2018

The Response Strategies of Proficient Readers When Correcting and Attempting to Correct Miscues on a Complex Scientific Text

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Abstract

This study examines the strategies proficient fourth grade readers employ when responding to their miscues. Thirty-four students orally read a complex expository scientific text. Reader response strategies to their miscues were identified. Response strategies were either graphic or contextual in nature. As measured by Chi-squares, readers varied their use of strategies. This variation was statistically significant for both correction and attempt to correct strategies. For both, the primary focus was on the word level. Existing research documents that as text complexity increases, readers have a tendency to rely on sounding out as a default strategy. As readers progress across the grades, teachers will therefore need to prompt the use more than graphic strategies when readers respond to their miscues.

Keywords: monitoring, correction strategies, cue use

The study examines the strategies proficient readers employ when responding to their miscues on a scientific text. In the primary grades, the monitoring of, and responding to, student oral reading miscues by the teacher is a common practice (Compton-Lilly, 2005; Rasinski & Hoffman, 2003). In effect, the teacher becomes "monitor in chief." Such monitoring frequently occurs in round robin reading groups which are a mainstay of early literacy instruction (Rasinski & Hoffman, 2003). As students reach the intermediate grades, however, these practices become less frequent, at least with proficient readers. There appears to be the assumption that older, more proficient readers can independently apply those strategies necessary for the construction of meaning from print.

A significant impact of the Common Core State Standards (National Governors Association Center for Best Practices, Council of Chief State School Officers, 2010) is the increased use of expository, disciplinary texts in elementary classrooms. This is especially the case with the use of scientific texts, given the implementation of the Next Generation Science Standards (Lead States, 2013) and the national focus on STEM education. Students are expected to determine what a text explicitly says and to cite evidence to support their conclusions and judge the reliability of the text. Of course, these expectations are based on the premise that students have developed the ability to correct those miscues that they deem necessary of correcting. This research investigates this premise through the following questions using a scientific expository text with older, more proficient readers:

(1) What strategies do readers employ when correcting or attempting to correct their miscues?

(2) Do the strategies employed vary for miscues that were and were not successfully corrected?

Theoretical and research framework

The critical role of monitoring for meaning and correcting when disruptions occur has been well

documented in the reading research since at least the 1960s (e.g., Clay, 1969; & Goodman, 1967, 1968, 1969. Goodman (1976) and Martlellock (1976), in particular, built a taxonomy of the reading process in which the correction of miscues plays a prominent role. A reader's correction is an acknowledgement that the reader believes that something has gone awry. When the readers did attempt to correct, the vast majority of their attempts were found to be successful. The taxonomy did not specify what strategies are available or utilized when readers respond to their miscues. All attempts to correct, however, involved the repetition of previously read material.

Clay (1969, 1991) also documented the critical role that the recognition of miscues plays in the development of proficient reading. She argued that proficiency involves the reader's recognition that something is amiss when miscues occur. This recognition led to the development and employment of various repair strategies for the correction of miscues. Even 5-year-old beginning readers were aware of their miscues, attempted to correct them, and were frequently successful. Reading development involved the ability of the readers to coordinate visual as well as contextual cues. The interrelationships between these two sources of information "provided a detailed background to the error when it occurred" (Clay, 1969, p. 54) and served as the basis for attempts to correct.

Monitoring and correcting behaviors have been further investigated by subsequent psycholinguistic research (e.g., Flurkey & Xu, 2003; Goodman, 1996; Goodman & Goodman, 2013). Theoreticians employing what might be termed a cognitive perspective have also examined the essential role these two behaviors play in the reading process (e.g., Kintsch, 1998; Rumelhart, 2013; Smith, 2012). Further research into the response of readers to their miscues has documented additional strategies that readers might use (Author, 1995, 2013, 2014). When correcting or attempting to correct, the proficient reader draws from a tool box of strategies. Beyond the already noted use of reading past the miscue and returning or rereading what came before the miscue, readers also read on to determine if the miscue was worth correcting, sounded out, substituted another word for the miscue, and used various text features such as pictures to support their correction of miscues.

As is clear, monitoring and correcting behaviors have long been acknowledged as critical to the reading process and its development. However, there is little research closely examining the profiles of specific processing behaviors that readers utilize when correcting or attempting to correct. Rather, the research on reader response to their miscues has largely focused on (1) whether or not miscues are corrected, (2) the kinds of miscues corrected, (3) the differences in correction rates between proficient and struggling readers, (4) the impact of delayed versus immediate teacher response on reader correction, and (5) the impact of text complexity on correction rates (e.g., Chinn, et al., 1993; Hoffman & Clements, 1984; McNaughton & Glynn, 1981; Schmitt, 2001; Share, 1990). Finally, most of reader miscue response research has been conducted with younger, developing readers. Few studies with intermediate, more proficient students are available.

The current study

This study investigates the strategies that proficient fourth grade readers employ to correct, or attempt to correct, their miscues on a complex scientific text.

Method

The Readers

Thirty-five fourth grade readers (nine and ten years of age) participated in this research. Sixteen were boys and nineteen were girls. The readers, monolingual in English, came from the five fourth grade classrooms that were part of a middle class elementary school in the Pacific Northwest. The parents of the readers were predominantly college educated and had agreed to allow their children to take part in the study. According to the Developmental Reading Assessment 2 (Beaver & Carter, 2011), the instrument used by the school to determine reading ability for instructional purposes, most of the participants were reading at least one year above grade level, with an average reading level of

5.2 and a range of 4.0 – 6.0. The teachers of the students also confirmed that they were proficient readers and had no known processing difficulties.

The Complex Scientific Text

The first three sections or subtopics of the science text, Lands of Rock (Evans, 2003), were used to collect reading behaviors. The book was associated with a fourth grade hands-on science program on rocks and minerals, but had not been used the year in which the data were collected. Multiple copies of the book were stored in a supply room to which the students did not have access. The publisher, Rigby, identified the book at a 4.0 reading level and the staff developer and teachers at the school indicated that it would be an appropriate text level for the students in the study.

Lands of Rock (Evans, 2003) is a 32-page expository trade book that is divided into ten subtopics. The subtopics used for the study were: *Riddles in Rock, Nature's Design, and Canyon Country*. Table 1 represents the major ideas as explicitly expressed in the text for the three subtopics. Each page of the book included at least one color photograph related to the issue being addressed on that page. These photographs were also accompanied by a short text describing what was being shown.

Table 1

Conceptual Text Complexities

A. Riddles in Rock

- Clues to the past and the future lie hidden in the shapes and textures of rock.
- Rocky places tell stories of ancient seas, ancient forests, and the power of fire, wind, and water to change the land over time.
- Fossils show signs of plants that grew and animals that roamed long ago.
- Rocky places hold a promise of adventure, discovery, danger, survival, new heights to conquer, and underground worlds to explore.
- Prehistoric people often used rock faces as drawing boards.

B. Nature's Design

- Fire and water are the Earth's master architects.
- Fiery forces have caused mountains to rise and fall, crevasses to open, and slabs of rock to push up.
- Rivers carve gorges, caves, and canyons.
- Wind, water, and ice erode rock to form arches, pillars, mesas, and giant solitary rocks called monoliths.
- By studying rocky places, geologists work to understand Earth's history and changes to come.
- Uluru, the Earth's biggest monolith, has special meaning to Aboriginal people.

C. Canyon Country

- Many rocky places are national parklands and protected wilderness areas.
- Canyon country forms the largest group of national parks and monuments in the world.
- Trickster Coyote invited animals to live in a cliff city and when they refused he turned them to stone.
- Time has turned tree trunks into stone fossils.
- In canyon country, there is the Painted Desert, the Petrified Forest, and the Grand Canyon.

One page, in addition to a photograph, contained a color map illustrating the location of national parklands or protected wilderness areas being addressed in the text. Based on having used the text the previous year, the teachers noted that, typically, most students have little prior knowledge of, or experiences with, the content in *Lands of Rock*.

Table 2

Linguistic Text Complexities

Text Feature	Count
Subtopics/Sections	3
Pages	6
Sentences	27
Words per Sentence	20.44
Clauses	75
Words per Clause	7.36
Clauses per Sentence	2.8
Words	552
Pictures/Illustrations	9

As illustrated in Table 2, there were 75 clauses and nine photographs or illustrations. The sentences, with an average of 20 words and 2.8 clauses each, were quite lengthy given the factual nature of the information being conveyed. The frequent use of embeddings contributed to information density as well as linguistic complexity. The embeddings interrupted the flow of the sentence with additional information that was conceptually unknown. The reader needed to integrate this new information with meanings that had preceded or were to come within the sentence.

Procedures

Data collection

The oral readings were conducted during one-on-one sessions with the researcher, a single student, and a single text. Before reading, students were informed that they would be reading a text aloud and were to read for meaning or understanding. No assistance would be provided when unknown words or ideas were encountered. Rather, students were told to do their best and to continue reading.

Each reading was audiotaped and lasted no longer than fifteen minutes. In total, the students read 2625 clauses.

Data analysis

All data were initially analyzed by one researcher and then examined by a second. Differences between

researchers were resolved during regular and ongoing data analysis meetings.

Reading behaviors were evaluated using a modified form of miscue analysis (Goodman, Watson, & Burke, 2005; Wilde, 2000). Miscue analysis evaluates the degree to which readers utilize the various systems of language—e.g., graphophonemics, syntax, semantics—when transacting with written discourse. All miscues were marked and numbered. Markings include substitutions, omissions, insertions, pauses, corrections, attempts to correct, abandonment of correct responses, and repetitions. The goal of the marking is to capture the reader's on-line processing of the discourse as fully as possible. In total, the thirty-five students generated 1039 miscues.

Following the identification of all miscues, the marked texts were separated into clauses for further analysis. The clause was used as the unit of analysis because there is some research to suggest that it is the basic linguistic unit for processing (Gee, 2014; Hayes & Nash, 1996). Following Gee, a clause was defined as any verb and the elements that 'cluster' with it or that are constituents of the verb. For example, the first sentence in Lands of Rock (Evans, 2003) contains two clauses, marked by a /: Earth's rocky places are much more than just bare stone / lying hot and still under the sun. Because many of the sentences read often contained multiple verbs, the use of the clause allowed for a more discrete analysis of reading behaviors.

On the clause level, the strategy response of the readers to their miscues in terms of correction or attempts to correct was explored. Based on an inductive examination of the responses, strategies were grouped by kind—word or contextual. At the conclusion of the analysis, for each student there was a count of each response strategy employed for correction and attempts to correct. Chi-square was the statistical procedure used to measure the significance of the association among the strategies used both when correcting and attempting to correct.

Results

Readers were able to correct the vast majority of their miscues when they chose to do so. This finding is similar to those of Goodman (1968, 1969) previously discussed. They successfully corrected 75% of their miscues and attempted to correct, although unsuccessfully, 25%. As indicated in Table 3, readers employed two different kinds of response strategies. The word strategy involved the reader sounding out the miscued word as the response. For example, the clause, *To an explorer, rocky places hold a promise of adventure, discovery, danger, and survival*, was read as, *To an explorer, rocky places hold a promise to of adventure, discovery, danger, and survival*. The reader reprocessed graphic information (letters and sounds) to correct. Contextual strategies involved the reader moving beyond the word level. In rereading or backtracking, the reader stopped reading immediately after the miscue, regressed, and reprocessed a portion of the text. The clause, *Geologists work to piece together a picture of Earth's history*, was processed as, *Geologists work to pies to piece together a picture of Earth's history*. Reading on involved reading beyond the miscue and then returning to correct or attempt to correct. The clause, *The trunks of trees that grew 200 million years ago*, was read as, *The trunks of trees that grew 200 millions years million years ago*. Interestingly, the readers never utilized more than a single strategy when attempting to correct and only five when correcting.

Table 3

Correction and Attempt Behaviors Summary Percentages

Correction Behaviors			Attempt Behaviors		
Word	Contextual		Word	Contextual	
	Reread	Read On		Reread	Read On
48%	25%	28%	89%	6%	6%

Readers varied in their use of the three response strategies. This variation was statistically significant at the p < .001 level for both correction strategies (x2 = 44.78) as well as attempt to correct strategies (x2 = 122.89). For correction strategies, the majority focused on the word level (48%). The use of context through rereading occurred 25% of the time and reading on 28% of the time. Therefore, 53% of the successful corrections involved the use of contextual strategies.

In contrast, the focus of unsuccessful attempts

was almost exclusively on the word level, 89% of the time. This was particularly the case for attempts (67%). The only other strategy of significance for attempts was the reread strategy (28%). Reread or read on were rarely used (6%).

Discussion

Readers were successful 75% of the time when engaging response strategies to correct their miscues. This finding replicates that of Goodman's (1967, 1968, 1969) earlier research. Corrections largely involved a single strategy. Interestingly, these corrections appeared to reflect readers who, rather than using sounding out as the default strategy, selected the strategy they felt was most appropriate to the context. More than 50% of successful responses were contextual in nature, involving rereading or reading on. It is interesting to note that almost one quarter of all responses involved rereading. There is some research indicating that this backtracking strategy develops in the later grades—sixth grade and beyond—and is difficult for students to learn (Paris, Wasik, & Turner, 1996). However, these proficient fourth graders appeared to be developing proficiency in the effective use of this response strategy.

In contrast, attempt behaviors that were successful relied heavily on sounding out, to a much lesser extent on rereading, and almost never on reading on. It appears that in these instances, readers were less effective in selecting the response strategy most likely to produce a correction. It might have been productive if the readers had employed alternate strategies when the initial strategy did not result in a correction. As previously noted, such multiple strategy use almost never occurred when readers unsuccessfully attempted to correct.

As the research indicates, effective and efficient readers have access to a toolbox of strategies and processes that can be selectively used as necessary. These strategies utilize both graphic and contextual information or cues. Even if these strategies and textual cues are explicitly taught to young readers—

which is not always the case—it is important that they are reintroduced and demonstrated by teachers working with older readers as well. These students will encounter increasingly more complex texts as they move through the intermediate grades. It is well documented that as text complexity increases, readers have a tendency to rely on sounding out as the strategy of choice (Biemiller, 1970; Chinn, et al., 1993; Leu, 1982).

Research and educational implications, limitations, and future research

This study examined the strategies proficient readers used when they responded to their miscues on a complex scientific expository text. It would be beneficial to investigate the employment of response strategies on other disciplinary texts, such as social studies and mathematics. Such texts typically require specialized knowledge as well as specialized language (Baumann & Graves, 2010; Nagy & Townsend, 2012). Literary texts, which are frequently narrative in nature and rely on general world knowledge, should also be explored. The engagement of response strategies might vary as text types and required knowledge varies.

Finally, teachers will need to be more explicit in their instruction of correction strategies with older students reading more complex texts. The default strategy of sounding out that is often used on more difficult texts will have "diminishing returns" and limited utility with expository texts in the disciplines. Even if the sounding out results in the correct pronunciation of the word, students may not understand the concept behind the word. In such cases, the use of contextual information becomes critical. To return to the metaphor of a toolbox of strategies, older students will need to have these strategies readily available if they are to successfully negotiate the complex disciplinary texts to be increasingly encountered in the upper grades. Even when available, teachers may still need to prompt their use.

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