Using Miscue Analysis to Assess Comprehension in Deaf College Readers

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For over 30 years, teachers have used miscue analysis as a tool to assess and evaluate the reading abilities of hearing students in elementary and middle schools and to design effective literacy programs. More recently, teachers of deaf and hard-of-hearing students have also reported its usefulness for diagnosing word- and phrase-level reading difficulties and for planning instruction. To our knowledge, miscue analysis has not been used with older, college-age deaf students who might also be having difficulty decoding and understanding text at the word level. The goal of this study was to determine whether such an analysis would be helpful in identifying the source of college students’ reading comprehension difficulties. After analyzing the miscues of 10 college-age readers and the results of other comprehension-related tasks, we concluded that comprehension of basic grade school-level passages depended on the ability to recognize and comprehend key words and phrases in these texts. We also concluded that these diagnostic procedures provided useful information about the reading abilities and strategies of each reader that had implications for designing more effective interventions.

In the United States, the reading levels of deaf and hard-of-hearing (D/HH) college-age students has remained remarkably stable over the past 30 years. The review of Qi and Mitchell (2007) of normative studies conducted on five editions of the Stanford Achievement Test Series shows that reading comprehension levels of 17-year-olds have increased but never exceeded the fourth-grade level. That is, reading comprehension subtest scores for deaf students increase each year from 1974 to 2003, but at age 17, their median performance never exceeded the fourth grade equivalent. Allen (1994) estimated that only college-bound high school graduates read at the eighth-grade level or higher. Because even an eighth-grade reading level is insufficient to handle the reading demands of college curricula, the challenge facing instructors in college preparatory courses is similar to the one high school teachers of deaf students face: What is the reason that many deaf students do not comprehend text as well as their hearing peers?

We know that “accuracy and automaticity of word recognition are separate but related aspects of learning to read” (Stahl, Kuhn, & Pickle, 2006, p. 380) and that good readers (deaf and hearing) are able to recognize words and group these words into meaningful phrases quickly and automatically (Kelly, 2003). Accuracy, as the term implies, refers to the number of words read correctly. Automaticity is the ability to recognize words rapidly enabling the reader to focus more on comprehension of the text. “Although it is not the only component of the reading process, word identification has to be automatic enough to allow comprehension to take place” (Rego, 2006, p. 152). Based on their review of the literature, Stahl and Hiebert (2006) make the case that word recognition is central in defining, not only the reading performance of beginning readers, but in accounting for a significant proportion of the variance in student performance among challenged readers as well. In sum, both accuracy and automaticity at the word level are central to developing the fluency necessary for comprehension. In addition, we know that good readers are able to use metacognitive strategies to enhance or check their comprehension.
and that they have had early, meaningful exposure to language and print in the home and at school (Toscano, McKee, & Lepoutre, 2002).

In a review of reading research undertaken with students who are deaf or hard of hearing between 1963 and 2005, Luckner and Handley (2008) conclude that this body of research only tentatively supports certain top-down evidence-based practices, with additional research needed in bottom-up reading processes, such as decoding and vocabulary recognition (p. 31). Although this review was conducted on research that reported on children and youth between 3 and 21 years of age, comparatively little research has been conducted on the reading processes of older D/HH readers and even less on bottom-up reading processes. That said, there is substantial evidence that, as with children, adults with reading disabilities have difficulties at the level of word recognition and the processes that underlie this skill (Bruck, 1990; Scarborough, 1983; Stanovich, 2000). In a recent meta-analysis of the literature on reading disabilities in adults, Swanson and Hsieh (2009) reported that “results support the notion that the primary processes that underlie reading disabilities in children are the same as those in adults” (p. 1384). More specifically, their review indicated reading disabilities in this population are related to phonological processing with processes related to verbal memory, vocabulary, and naming speed playing equally important roles. Thus, the focus of this article is on the nature of the bottom-up reading processes of college-age deaf readers experiencing difficulties in reading college-level texts and the extent to which these difficulties are related to word recognition.

It is now the case that the most widely held view to conceptualize the process of reading is some form of interactive model (Gillon, 2004; McCardle & Chhabra, 2004; Pressley, 2006). In an interactive view of reading (Rumelhart, 1977; Stanovich, 2000), it is argued that readers must integrate both micro (bottom-up) and macro (top-down) strategies to read efficiently and effectively. At the microlevel, readers must be able to match letters (and letter combinations) to sounds (or articulations of sounds) in order to retrieve the memory (and meaning) of a word. Good readers must also be able to make inferences, ask themselves questions, and monitor comprehension while reading. In an “interactive-compensatory model” of reading, an additional assumption is that “deficiencies at any level in the processing hierarchy can be compensated for by a greater use of information from other levels” (Stanovich, 1984, p. 15). This may be particularly important in an investigation of college-age readers where the assumption is that they have learned to draw on different sources in constructing meaning while reading.

Such a view has particular relevance when thinking about the word recognition strategies employed by D/HH readers as the phonological processing route presents singular challenges in the presence of a hearing loss (Paul, 1998; Trezek, Paul, & Wang, 2009)—an issue that has been at the center of a long-standing and on-going debate in the field (see Allen et al., 2009; Paul, Wang, Trezek, & Luckner, 2009). A review of the research (Marschark & Harris, 1996) indicates that, although there may be a delay, D/HH readers do develop phonological awareness, sometimes with the support of visual and kinesthetic-tactile strategies such as contact sign, speechreading/mouthing, fingerspelling, cued speech, and visual phonics (Mayer, 2007; Paul, 2003). But although the efficacy of these alternative coding strategies continues to be explored, research evidence consistently indicates that deaf readers who use phonological coding strategies while reading tend to be better readers than those who do not (see Trezek, Wang, & Paul, 2009; Wang et al., 2008 for discussions). Thus, given the importance, phonological processing and the likelihood that college-age D/HH readers employ a diverse array of coding and word recognition strategies, we determined to examine bottom-up processes by means of a miscue analysis.

Misscues analysis is an assessment tool, which measures oral reading accuracy at the word level by identifying when and the ways in which the reader deviates from the text while reading aloud (Goodman, 1969; Goodman K & Goodman Y, 1977). An analysis of these misscues or deviations provides information on the nature of the cueing systems—graphophonic, syntactic, and semantic—that is used for word recognition (Rhodes, 1993). According to Goodman, these misscues should not be viewed as errors but rather “examined to illuminate the reader’s thinking process during
Counting the number of these miscues also provides important information. “When a reader misses a sizeable proportion of words, comprehension will suffer. A critical question for instruction as well as assessment pertains to the size of the corpus of words that are recognized incorrectly, before comprehension breaks down” (Stahl & McKenna, 2006, p. 412). In other words, readers begin to lose meaning as deviations from the text increase (Leslie & Osol, 1978), especially if these miscues change the meaning of the text.

Given the rich information it provides, miscue analysis has become a widely used tool for assessing hearing readers in both elementary and middle school. It has also been used with modifications with school-aged deaf readers (Chaleff & Ritter, 2001; Gennaoui & Chaleff, 2000; Luft, 2009), but not, to our knowledge, with older deaf readers who might also be having difficulty decoding and understanding text at the word and phrase level. The goal of this study was to determine whether results of a miscue analysis would provide useful information for instructors about the word recognition strategies and comprehension abilities of these students. To answer these questions, we present qualitative reading profiles for five students who together represent the range of communication preferences and reading styles found in the sample of college-age readers in our study.

Methods

Participants

Ten deaf college students at a technical university in the northeast United States volunteered to take part in this study. Nine of the ten students were associate degree students, and one was enrolled in a bachelors program. The two women and eight men ranged in age from 19 to 25 and all had moderately severe-to-profound hearing losses. All were the children of hearing parents and only one had deaf siblings. All reported that English was the only spoken language used in the home. Their reported use of sign language in the home ranged from the use of ASL only to simultaneous communication to speech only. When asked for their preferred mode of communication “most of the time,” four preferred ASL only, five preferred English-based signing and speech together, and one preferred English-based signing with English mouth movement and no voice.

The nine associate degree students were recruited from a developmental reading course designed for students not yet able to read college-level materials. According to a 1988 nationally representative sample, the mean reading score for college-bound grade 12 students was 18.13 (SD 4.56) (ACT Technical Manual, 2008). The mean score for the nine associate degree students in this study was 14.66 (range 12–21; SD 2.83). The deaf bachelor degree student recruited for the study received a 34 on the ACT Reading subtest and was recruited to pilot the methodology. We wanted to make sure that this qualitative procedure would be appropriate for this age group (see Table 1 and discussion below).

Because scores of 12 and below are at chance levels (Dowaliby et al., 1997), all entering students who score at 14 or below are required to take the school’s own reading and writing placement measures. So, for example, a student who scores 144 or above on the National Technical Institute for the Deaf (NTID) Reading Test is judged to be a proficient college-level reader and not required to take courses in the developmental course sequence. Students’ scores on the NTID Writing test ranged from 39 to 65 (mean 47.22; SD 10.97). A student scoring 68 or above on

<table>
<thead>
<tr>
<th>ID</th>
<th>ACT Reading subtest</th>
<th>NTID Reading Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>William</td>
<td>34</td>
<td>ND</td>
</tr>
<tr>
<td>Antonia</td>
<td>17</td>
<td>102 (8–9)</td>
</tr>
<tr>
<td>Alonzo</td>
<td>15</td>
<td>90 (7–8)</td>
</tr>
<tr>
<td>Jordan</td>
<td>14</td>
<td>76 (below 7)</td>
</tr>
<tr>
<td>Malcolm</td>
<td>21</td>
<td>112 (8–9)</td>
</tr>
<tr>
<td>Ginny</td>
<td>14</td>
<td>125 (9–10)</td>
</tr>
<tr>
<td>Jeffrey</td>
<td>12</td>
<td>110 (8–9)</td>
</tr>
<tr>
<td>James</td>
<td>12</td>
<td>87 (7–8)</td>
</tr>
<tr>
<td>Jack</td>
<td>13</td>
<td>86 (7–8)</td>
</tr>
<tr>
<td>Clive</td>
<td>14</td>
<td>118 (8 to 9)</td>
</tr>
</tbody>
</table>

Note. ND, not determined.

*aScores of 12 or below are chance level (Dowaliby et al., 1997).
*bNTID Reading Test (200 points).
the writing test is judged to be proficient and ready to begin the university’s first year writing sequence.

Procedure

In order to examine decoding (word recognition) strategies and assess comprehension levels of these ten deaf college students, we selected the Qualitative Reading Inventory (QRI)-4 (Leslie & Caldwell, 2006). This inventory is grounded in the most current reading theory and research literature and provides normative data (on a hearing, school-age population) (Leslie & Caldwell, 2006, pp. 440–478). In describing the QRI-3, Harp (2006) writes that “it is clearly one of the best-documented, most thoughtfully conceived, and most complete informal reading inventories available” (p. 240). We believed that using such an inventory with D/HH college students would provide insights into the nature of these older learners’ reading processes. Piloting the complete procedure with the deaf bachelor degree student indicated that it was appropriate for this age group. It was easy to administer and results indicated that he was indeed a proficient reader.

The diagnostic sequence for each student was videotaped and took less than an hour per participant. Protocols were followed as outlined in the QRI-4. Screening word lists were used to identify appropriate grade-level passages for the assessment (from pre-primer to high school) with students being asked to read words from the list “aloud” in whatever modes were comfortable for them—speech alone, sign alone, or some combination. When a student read a list with 80%–85% accuracy (defined as instructional level in the QRI-4), an associated grade-level text was chosen for the passage administration.

Before students read a passage, they were asked several general content questions to establish a context for the text. They were then asked to read the passage “out loud” in their preferred manner, as they had done for the word lists. The students were then asked to retell what they had read including as many key points and supporting details as they could remember. Finally, they were asked to respond to a series of both explicit and implicit comprehension questions.

Seven of the ten students returned for a second hour and read a different passage. The “pilot” student was not asked to return, and though repeated attempts were made to solicit participation of the remaining two, they were unable to oblige because of workload and scheduling conflicts. In the second session, two new tasks followed the comprehension questions. The students were asked to complete a CLOZE passage (from the word “closure”) based on the text and to retell what they had read in writing including as much detail as possible. The additional tasks are commonly used comprehension measures and were added to provide a more robust comprehension battery.

Scoring

All the video recordings were transcribed for purposes of scoring and analysis. All portions of the video recordings that were signed without voice were translated into English and transcribed by a native user of American Sign Language and certified sign language interpreter. Because the translator was told about the context of the tapings but not about the content of the passages or questions, the transcripts were checked for ambiguities in the translation. For example, the participants often used the ASL sign, MACHINE, to indicate the English, machine, engine, and locomotive. Because such variations would be scored as substitution miscues, we reviewed the tapes and in instances where mouth movements, context referents, or other cues indicated a specific term, we modified the transcripts.

What follows are representative excerpts from the transcripts to illustrate the nature of the miscue analysis and four other diagnostic procedures used in this study. Figure 1 shows an example of how the transcript of Clive’s “read aloud” (of a fourth-grade passage) was scored for miscues. Lines from the passage

Railroads began as rails laid down in a road. The rails were made of wood
Railroads began as rails laid down in a road. The rails were made out of wood
topped with iron. Horses pulled carts running along the rails. The rails were
topped with iron. Horses pulled carts running along the rail. The rails were
smoother than the roads so the horses could pull the carts faster than they
smoother than the road so the horses could pull the carts faster than they
could pull wagons over roads.
could pull wagons over roads.

Figure 1  Miscue analysis: Early Railroads—Clive.
are paired with lines from the read-aloud transcripts (in italics). Miscues are underlined.

Miscues were scored as per the QRI-4 manual (pp. 72–82). A total accuracy count was done in which any deviation from the printed text is counted as a miscue. This includes insertions, omissions, substitutions, reversals, and self-corrections. Although there are concerns with using a total accuracy count versus a count of only those miscues that distort or change meaning, often referred to as a total acceptability count (see Harp, 2006, p. 240), it was decided to use total accuracy as there were so few instances of miscues that did not interfere with meaning (e.g., reading “Maria” as “Mary”). Conceptually inaccurate renditions of a word or phrase were scored as miscues. For example, in the section describing the race (“At first the horse pulled ahead. Then the train picked up speed and soon it was neck and neck with the horse.”), Jeffrey signed PULLED + AHEAD and NECK + IN + NECK; that is, he signed the phrases literally, word for word. In the few instances when a word was fingerspelled, it was noted on the transcript with a “+” or “−.” In the whole passage, Ginny fingerspelled only one word, “ton,” in the sentence, “It [the engine] was small and weighed barely a ton.” The notation, “fs+,” on the transcript meant that she appeared to understand the meaning of T-O-N.

A challenge when scoring the reading of students who used signs was that there were many instances when they did not sign the words on the page but rather attempted to sign a translation of what they believed was meant. These “unread” words were scored as omissions, accounting for the large number of miscues recorded for some of the students. This approach to scoring was taken because one of the goals of the study was to determine whether this translation strategy was effective in making meaning from the text.

Retells (see Figure 2) were scored using the Retelling Scoring Sheets from the QRI-4, which are composed of the important ideas contained in a passage. For example, the fourth-grade passage “Early Railroads” has a potential score of 57 idea units. The examiner places a check next to each explicit idea listed on the scoring sheet that was recalled by the student. Students are not expected to remember the exact wording of the text. Synonyms and paraphrases

Figure 2 Spoken/signed retell—Clive.

are acceptable and it is up to the examiner to determine whether the student’s recall matches the meaning of the text. “Although the retelling is not used to determine independent, instructional and frustration levels, it can provide valuable information with implications for instruction” in the areas of text structure and sequence, identifying main ideas and supporting details and accuracy (Leslie & Caldwell, 2006, p. 86).

Comprehension questions (Figure 3) are scored as per the suggestions provided in the manual with each question getting one point if it is answered correctly. In the case of explicit questions, the answer must come from the passage. Implicit questions may not be scored as correct “if the answer is not related to a clue in the passage …. if the answer comes from prior knowledge only, it is not counted as correct” (Leslie & Caldwell, 2006, p. 88). This was an important consideration in scoring the responses of college-age students who were reading passages at levels intended for much younger readers (i.e., fourth grade). The assumption is that these older learners come to the text with a depth of background knowledge that surpasses that of the younger readers for whom these passages were designed and therefore may answer questions based on prior knowledge rather than what has been gleaned from a reading of the text.

Scoring the CLOZE passage (Figure 4) was done as per the protocol described in McKenna and Stahl (2003). Credit was given only for verbatim responses (i.e., for the exact word that was deleted in each case), although minor misspellings are counted as correct (e.g., scarlet for scarlet). Verbatim scoring is preferred

1. What was this passage mainly about?
   Uh, it’s mainly about the race between Tom Thumb and horses. When I say Tom Thumb it’s a name of a steam boat.

2. Why did Peter Cooper build a steam engine?
   Cooper built a steam engine because he wanted an engine that could carry heavy loads faster than a horse pulled the cars on the rail, the old fashioned way.
Plant Structures for Survival

Plants and animals live in many different environments—hot, cold, wet, dry. But no matter where they live, all living things have basic needs that must be met. Any structure or behavior that helps a living thing meet those needs and survive in its environment is called an adaptation.

Plants need sunlight to live and grow. Many plants have special adaptations for getting sunlight. Vines climb on the sides of taller plants to objects where there is more sunlight. Water lilies have large, round leaves called pads that can take a lot more sunlight than small leaves. The giant water lily pads are so big that you can stand on them without sinking!

Figure 4  CLOZE passage—Clive.

as it is more objective, easier to grade, and correlates well with scores based on accepting synonyms or other reasonable responses. Most importantly, using any other approach makes it “nearly impossible to interpret the results” (McKenna & Stahl, 2003, p. 173). A calculation was made of the percentage of answers correct and then scored using the following guide: Independent Level (above 60%), Instructional Level (40%–60%), and Frustration Level (below 40%).

Scoring the written retells (Figure 5) followed the same procedure as that described for the oral retells in the previous section.

Results

We began this study asking whether results of this qualitative analysis would yield useful information for college instructors in planning effective programs and interventions. However, we were also curious about the extent to which results of this analysis would agree with formal group assessments of reading. To answer this question, we compared our diagnostic assessment scores with those from the two group assessments of reading skill. Table 2 shows all the available qualitative scores for all the students. We analyzed the miscues and comprehension of the bottom five students in Table 2 because they read the same reading passage, Early Railroads (Leslie & Caldwell, 2006, p. 253) and represented the range of communication (and read aloud) preferences in the sample.

Table 2  Qualitative scores for all students.

<table>
<thead>
<tr>
<th>Student</th>
<th>Miscues</th>
<th>Comprehension</th>
<th>CLOZE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Student A</td>
<td>80</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>Student B</td>
<td>90</td>
<td>95</td>
<td>75</td>
</tr>
<tr>
<td>Student C</td>
<td>100</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Student D</td>
<td>110</td>
<td>85</td>
<td>85</td>
</tr>
<tr>
<td>Student E</td>
<td>120</td>
<td>90</td>
<td>90</td>
</tr>
</tbody>
</table>

The grade level for each of the five students (Column 3) was determined by scoring read alouds of word lists (QRI-4, 2006). Columns 5 and 6 show percent correct for spoken/signed and written retellings of the passage, respectively (the same criteria were used to score both), and Column 7 indicates verbatim scores for the CLOZE task. According to this inventory, all five were at a fourth-grade instructional (not independent) level.

Table 3 displays rank orders of the same five students according to the miscue assessment alone, four diagnostic assessments combined (retell, comprehension questions, CLOZE, and written retell), and two group assessments combined. As seen in the table, Clive ranks first on number of miscues (he made the fewest), first on the other diagnostic measures combined, and second on the group assessments combined.

Comparing the rank orders of reading miscues, other diagnostic measures, and group assessments, we find that miscue analysis predicts the rank order of the qualitative assessments but not that of the group assessments. This suggests two things. First, although group assessments may provide useful course placement information, the ones used here were limited in their ability to predict differences in reading strategies and text comprehension. Second, although the screening task (reading vocabulary lists aloud) placed all five students at the fourth-grade reading level, the miscue analysis predicted differences in reading comprehension (as measured by comprehension questions, retellings, and CLOZE tasks). In other words, even within the category of “grade four reading level,” participants’ comprehension of text differed noticeably. To understand these differences, we compared miscues and comprehension errors, and this revealed a range of error by both type and quantity. Some readers’ miscues were mainly omissions, whereas others made graphophonic and semantic errors.

Clive read aloud word for word using only voice. As shown in Figure 6, he attempted pronunciations of words he did not know (engine and locomotive). He answered only 50% of the comprehension questions correctly. His reading of steam engine as steamboat suggests construction of meaning with faulty comprehension. Figure 6 displays four sentences. The first pair
displays a sentence from the passage and Clive’s reading of that sentence and the second pair, a comprehension question and his answer.

Jack also read aloud using only voice. He answered 63% of the comprehension questions correctly. Two of his answers were scored as incorrect because key points were omitted. His third incorrect answer (see Figure 7) seems related to the misreading of a key term.

Ginny read to herself and then signed the text without voice, sentence by sentence. She switched between signing in English word order (the print driving the sign production) and in ASL. She answered 63% of the comprehension questions correctly, and for her too, comprehension errors seem related to the misreading of key terms and skipping sections of the text (resulting in a number of omission miscues). For example, as shown in Figure 8, she read take over from (replace) as take off (accelerate).

Jeffrey, who read and signed without voice, answered 43% of the comprehension questions correctly. His response to one comprehension question also seems related to a misreading of a key term in the text. In reading aloud the sentence about the eventual triumph of the steam engine, Jeffrey signed TAKE OVER for the phrase, take over from (Figure 9). This was scored as a miscue and his response was scored as incorrect. His response indicates that he, like Ginny, assigned the meaning of go ahead of to take over from. The standard meaning of the phrase in this context is to replace. It is, of course, possible that both readers used (and understood) go ahead of to mean win or triumph. Whatever meaning Ginny and Jeffrey assigned to this phrase, our point is simply that a miscue analysis of deaf readers reading aloud is useful for identifying sources of comprehension errors if it takes into account both speech and sign.

Our fifth reader was James who also read and signed without voice. He signed many fewer phrases than were in the text. Because he skipped so many words and diverged from the text when he read aloud, he had the highest number of miscues (200+) and, not

<table>
<thead>
<tr>
<th>ID</th>
<th>Read-aloud mode</th>
<th>Grade level</th>
<th>Miscues</th>
<th>Retella (%)</th>
<th>Comprehension question (%)</th>
<th>CLOZE (verbatim %)</th>
<th>Written retell (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>William</td>
<td>Speech</td>
<td>8</td>
<td>4</td>
<td>ND</td>
<td>90</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Antonia</td>
<td>Speech</td>
<td>6</td>
<td>11</td>
<td>14</td>
<td>63</td>
<td>12</td>
<td>14</td>
</tr>
<tr>
<td>Alonzo</td>
<td>Sign</td>
<td>4</td>
<td>175+</td>
<td>7</td>
<td>13</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Jordan</td>
<td>Speech</td>
<td>4</td>
<td>15</td>
<td>5</td>
<td>25</td>
<td>ND</td>
<td>ND</td>
</tr>
<tr>
<td>Malcolm</td>
<td>Speech</td>
<td>5</td>
<td>22</td>
<td>0</td>
<td>63</td>
<td>15</td>
<td>ND</td>
</tr>
<tr>
<td>Ginny</td>
<td>Sign</td>
<td>4</td>
<td>116</td>
<td>23</td>
<td>63</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Jeffrey</td>
<td>Sign</td>
<td>4</td>
<td>153</td>
<td>21</td>
<td>43</td>
<td>12</td>
<td>42</td>
</tr>
<tr>
<td>James</td>
<td>Sign</td>
<td>4</td>
<td>200+</td>
<td>11</td>
<td>13</td>
<td>16</td>
<td>7</td>
</tr>
<tr>
<td>Jack</td>
<td>Speech</td>
<td>4</td>
<td>44</td>
<td>2</td>
<td>75</td>
<td>17</td>
<td>32</td>
</tr>
<tr>
<td>Clive</td>
<td>Speech</td>
<td>4</td>
<td>34</td>
<td>35</td>
<td>50</td>
<td>24</td>
<td>39</td>
</tr>
</tbody>
</table>

Table 2 Diagnostic assessments of reading

1Note: ND, not determined.
2Qualitative Reading Inventory-4, 2006.
3Pilot test subject.
4Subject misunderstood directions.

His response to one comprehension question also seems related to a misreading of a key term in the text. In reading aloud the sentence about the eventual triumph of the steam engine, Jeffrey signed TAKE OVER for the phrase, take over from (Figure 9). This was scored as a miscue and his response was scored as incorrect. His response indicates that he, like Ginny, assigned the meaning of go ahead of to take over from. The standard meaning of the phrase in this context is to replace. It is, of course, possible that both readers used (and understood) go ahead of to mean win or triumph. Whatever meaning Ginny and Jeffrey assigned to this phrase, our point is simply that a miscue analysis of deaf readers reading aloud is useful for identifying sources of comprehension errors if it takes into account both speech and sign.

Our fifth reader was James who also read and signed without voice. He signed many fewer phrases than were in the text. Because he skipped so many words and diverged from the text when he read aloud, he had the highest number of miscues (200+) and, not

Table 3 Rank orders

<table>
<thead>
<tr>
<th>Name</th>
<th>Miscues</th>
<th>Diagnostic tests (mean rank order)</th>
<th>Group tests (mean rank order)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clive</td>
<td>1</td>
<td>1.75</td>
<td>1.5</td>
</tr>
<tr>
<td>Jack</td>
<td>2</td>
<td>2.75</td>
<td>3.5</td>
</tr>
<tr>
<td>Ginny</td>
<td>3</td>
<td>3.00</td>
<td>1.0</td>
</tr>
<tr>
<td>Jeffrey</td>
<td>4</td>
<td>3.25</td>
<td>3.0</td>
</tr>
<tr>
<td>James</td>
<td>5</td>
<td>4.25</td>
<td>3.5</td>
</tr>
</tbody>
</table>

Figure 6 Miscues and comprehension errors—Clive.
surprisingly, the lowest comprehension score (13% correct). The example in Figure 10 shows how he compressed the text in his reading aloud perhaps because he did not understand a tiny hero.

Discussion
As expected, the results indicate that the qualitative analyses of reading comprehension used in this study do not correlate well with standard assessments. Neither the number of miscues produced nor a combined rank ordering of three additional diagnostic measures (comprehension questions, retells, and CLOZE) correlates to performance on the ACT. Though the small number of subjects precludes a definite conclusion, the discrepancies are most likely due to the nature of the tests. The ACT is a general measure of reading ability and scores of 12, 13, and 14 are at or near chance level (Table 1). Thus, using the ACT to place students with such scores in developmental reading courses will probably result in classes where reading comprehension skills vary greatly. Although the NTID Reading Test does better in grouping students, it too was not designed to diagnose reading deficiencies.

The diagnostic measures, on the other hand, indicate both a range of ability and a variety of strategies. Based on the reading of graded vocabulary lists, the five students profiled here were all assigned fourth-grade passages and then assessed to be working at a fourth-grade instructional level. However, their strategies for reading this passage and their comprehension of the passage varied widely. Although number of miscues may have been an artifact of the chosen read-aloud strategy, this number correlated better with the diagnostic measures of comprehension than with the group tests of reading ability.

Basically, the readers chose one of three read-aloud strategies. Clive and Jack read every word orally without signing. For them, as for hearing students, mispronunciations (steam enidge or misreadings (value for valve) indicated a problem with decoding and comprehension. Jeffrey generally signed word for word without speech. His signing of take over from as TAKE + OVER is an example of signing English literally without comprehension. It should be noted that students sometimes self-corrected while reading aloud. In this case, Jeffrey did not and his miscue proved to be a locus of miscomprehension.

Both Ginny and James signed ASL translations of the text. Ginny first read each sentence to herself and then signed it in ASL. Her translation strategy led to a divergence from the text and an increase in the number of reading miscues compared to Clive and Jack (Table 2). That said, she answered more comprehension questions correctly than Clive, but not as many as Jack, both of whom had read every word orally. James also translated into ASL as he read. He deviated the most from the text (as shown by the largest number of miscues), resulting in the lowest comprehension scores.

Text: Although Tom Thumb lost the race, steam engines would soon take over from horses.
Read as: Tom Thumb lost the race, but the steam engine would soon take over the horse.
Question: Even though the horse won the race, why could you say that Tom Thumb really won?
Answer: Tom didn’t win but it still had power to overtake the horse—it still went ahead of the horse.

Figure 9 Miscues and comprehension errors—Jeffrey.
The students who signed while reading aloud also modified sentence structure. Jeffrey’s, Ginny’s, and James’ renderings of the text suggest a syntactic filtering. That is, their renderings are syntactically reduced from complex to compound and simple sentences. Past research has indicated that college-age D/HH students will reduce complexity in an elicited imitation task if they have not yet mastered the complex sentence structures (Albertini & Forman, 1985). It may be the case that reduction in syntactic complexity when reading aloud also indicates that the reader’s grammatical competence is below that of the text (see Figure 11). In certain instances, this reduction or modification of structure may reflect a change of meaning and thus a misinterpretation of the original.

All the readers displayed attempts to construct meaning as they read, even when they did not recognize all the words. For those who used speech, miscues were identified as substitutions, omissions, or mispronunciations—with hesitations, intonation, and facial expression also indicating lack of comprehension. This does not differ significantly from the ways in which miscues would be interpreted for hearing readers. Therefore, in the case of Clive and Jack, the scoring of the miscues was relatively straightforward.

For those who signed as they read, the scoring of miscues was less clear-cut. Choosing to fingerspell a word rather than sign it and signing a phrase word for word (rather than conceptually) may have signaled miscomprehension but were not scored as miscues. These word readings were taken as analogous to hearing readers who read words without comprehending them (i.e., word calling). More problematic were the students who used a translation strategy. That is, rather than reading word for word, the students attempted to translate text as they read it. By definition, this resulted in many more miscues (i.e., usually omissions) for Ginny, Jeffrey, and James (116, 153, and 200+ words, respectively) than for the others who spoke or signed each word.

But it should be noted that there was a qualitative difference between Ginny’s reading and that of Jeffrey and James, perhaps accounting for Ginny’s stronger comprehension scores and the fewest omissions of the three signers in the study. Ginny read the text before she signed a translation—sometimes signing word for word as Jeffrey had done. As she was unwilling to sign or mouth while reading, she did not “let us in on” her word recognition processes even though it appeared that she was engaging with the text at this level. She preferred to sign only the product of her comprehension (the translation), and therefore, it was difficult to sort out the extent to which her breakdowns in comprehension could be attributed to gaps in word recognition, the use of an inefficient reading strategy (translation), or a combination of both. We speculate that she was indeed reading word for word (albeit silently) and, when all words were “known,” she was able to provide an accurate translation. Comprehension broke down when there were too many words she did not know, and in these cases, her translation was flawed.

James was not reading at the word level. He skipped large sections of the passage and relied more on background knowledge than information from the passage to answer the comprehension questions. He also appeared to use a translation strategy while reading. However, because he could not make sense of over 150 words, he could not use this strategy successfully.

**Implications**

When teaching reading, teachers of high school and college-aged deaf students often focus on metacognitive comprehension strategies (Schirmer, 1997; Strassman, 1997). However, the results of this study suggest that for some students in this age group, the focus should also be on strategies at the word recognition level. For the five readers profiled here, comprehension was directly related to word recognition.
and grammatical competence. Whatever macro strategies they may have employed to make sense of the passage did not compensate for gaps in word and sentence understanding.

As is the case with younger readers, miscue analysis appears to be a valuable diagnostic tool for these college-age readers, just as it is for other older, struggling, hearing readers (Allington, 1984). Instructors could well employ this procedure to gain an initial assessment of students’ ability to engage with a text. Although it is the case that miscue analysis has not been a traditional aspect of assessing the reading performance of older learners, we would argue for its use with this population. Administering the QRI (that incorporates a miscue analysis) is not overly time consuming and well within the scope and ability of most educators of D/HH learners. Given that it is employed as an evaluation strategy in schools and programs with elementary-aged D/HH students (where it can be more difficult to ask children to read aloud and evaluate miscues) (e.g., Chaleff & Ritter, 2001; Gennaoui & Chaleff, 2000), the approach should prove to be equally viable with older readers.

For diagnostic purposes, it was necessary for the readers in this study to read aloud. However, it is important to remember that most adult readers read silently and that comprehension abilities may vary in these two conditions. In future studies, it would be interesting to have students read passages silently to find out whether comprehension and fluency improved in this condition. Protocols for this are described in the QRI and would be valuable to include as an aspect of future research.

In comparing these students’ read-aloud preferences, the most transparent were the use of speech or signing word for word. For diagnostic and teaching purposes, we argue these are the only viable strategies worth using. Gina’s insistence on translating from English words to ASL signs. The issue here is that it is impossible to provide a translation if one has not read and comprehended the text in the first place.

We would advise Ginny that accurate translation depends on an accurate reading and comprehension of the source text. We would suggest to her and others to concentrate on a “close reading” (i.e., usually, word-for-word) of the text when reading aloud. Translation may then be used in the classroom to check comprehension or for interpretation of the text. Finally, we would recommend this type of “close reading” as a way of sensitizing students to their own miscues. If they can become more aware of their miscues and employ some form of corrective action at those cites where their understanding may diverge from the meaning of the text, they stand a better chance of understanding the text as a whole.

In contrast to earlier views that reading difficulties arose when readers did not use contextual information to predict upcoming words, Stanovich (2000) found that it was actually less skilled readers who were more dependent on context for word recognition. In a summary of his two decades of research in the field, he concluded that, “the word recognition processes of the skilled reader were so rapid and automatic that they did not need to rely on contextual information” (p. 394). The deaf readers in this study lacked the automaticity in word recognition that would make for easy comprehension of the text. They were often left to rely on context (or other strategies) to make sense of what they had read—often with unsatisfactory results. For Stanovich, the key to rapid and automatic word recognition is phonological processing. Although the jury is still out on the exact nature of phonological processing in deaf readers, it is clear that this is an area that cannot be ignored in thinking about why some college-aged students continue to struggle with word recognition and reading texts at age-appropriate levels.

In light of the central role that word recognition plays in the reading process, we suggest that it needs to be targeted when designing developmental programs or interventions for college-age readers. This is not to suggest that teaching other strategies should be abandoned, but rather to argue for a refocusing on
all aspects of becoming a fluent reader. We would also argue that strategies, which encourage readers to bypass decoding as they engage with text are ill-advised. For these learners, translation should be viewed as a product of comprehension, not the route to achieving it.

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References


