end. They are different from morphemes in that they do not always convey meaning. Think about a word like *elephant*. It has three syllables but only one meaningful unit. It is not like the part *ele* means a pachyderm and the part *phant* means "with a trunk." Syllables have vowels at their nucleus. A syllable can be just a vowel sound, such as the */ə/* sound in the middle of *el-e-phant*, or they can have consonants at the beginning and end, such as the syllable *phant*. Instructionally, students "look for vowels" in order to find the syllables in words.

Research tells us that students find reading polysyllabic and polymorphemic words more challenging than reading single-syllable words. In a study of oral reading fluency, students were most challenged by polysyllabic words (Compton et al., 2004). In another fluency study of Grade 1 students at different points in the year (Hiebert et al., 2020), Grade 1 students were most challenged by polysyllabic words.

It may seem unusual to be concerned about polysyllabic words as early as Grade 1, but a recent study comparing across different eras (e.g., 1962, 1983, 1993, 2000, 2007, 2013) showed increases in polysyllabic words (Fitzgerald et al., 2016). Specifically, in materials produced in 2007 and 2013, texts a) had more polysyllabic words, b) repeated words less frequently, and c) had more difficult words from a meaning perspective.

Grade 1 Reading Materials Have Many Polysyllabic and Polymorphemic Words

A recent study compared the words in three basal reading series at the Grades 1 and 3 levels (Houghton-Mifflin Harcourt, 2014; McGraw-Hill, 2014; Foresman, 2013; Kearns & Hiebert, 2022). In Grade 1, the words in materials included at least 48% with more than one syllable.

The majority of polysyllabic words had two syllables (i.e., 38%), 11.1% had three syllables, and the remaining percentage had more than three syllables. Thirteen percent of words had more than one morpheme, with most of these words having inflections (e.g., run*ning*, cat*s*, batt*ed*), with some compound words, and derived forms (e.g., bad*ly*, act*ion*). As found in the other studies, the levels of polysyllabic and polymorphemic words increased over the Grade 1 year.

Pacing and Repetition of Words in a Text Program

The most effective means of cognitively storing words is by mapping the sound-to-spelling relationships. However, if a reader cannot read a word automatically or does not possess the knowledge of the code to recognize it, then repeatedly seeing a word can help. Content that is repeated more often is more likely to be learned if knowledge of the code is absent.

Repetition of words in text is more important if the word is not very frequent and the reader is not likely to have seen it often or if the word is not decodable to them. Often, unusual names or important, content-specific words are repeated, especially if students have not yet been taught the information (e.g., *friends, help, clues, find*).

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Low Levels of Pacing and Repetition in Recent Years (i.e., 2007 and 2013)

A consistent finding across studies of Grade 1 materials has been the lack of pacing of new words or repetition of them (Fitzgerald et al., 2016; Foorman et al., 2004). Pacing is measured as the number of words that occur only one time.

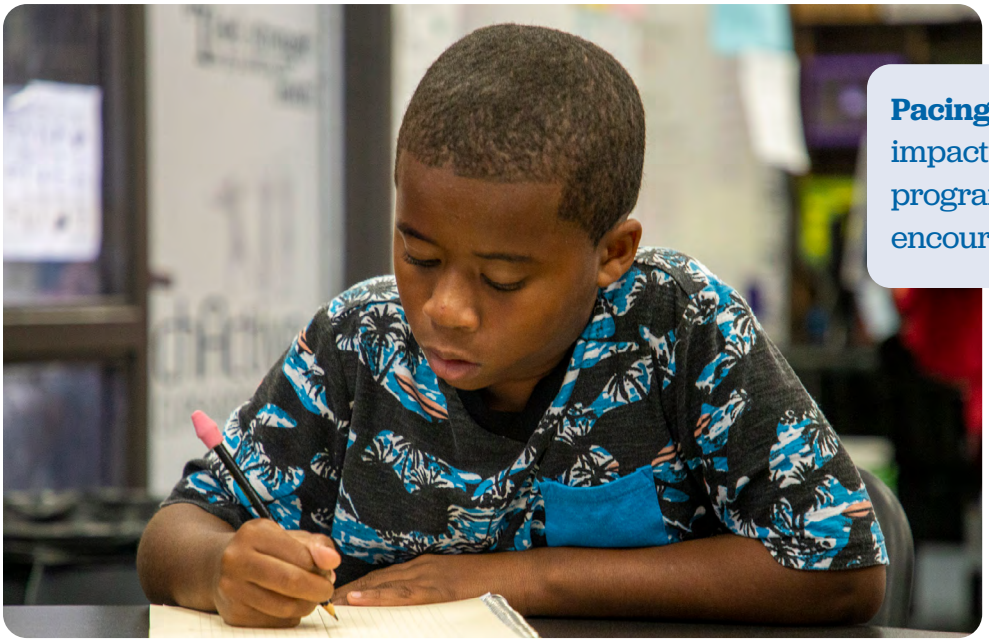
In a study of Grade 1 texts, 70% of non-decodable words appeared only one time (Foorman et al., 2004). In other words, students were often confronted with words they could not decode and would not see again. In this same study, new words were introduced at a very fast pace of 48–165 new words *per week*.

In another study, researchers analyzed Grade 1 text trends across different eras (e.g., 1962, 1983, 1993, 2000, 2007, 2013) (Fitzgerald et al., 2016). Based on two measures, the lowest levels of repetition were in 2007 and 2013 (i.e., phrasal diversity and text density).

Pacing refers to the rate of introducing new words in a text. Some call this cognitive load because it represents the amount of words a student must store and retrieve cognitively (Menon & Hiebert, 2005). Repetition is a basic learning principle that applies to foundational skills that depend on memory.

A 2010 study tested the influence of different reader accuracy levels (80%–90% versus 92%–100%) on the word recognition, decoding, vocabulary, and comprehension of students in Grades 2–4 experiencing reading difficulty (O'Connor et al., 2010). Both the group reading at 80%–90% accuracy and the one reading at 92%–100% had better reading rates, word recognition, and comprehension skills regardless of the accuracy levels. However, the easier texts had more overlapping or repeated words across passages, and students were rereading more previously seen words. The study suggested that, with an adult nearby, students can handle texts they originally read with as low as 80% word accuracy, but texts should have some repetition of words across passages.

Pacing and repetition are most impactful as features of a text program because they may encourage self-teaching. As explained by researchers, "Well-designed text programs may hold greater promise for self-teaching than ad hoc text diets because they can capitalize on longitudinal opportunities and distributed learning" (Mesmer et al., 2012).



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Text Cohesion: How Repetition Helps Not Only Word Recognition but Also Comprehension

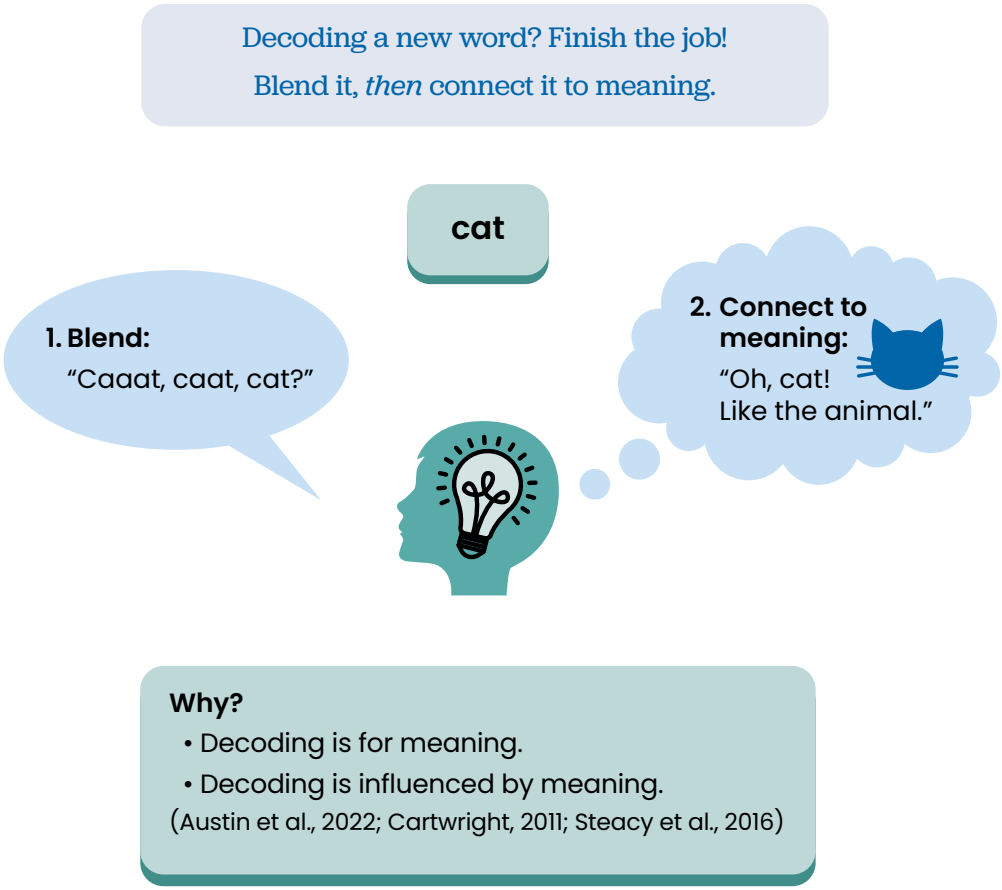
Text cohesion refers to the linguistic features that make the ideas in a text more or less connected. Text cohesion helps a paragraph or chapter "hang together" so a reader can retain the ideas. There are many ways that writers create cohesion. They may use pronouns to refer to subjects between sentences. They may also use connective devices such as conjunctions (e.g., *but, either, and*). Often, they will repeat words, especially new or challenging words, throughout a section of text. In the two examples of text below, note that the text with higher levels of cohesion introduces the main ideas *butterfly, eggs, caterpillar*, and *chrysalis* early and then repeats these words.

Note: The numbers in parentheses denote the number of times each word is repeated.

The text with less cohesion not only uses fewer connective devices but also has less repetition. The reader must make a series of text-based inferences to make sense of the content.

High cohesion	Low cohesion
The life cycle of a **butterfly** is an amazing journey in four stages: **egg**, **caterpillar**, **chrysalis**, and **butterfly**. First, the **butterfly** lays tiny **eggs** on a leaf. Soon, the **eggs (3)** hatch into **caterpillars**, which are small, hungry worms that eat lots of leaves to grow big and strong. When the **caterpillar** is ready, it forms a **chrysalis**, a special shell where it rests and transforms. Inside the **chrysalis (3)**, the **caterpillar (4)** changes completely into a beautiful **butterfly (4)**.	A **butterfly** starts as a tiny **egg** on a leaf. That **egg (2)** hatches, and out comes a **caterpillar (1)**. This little creature eats lots of leaves and grows bigger. It makes a **chrysalis (1)** around itself. Inside, it changes. After some time, a **butterfly (2)** comes out. The beautiful creature flies away to begin the cycle again.

Meaning Vocabulary



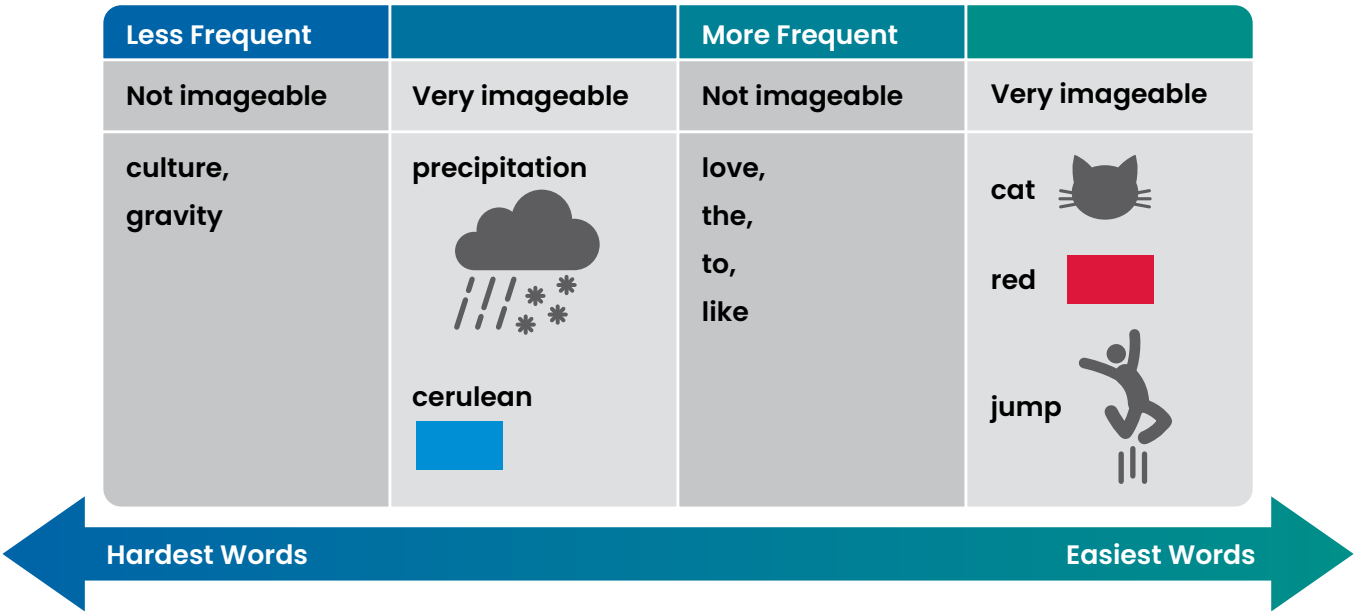
The final step of decoding a word is connecting that word to meaning. If students do not have decoded words in their receptive vocabularies, the word will not be retained in memory. As shown in the connectionist model, after a word is decoded or automatically accessed via spelling, it is cross-checked against known words. That is, the last step in decoding is to connect the oral pronunciation to a word that you know.

Teachers cannot assume that readers know the meanings of all the words in text they are asked to decode. First, as many as 20% of students speak a language other than English at home. Second, many words in texts, even decodable texts, are unfamiliar and infrequent (e.g., *jigs, nubs, lug*). In fact, a 2004 study examining the meaning difficulty of words in Grade 1, revealed that up to 80% of words were at the Grade 4 level (Foorman et al., 2004). Thus, if texts contain fewer familiar words, these words should be explained and illustrated before reading.

Imageability

Imageability refers to how well a word can evoke a mental image in the reader's mind. It has been described as the extent to which a word's meaning includes sensory and motor properties (Strain et al., 1995). For instance, words like *purple, skip,* and *manatee*, if familiar to the reader, are considered imageable. In contrast, words like *jealousy, hope*, and *to* are not imageable. The term *concrete* is often used instead of imageable because imageability assumes familiarity with the word. If someone does not know what a manatee is, they cannot form a mental image of it. The frequency of a word and its concreteness interact, making frequent, highly concrete words the easiest to read and infrequent, abstract words the hardest. The table on the next page illustrates this relationship.

Less imageable, less frequent words are harder.



Word concreteness, or imageability, affects how easily people can read and remember the meanings of words, but it interacts with the decodabilty and frequency of words. Young readers quickly learn more concrete words, especially if those words are also very frequent and regularly spelled (e.g., *cat* versus *enough*) (Hargis & Gickling, 1978). Concreteness appears to be a compensatory word feature that striving readers use when they do not possess the knowledge to decode a word (Siegelman et al., 2020; Steacy et al., 2020). In one study, researchers explained, "In the absence of typical word-recognition skills, poor readers tend to rely on other sources of information to learn words, which tend to be related to the semantic features of words" (Steacy et al., 2020). This pattern also holds true with experienced readers when they interact with words that are less frequent or have more complex letter-sound relationships (Raman & Baluch, 2001).

Summary

For beginning readers, word recognition is an obstacle that requires specially designed beginning reading materials. This is especially important in English because the system is a deep orthography with variation in spellings (e.g., *goat, hope, row, toe*) and, for this reason, it takes longer to learn. The text diet that beginning readers receive affects their development. Texts should be designed, both individually and at a programmatic level, to enhance learning and growth, with particular focus given to the features of words that are most closely associated with word recognition (e.g., decodability, word frequency, and polymorphemic words). At the programmatic level, the pacing and repetition of words has waned in recent years and could be given more attention. This means that vocabulary, the degree to which a word might be known to a learner, should also be given attention in design as it contributes to word recognition as well.

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