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How important is reading skill fluency for comprehension?

The findings of a major test of compensatory-encoding theory indicated that there is more than one way to comprehend well.

Dwain and Tammy are third graders of normal intelligence. Dwain can read aloud fluently most texts assigned to him by his teacher, Ms. Lopez (all names are pseudonyms). However, she often notices that he misses key points when asked to summarize the passage just read. Tammy, on the other hand, reads comparable passages slowly, pauses quite often, and regularly mispronounces words. Even so, when asked to summarize, she frequently surprises Ms. Lopez with what she noticed and remembers from the passage. Along these lines, a central goal of this article is to help clarify the relationship between word reading fluency and comprehension.

Word reading fluency is the ability to identify written words quickly and accurately (Perfetti, 1985, 1999; Stanovich, 1986). In recent years, there has been an emphasis by reading teachers and researchers on developing fluent word reading in struggling readers to improve their comprehension (Fuchs, Fuchs, Hosp, & Jenkins, 2001; Perfetti, 1999). In this article, the scientific rationale for this emphasis is reconsidered, and compensatory-encoding theory is presented to help clarify the relationship between reading fluency and comprehension.

Individual differences in reading skills

The scientific basis for the current emphasis on word reading fluency can be partially traced to au-tomaticity theory (AT; LaBerge & Samuels, 1974; Samuels & Flor, 1997) and verbal efficiency theory (VET; Perfetti, 1985, 1999). Both theories highlight the harmful effects of inefficient skills on comprehension and maintain that if word reading demands too much attention, little remains for higher level comprehension. According to both, beginning readers first concentrate on word reading and gradually shift attention to understand what they read (LaBerge & Samuels; Samuels & Flor; Perfetti, 1985). By this view, repeated practice makes word recognition automatic and frees attention for comprehension.

Consistent with AT and VET, several studies have shown that fluent word reading helps comprehension (e.g., Bell & Perfetti, 1994; Fuchs et al., 2001). Even so, 10 to 15% of children have comprehension difficulties that are not due to poor word reading (Yuill & Oakhill, 1991), and many of them have deficits in spoken language processing (Nation & Snowling, 1997; Stothard & Hulme, 1995).

Gough and Tunmer (1986) and Hoover and Gough (1990) proposed that reading consists of word recognition, with listening comprehension added on. In support of that theory, word reading fluency and listening comprehension are largely independent (Oakhill, Cain, & Bryant, 2003; Storch & Whitehurst, 2002). For instance, in early elementary school, visual and auditory analysis (e.g., phonemic awareness) determine the speed and accuracy of word reading (Pazzaglia, Cornoldi, & Tressoldi, 1993). Even so, older children can comprehend well, even when word or pseudoword reading skills are poor (Shankweiler et al., 1995; Thompson & Johnston, 2000). Adults, too, can overcome poor word reading. For instance, college students diagnosed with dyslexia in childhood or with persistent problems in phonological process-

ing, spelling, or rapid word reading, often comprehend adequately (Bruck, 1998; Jackson & Doellinger, 2002).

As noted above, comprehension problems can arise due to deficits in understanding spoken language. For instance, some struggling readers have difficulty acting out sentences others have read to them (Crain, Shankweiler, Macaruso, & Bar-Shalom, 1990). They frequently have small listening verbal working memory capacities (information in consciousness) and quickly forget to whom *he* refers or the meaning of a sentence heard a minute before (Perfetti, 1985; Walczyk, Marsiglia, Johns, & Bryan, 2004). Grammatical complexity is often a source of confusion, including temporal terms (e.g., *before*) or relative clauses in sentences (Shankweiler et al., 1995). Even when texts challenge listening comprehension skills, however, readers can compensate.

Compensatory-encoding theory

Though reading and listening are certainly related, a fundamental difference between them is often overlooked. When listening to teachers or parents, children typically have little control over how quickly and in what order verbal information enters their minds compared to reading (Walczyk, 2000). This fact is crucial for understanding compensatory-encoding theory (C-ET), which explains how readers with weak skills can comprehend well by adjusting reading. Specifically, the theory describes how poor word readers, those who quickly forget sentence meanings or with other weak skills, prevent reading problems and overcome those that occur. Thus, it complements AT and VET by identifying how weak readers can understand well.

How readers can overcome weak skills

Struggling readers often experience significant improvements in comprehension when taught reading strategies (Shearer, Ruddell, & Vogt, 2001; Vogt & Nagano, 2003). C-ET identifies actions, some used spontaneously and others learned, which can overcome weak skills. They include strategies that are components of Reading Recovery (Clay, 1979) and other successful interventions for helping struggling readers. C-ET adds to this literature by mapping compensatory actions onto the problems, by describing when and how they work, and by other ways discussed later.

All readers have occasions that challenge their skills. These cases create "confusions": instances of reader uncertainty over the meaning of a word, a phrase, or another part of text. A confusion can result from poor word reading, an unfamiliar word, a small verbal working memory capacity, or other sources. For example, readers may forget to whom the pronoun *she* refers in a narrative.

To overcome confusion, readers can employ "compensations": reader actions that help automatic reading to succeed or that provide information to working memory by an alternative means when automatic reading fails. In other words, readers can take actions to help their skills succeed (e.g., slowing reading rate, pausing, reading aloud) or can take other actions (e.g., sounding out, rereading) when automatic processes cannot provide readers with the information needed to understand text.

Common compensations and sources of confusion

The following are the most frequently used compensations, which are described and ranked by how disruptive they are of reading. The compensations that appear at the end of the list take longer to perform. As a general rule, readers will use the least disruptive compensations first. If they fail to prevent or resolve confusion, later ones serve as backups.

1. Slowing reading rate. As readers become more skilled, their control over reading rate increases (Baker & Brown, 1984; Chall, 1996). Moreover, readers become more aware of cues to text difficulty, signaling the need to read slowly (Kucan & Beck, 1997). Slowing reading helps to prevent many confusions by allowing inefficient readers to read text at a pace that their skills can handle, whereas faster reading might overwhelm skills (Baker & Brown; Chall; Walczyk, Wei, Griffith-Ross, Goubert, Cooper, & Zha, 2006).

2. Pause. Less skilled readers pause longer and more often than do skilled readers (Haviland & Clark, 1974; Perfetti, 1985, 1999; Walczyk, Marsiglia, Bryan, & Naquin, 2001; Walczyk et al., 2004). A pause is compensatory if it is an uncom-

monly long delay during reading that allows an inefficient reading subcomponent (e.g., reading a word by sight) sufficient time to succeed. When slowing reading does not allow enough time, pausing may be its backup. Furthermore, when the source of confusion is unclear, pausing can occur as readers try to understand its nature and select other compensations for resolving it (Pressley & Afflerbach, 1995; Walczyk et al., 2006).

3. Look back. Looking back occurs when readers briefly glance to text previously read. Walczyk et al. (2001) defined it as the reprocessing of three words or less, which is slightly more disruptive of word reading than slowing reading rate or pausing (Cataldo & Oakhill, 2000). Looking back is compensatory when it resolves confusion by restoring information forgotten from working memory or by providing information overlooked on the first pass through text (e.g., what *it* refers to). It can aid poor word reading by uncovering textual cues to an unfamiliar word's meaning (Ehri, 1994). With pausing and reading aloud, it can help overcome confusions due to difficult words, small verbal working memories, unfamiliar concepts, verbosity, or abstractly written text (Kucan & Beck, 1997; Pressley & Afflerbach, 1995).

4. Read aloud. Reading aloud often occurs spontaneously to difficult text or noisy reading environments (Chall, 1996), suggesting that it is compensatory. Researchers have noted marked improvement in comprehension when reading is done aloud. For instance, Miller and Smith (1985) tested 94 second through fifth graders and found that the 33 poorest readers comprehended best when they read aloud. Reading aloud helps focus attention when readers are tired or bored (see Pressley & Afflerbach, 1995) and facilitates comprehension monitoring (Bereiter & Bird, 1985; Ericsson, 1988). It also helps automatic reading to succeed by drowning out distractions. It is especially helpful for less fluent readers, providing auditory feedback on the accuracy of their word reading attempts (Ehri, 1994; Walker, 2005). Reading aloud provides less fluent readers with more opportunities to learn about words and assists those more fluent to read with prosody (National Institute of Child Health and Human Development, 2000).

5. Sounding out, analogizing to known sight words, or contextual guessing. Ehri (1994) described four ways children read words. When skills are fluent or words are familiar, (1) reading by sight is possible. Words frequently encountered (e.g., *car*) are eventually recognized as whole units that activate sounds and meanings quickly from memory. This is automatic word reading. The remaining three are compensatory: backups when automatic word reading fails. (2) Phonological recoding (sounding out) is using the rules of phonics to match a letter string to a spoken word in memory. (3) Analogizing to known sight words occurs when readers look at a word's spelling and bring to mind similarly spelled words to cue its meaning. (4) Contextual guessing is using surrounding text to infer an unknown word's meaning.

6. Jump over. Another way of dealing with word reading confusion can be added to the three mentioned previously. If readers conclude that an unfamiliar word or other confusion involves a minor detail, or that resolving it will take too much time, they can jump over it. For example, if the meaning of an unfamiliar word seems tangential to understanding the overall text, choosing to overlook it makes sense. Older readers know that spending too much time resolving such confusion can cause them to forget important information previously read, making it harder to form connections (Walczyk et al., 2006). Of course, jumping over too often will lower comprehension.

7. Reread text. Rereading is compensatory when it resolves confusion noted on an earlier pass through text but is more disruptive of reading than the preceding compensations. As a consequence, skilled readers will employ it only after other compensations have not prevented or resolved confusion. Walczyk et al. (2004) defined it as the reprocessing of four or more words. With each rereading, readers become more familiar with words, phrases, and their meanings and can focus more attention on comprehension (Perfetti, 1985; Samuels & Flor, 1997). Rereading can resolve confusion due to poor reading skills, as well as to choppy, verbose, or abstract text (Pressley & Afflerbach, 1995; Walczyk & Taylor, 1996; Walczyk et al., 2001, 2004). Other compensations exist (e.g., using a dictionary) but are beyond the scope of this article.

When and how less fluent skills lower comprehension

According to C-ET, readers with poor word reading, small verbal working memory capacities, or poor listening comprehension can comprehend well, as long as they are motivated to understand and free to compensate. On the other hand, restriction on reading discourages or stops children from compensating, which is any aspect of the classroom or task that keeps children from compensating when needed. Restriction is not all or nothing. Some tasks are more restrictive than others. Restriction includes (a) having to read under time pressure (as occurs in most standardized testing), which discourages all compensation use; (b) having to read at a fast or constant rate, which prevents readers from slowing reading rate, pausing, or rereading; and (c) mandatory silent reading, which is common in the classroom (Nagy, Campenni, & Shaw, 2000) and prevents children from receiving auditory feedback on attempts at word reading, which might otherwise activate relevant information from memory (Bereiter & Bird, 1985; Ehri, 1994; Ericsson, 1988; Walker, 2005; Walczyk et al., 2006). In contrast, less restricted reading includes (a) reading without time constraints, which allows students to use all compensations without anxiety over deadlines (Calvo & Carreiras, 1993); (b) reading at a normal, variable rate, which allows students to pause and reprocess difficult portions of text; and (c) freedom to read aloud. As noted previously, reading aloud helps readers to overcome distractions, facilitates comprehension monitoring, and increases auditory feedback (Bereiter & Bird; Chall, 1996; Ehri; Ericsson; Pressley & Afflerbach, 1995; Walker).

Summary of a major recent test of C-ET

A large-scale test of C-ET, funded by the National Science Foundation, was recently concluded. The design and procedures are now summarized. Table 1 describes the children tested (third, fifth, and seventh graders), the reading fluency measures and passages used, the comprehension tests constructed, and the reading tasks. Additional clarification is presented in the following sections. The findings and those of related research are discussed. Three research questions guided the study: (a) How strongly does comprehension depend on reading skill fluency? (b) How is the fluency–comprehension relationship influenced by development and motivation? (c) How is the relationship influenced by restriction?

The skill fluency-comprehension relationship when reading is unrestricted

Instructions for the unrestricted reading task, which everyone received, encouraged children to take whatever action they needed to understand texts. To assess motivation, readers were asked after each task how interesting they found the texts. Among the important findings, reading fluency measures were weakly related to comprehension across grades. Moreover, reading fluency measures were generally negatively related with compensation use. In other words, within each grade, readers with less fluent skills compensated more often (e.g., slowed reading rate, paused, looked back, reread). More fluent readers compensated less. Similar results have been reported (Walczyk & Taylor, 1996; Walczyk et al., 2001, 2004). However, an interesting developmental trend occurred: fifth and seventh graders were likely to jump over minor words spontaneously. Third graders spent too much time trying to sound them out and often had to be prompted by the experimenter to continue reading. Moreover, analysis of seventh-grade data showed that fluent readers tended to compensate infrequently and comprehend well. Less fluent seventh graders who found the texts interesting tended to compensate frequently and comprehended well. Less fluent readers who did not find the texts interesting tended to compensate infrequently and comprehended poorly. Thus, there are at least two pathways to good comprehension: (a) Fluent skills, infrequent compensation or (b) nonfluent skills, high motivation, frequent compensation, which are all consistent with C-ET.

These findings demonstrate, in the case of challenging texts, that the willingness to compensate depends on children's motivation to understand. Less skilled readers low in motivation, or who do not believe in their ability to understand well, will likely compensate infrequently and comprehend poorly (Butkowsky & Willows, 1980; Johnston & Winograd, 1985). According to C-ET,

TABLE 1
Summary of the NSF Research

Sample: Seventy-one third-graders were tested: 38 males and 33 females; 46 Caucasians and 25 African Americans. Sixty-eight fifth graders were tested: 35 males and 33 females; 47 Caucasians, 19 African Americans, and 2 Native Americans. Seventy-two seventh graders participated: 39 males and 33 females; 53 Caucasians, 17 African Americans, and 2 Latino Americans. Approximately half of the students at each grade were enrolled in a university laboratory school in Ruston, Louisiana, which is suburban school of approximately 264 students, grades K–8. The other half were enrolled in a rural school in northern Louisiana of 603 students, grades K–12. Standardized test score results revealed that the school performed 13% below the state average in English language arts in 2003. Students at the laboratory school scored 35% above the state average. Clearly, the skill level of participants was quite diverse, though no one had a reading disability.

Computerized or group reading fluency tasks taken by all children.

Word reading: How quickly and accurately children read words flashed on a computer screen.

Word meanings: How quickly and accurately children decided if two nouns (e.g., *food, sports*) belonged to the same category.

Sentence comprehension: How quickly and accurately children decided which of two words best completed a sentence.

Working memory: How accurately verbal information was retained in working memory.

Motivation: Students' self-reports.

Comprehension tests: Multiple-choice tests followed each passage, 8 to 11 items in length. Items were a mixture of literal and inferential.

Reading tasks: Four reading tasks were individually administered. Tasks 2 through 4 in the following section were true experiments. For each task, practice passages and two challenging test passages (expository and narrative) were used, each about 300 words.

1. Unrestricted reading: For this task, all children at each grade were recorded reading aloud the passages. How often and how they compensated was coded later.

2. Time pressure/no time pressure: Half of the students at each grade were randomly assigned to read under time pressure, the other half under no time pressure. All passages were read aloud.

3. Constant/variable rate: Half of the students at each grade were randomly assigned to read at a constant rate, but were not permitted to a slow reading rate, look back in text, or otherwise compensate. The other half could compensate freely. All passages were read aloud.

4. Read silently/aloud: Half of the students at each grade were randomly assigned to read silently at all times; the other half were asked to read aloud.

older and more fluent readers generally will require interesting texts or challenging tasks to stay engaged because, for them, reading often is routine (Chall, 1996). As will be seen in the following sections, interesting or challenging tasks can increase readers' motivation to understand.

Effects of restriction: Time pressure

The time pressure imposed in this study was moderate, allowing readers 66% of the average time needed by typical readers of their age to complete test passages. Across grade levels, the comprehension of time-pressured readers was significantly lower than that of non–time-pressured readers. For third and fifth graders reading under time pressure, the relationship between reading fluency and comprehension was strongly positive. Those more fluent comprehended significantly better. Under no time pressure, the relationships were much weaker, indicating that readers with weak skills compensated. For seventh graders, the situation was reversed. Stronger positive relationships between skill fluency

and comprehension were observed under no time pressure, partly because the skills of older readers are quite robust in overcoming restriction (Chall, 1996; Perfetti, 1985). Rather than overwhelming their skills, time pressure likely increased seventh graders' reading engagement (mostly those with the weakest skills, such that comprehension was weakly related to skill level). This phenomenon has been observed in adults (Walczyk, Kelly, Meche, & Braud, 1999). Under no time pressure, seventh graders generally were poorly engaged (likely because the task resembled routine reading), and compensation use was infrequent for all. As a consequence, more fluent readers comprehended better.

Effects of restriction: Constant/ variable rate

This task was not as restrictive as time pressure and did not prevent all compensation use. Rather, it prevented readers from pausing, looking back, and rereading. However, children generally adopted a reading rate they could handle. Reading at a constant rate significantly lowered comprehension for third and fifth graders but not for seventh graders, whose skills were most robust. The relationship between skill fluency and comprehension was positive for third graders who read at a constant rate and was weaker when reading rate was variable, indicating that when readers could compensate (variable rate reading), they did, and comprehension depended less on skill fluency. For the fifth graders, the skill fluency–comprehension relationship was equally positive whether reading rate was constant or variable. For seventh graders, stronger positive skill fluency–comprehension relationships were observed when reading was variable than when it was constant. As before, because a constant reading rate was a novel challenge, it engaged all seventh graders, but especially the least fluent. The variable rate, resembling routine reading, generally resulted in minimal text engagement and compensation use. As a consequence, more fluent readers had superior comprehension. Fifth graders appeared to be in transition between the third and seventh graders.

Effects of restriction: Read silently/aloud

Reading silently is more restrictive than reading aloud. For third graders, reading aloud produced significantly higher comprehension—evidence that it was compensatory. No comprehension differences were found, however, for fifth or seventh graders, likely because their texts were not sufficiently difficult. It was ironic that, for both third and seventh graders, an identical pattern of relationships was found between reading skill fluency and comprehension. It was strongly positive when reading silently and near zero when reading aloud, as predicted. Reading aloud thus helped less fluent readers and skilled readers to comprehend—not so when reading silently. For fifth graders, this relationship was equally positive whether reading silently or aloud. Again, fifth graders may be in transition. For them, reading silently is not well practiced and may engage them cognitively as much as reading aloud. By seventh grade, reading silently has become routine.

Instructional implications

This presentation of C-ET suggests ways of helping two groups of poor comprehenders to understand better: (a) those whose reading fluency is low, but without reading disabilities, and (b) fluent readers who understand beneath their potential (word callers). The article concludes with instructional recommendations for both.

Helping nonfluent word readers to comprehend better

This study, along with those cited previously, demonstrated that low-fluency readers can comprehend better in relaxed, unrestricted environments that encourage and permit them to compensate freely. However, struggling readers often have negative attitudes toward reading. Lack of success, in many cases, creates a sense of learned helplessness. Such readers often attribute poor comprehension to low ability and ascribe success to easy text. This attribution style discourages task analysis, effort, and perseverance when confusion arises (Butkowsky & Willows, 1980; Johnston & Winograd, 1985). Such readers also tend to be anxious in competitive and restrictive tasks, which undermines their integration of sentences and their elaboration of content (Calvo & Carrieras, 1993). Although many academic tasks, such as standardized testing, require students to

read under restriction, by setting aside a little time each week for unrestricted reading teachers may help students to enjoy reading more by creating opportunities for success. More positive experiences with reading, in turn, should encourage students to read more on their own and increase their fluency (Charlesworth, Fleege, & Weitman, 1994; Fleege, Charlesworth, Burts, & Hart, 1992). Although independent reading often occurs silently, students should be encouraged by teachers to read aloud when needed, especially when text is difficult.

Struggling readers only need to compensate when confusions occur or are imminent (e.g., when reading a difficult text). They must, therefore, be taught to recognize such occasions. Struggling readers who do not compensate appropriately can be taught to do so. First they must understand how and why to slow reading rate, pause, look back, and use the other compensations discussed previously. Without direct metacognitive training, struggling readers are unlikely to compensate on their own (Miranda & Villaescusa, 1997). Readers can be taught the advantages of pausing briefly at phrase or sentence markers (e.g., a period, comma, or question mark) to integrate textual information. They can further be taught the importance of reading aloud when text is difficult and be exposed to modeled examples of common sources of confusion successfully resolved (e.g., forgetting to whom *they* refers, resolvable by looking back). As readers practice compensating, teachers or more able peers can provide scaffolding. After applying the compensations, students can discuss which ones worked best for them with their peers and explain to them how they applied such strategies. In this manner, students can learn from others who are experiencing similar problems and can discuss them on a level they understand. Knowing that they are not the only students who have difficulties can improve students' self-esteem, which, in turn, can motivate them to work harder to understand text (Winstead, 2004).

Word calling

In the anecdote that began this article, Dwain's oral reading was fluent, but his comprehension was low. In the reading literature, such occurrences have been labeled *word calling*. Stanovich (1986) proposed this definition: "when the words in the text are

efficiently decoded into their spoken forms without comprehension of the passage taking place" (p. 372) and suggested that it may involve the fluent reading of words whose meanings are not in children's listening vocabularies. Although this certainly accounts for some instances, C-ET identifies another possibility. Some word callers may read words so fluently that they are not cognitively engaged by the text. In other words, their effortless word reading allows their minds to wander. To understand text well, children must focus on meaning, relate content to relevant information from memory, and monitor comprehension (Oakhill, 1993; Oakhill et al., 2003). Fluent word reading, then, may not be sufficient, or even necessary, to comprehend well. Based on the data presented in this article, having to struggle a little with word reading helps students to stay engaged (see Salomon & Globerson, 1987). More fluent word readers are engaged by challenging and interesting tasks (Walczyk et al., 2006); otherwise they may read lackadaisically. For older readers (fifth graders and up), slight restriction on reading (e.g., mild time pressure or other challenges) can increase their cognitive engagement and comprehension (Duffy, Shinjo, & Myers, 1990; Salomon & Sieber-Suppes, 1970).

Helping word callers to comprehend better

Because more fluent readers may require more challenging and interesting tasks to engage them, classroom activities that help them to comprehend at their best differ from those of struggling readers. Acknowledging that teachers do their best to choose texts and tasks to maximize reader engagement, here are a few research-based suggestions, ranging from directing students to read with unusual purposes to presenting them with game-like challenges (Salomon & Globerson, 1987; Walczyk et al., 1999). Benware and Deci (1984) directed students to learn materials with the intention of explaining it to others at a later time. Wittrock (1986) encouraged students to create mental images of passage content and associate it to their existing knowledge. Both approaches led to better learning. Globerson, Weinstein, and Sharabany (1985) found that when learners were focused on the activity of learning (e.g., through metacognitive training), their engagement and comprehension were enhanced. Reading in cooperative learning groups

can also increase cognitive engagement. When students work jointly, they communicate information, discuss their views, and are exposed to alternative interpretations (Baker & Brown, 1984; Salomon & Globerson, 1987). Finally, granting students some choice of texts or tasks can increase engagement as well (Shearer et al., 2001).

Final thoughts

This article presented compensatory-encoding theory by which nonfluent reading skills do not always lower comprehension. The findings of a major test of C-ET indicated that there is more than one way to comprehend well. Less fluent readers must understand how and why to compensate, be motivated, and unrestricted. Furthermore, older, more fluent readers can benefit by reading under slight restriction or by other engaging tasks or texts. Routine reading tasks allow their minds to wander. In light of differences between these two groups, instructional implications were discussed based on the distinct needs of each to maximize comprehension. We hope that this article helps reading teachers to understand the diverse pathways readers can take to good comprehension and helps clarify the relationship between reading fluency and comprehension.

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