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Morphemic Decoding Instruction for Students Who are Deaf or Hard of Hearing

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Abstract

Community-engaged scholarship places an emphasis on addressing issues of public concern and building capacity in individuals and organizations while testing theory or evaluating practice. In the study reported here, a public school speech and language pathologist contacted a university reading professor to express her concern about the reading difficulties experienced by nine junior high school students on her caseload who were deaf or hard of hearing (D/HH). The students were experiencing significant difficulties in decoding and spelling polysyllabic vocabulary and in reading assignments at their grade level. The objective of the resultant collaboration was to explore the effects of morphemic decoding instruction in addressing the identified difficulties. Nine seventh and eighth graders who were D/HH were provided with weekly lessons for 10 weeks that engaged them in manipulating commonly occurring prefixes and suffixes within real words as they read and generated morphologically complex words. Average growth in a task combining flash and mediated word identification was 2.33 years. The study suggests an important role of community-engaged scholarship in exploring new questions, the potential value of engaging students in constructive morphemic decoding instructional activities, and the need for larger scale studies of morphology instruction involving students who are D/HH.

Morphemic Decoding Instruction for Students Who are Deaf or Hard of Hearing

Introduction

Community engagement “describes the collaboration between institutions of higher education and their larger communities (local, regional/state, national, global) for the mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity” (Carnegie Foundation for the Advancement of Teaching, n.d., p. 2). Engaged scholarship partners academics with knowledgeable practitioners from outside the academy. Mutual benefits derive from the learning community formed by researchers and practitioners as they negotiate and collaborate in defining problems and testing solutions, jointly producing knowledge that can enrich research and more readily transfer to practice settings because of the direct participation of practitioners (Boyer, 1996; New England Resource Center for Higher Education, n.d.). Community-engaged scholarship places an emphasis on addressing issues of public concern and building capacity in individuals and organizations while testing theory or evaluating practice.

The morphemic decoding intervention approach described in this paper is an example of community-engaged scholarship. The first author, a reading professor, and the second author, a school-based speech-language pathologist, have collaborated for more than a decade in identifying literacy needs of students with significant disabilities and developing instruction to address those needs. They previously developed a writing intervention that arose from an e-pal collaboration between the first author’s preservice reading methods undergraduates and the second author’s seventh and eighth grade students with significant disabilities (Williams, Koppenhaver, & Wollak, 2007) and a theoretically-grounded and evidence-based writing instructional program for students with significant disabilities (Wollak & Koppenhaver, 2011). On this occasion, the second author expressed a concern about the reading difficulties that the seventh and eighth grade deaf and hard of hearing (D/HH) students on her caseload were experiencing. She explained that all of the students were reading two or more years below their grade level expectations. However, according to an informal reading inventory, all could identify words and read text with comprehension at least at the second grade level. Finally, she noted that all of the students had difficulty in decoding polysyllabic words. Keeping in mind the students’ hearing impairments and reading skill level, as well as the limited time the second author had to work with the students, the first author suggested that perhaps morphemic decoding might be a profitable direction to consider. The objective of this community-based scholarship project thus became the exploration of morphemic decoding instruction as a means of promoting word identification growth in students who are D/HH.

Morphology and Students Who Are D/HH

Morphology is the study of the structure of words (i.e., morph- meaning shape and -ology meaning the study of). Morphological awareness contributes to decoding, spelling, vocabulary knowledge, and reading comprehension in middle grades students (Nagy,

Berninger, & Abbott, 2006). Students encounter an increasing number of morphologically complex words (i.e., words composed of two or more morphemes such as morph-ology, re-match, or industry-al-ize) as they advance in school. Thus, instruction in morphology assists students in interpreting and learning unfamiliar words (Nagy & Anderson, 1984). These instructional effects are even larger for less able readers (Bowers, Kirby, & Deacon, 2010).

The reading achievement of students who are D/HH has remained unchanged, approximately a third to fourth grade median reading comprehension level at high school graduation, in repeated, large-scale, nationwide assessments since 1974 (Qi & Mitchell, 2012). It has been hypothesized that the source of these reading difficulties is ineffective phonological knowledge due directly to hearing loss and indirectly to its associated impact on learning environments and linguistic experience (Gaustad, 2000; Miller, 2007). Studies of skilled readers who are D/HH suggest that they understand and apply morphological knowledge in reading and spelling, and may be more advanced in their reading partially because of this skill (Hanson & Feldman, 1989; Hanson, 1993). Morphemes may be more accessible and provide indirect access to phonology, because students who are D/HH can access them visually during regular reading activity (Gaustad & Kelly, 2004).

Improved morphological knowledge may have more to do with degree of linguistic and print experience than reading skill. A study of spelling strategies in two groups of French students with D/HH, 29 students with a mean age of 10.9 years and 44 students, mean age 13.3 years, of varying reading abilities, found that younger students were more likely to spell words with reference to surface phonological structure but that older students were more likely to spell by analogy to words with similar morphemic structure (Leybaert & Alegria, 1995). The data suggested an increasing trend toward morphology use for spelling after the second year of formal reading instruction comparable to that reported in hearing children (e.g., Anglin, Miller, & Wakefield, 1993).

Morphological knowledge in readers who are D/HH appears to follow a normal developmental pattern but lag significantly behind that of hearing students. In a comparison of morpheme perception and application tasks in young adolescents and college students, college students who were D/HH scored similarly to hearing young adolescents, 12 to 15 years old, whose mean reading comprehension scores were 1.4 grade levels below those of the students who were D/HH (Gaustad, Kelly, Payne, & Lylak, 2002). All students' performance declined as task difficulty increased, but the decline was greatest among young adolescents who were D/HH. In a re-analysis of these data, Gaustad & Kelly (2004) examined individual hearing young adolescents paired more precisely on reading ability with individual college students who were D/HH. Hearing students were superior in their understanding and use of derivational morphemes and roots and in their segmentation of morphologically complex words despite the overall reading ability match. Taken together, these studies suggest that while students who are D/HH can acquire morphological knowledge they may need carefully structured

interventions in order to more efficiently progress toward the breadth, depth, and automaticity of understanding and application found in hearing students.

Gaustad (2000) proposed that teaching D/HH students morphology using printed words, what she called “morphographic analysis,” would enable them to circumvent the necessity of acquiring mastery of English phonology and applying phonics in decoding. That is, she recommended that students engage in morphographic analysis (e.g., -s in dogs; -ing in reading) even in beginning reading instruction. She argued that this would create a more efficient route to word identification by eliminating the need for phonemic awareness while requiring intent to analyze words, visual skills and segmental awareness (both orthographic and morphologic), as well as experience with printed words and the meanings they encode. Nielsen, Luetke, and Stryker (2011) concurred and argued for the use of Signing Exact English (SEE) as a means of making morphology even more visible to students who are D/HH.

Despite long-standing and repeated calls for morphology instruction in the classrooms serving students who are D/HH, only a single published study could be identified that attempted to assess the effects of morphology instruction for these students (Bow, Blamey, Paatsch, & Sarant, 2004). The morphology instruction offered in this study focused on present tense (e.g., he walks, they walk), past tense (e.g., I liked, you liked), and plurals (e.g., cat, cats) using games, worksheets, stories, and puzzles. Students, ages 5 – 11 years who were D/HH, received instruction in age-similar groups involving judgment and speech perception tasks.

In sum, the research suggests that morphological knowledge is important to readers who are D/HH. They appear to develop morphological knowledge as they gain linguistic and reading experience but at a much slower rate than hearing students. Scholars have called for the inclusion of morphology in reading instruction programs serving students who are D/HH. However, there are no studies examining the reading outcomes of morphology interventions, nor is there any guidance regarding what such interventions might look like for practitioners wishing to respond to this call.

Theoretical and Practical Perspectives

The English spelling system is morphophonemic, representing both units of sound (i.e., phonemes) and units of meaning (i.e., morphemes). While scholars acknowledge the importance of meaning in decoding and spelling (Adams, 1990; Bowers, Kirby, & Deacon, 2010), the place of morphemes in learning to read has not been clearly delineated (Carlisle & Stone, 2005). It is clear, however, that adolescent readers use morphemes in decoding more efficiently (Nagy, Berninger, & Abbott, 2006) and in comprehending text more effectively (Carlisle, 2000). It is equally clear that students who are D/HH acquire morphological knowledge but that their degree of understanding and use of that knowledge lags significantly behind hearing students (Gaustad & Kelly, 2004). Finally, it has been observed that more than half of the words in English are morphologically complex and that these words are encountered with increasing frequency in the texts that

children read as they progress through school and beyond (Nagy & Anderson, 1984). Young adolescent students, especially those who are D/HH and possess word identification skills significantly below their grade placement, require, among other skills, improved ability to decode and spell morphologically complex words.

Methods

Participants

Nine seventh and eighth grade students, who met the state's criteria for D/HH services, were enrolled in the D/HH program of an urban junior high school in the upper Midwest. The students' degree of hearing loss ranged from mild to profound, and English was not the first language spoken in the homes of two of the students.

The school system mandated informal reading assessments for all students. On the word identification subtest of the *Qualitative Reading Inventory – 3* (QRI-3) (Leslie & Caldwell, 2000), the group ranged from second to fifth grade ($M = 3.6$). Scores on the Qualitative Inventory of Word Knowledge (Short Form) were comparable, ranging from third to fifth grade ($M = 3.5$) (Schlagal, 2003). Finally, the second author also administered the Word Writing Café (Leal, 2005/2006) as a generative assessment of the students' word writing accuracy, fluency, and complexity. For the group, total words correctly spelled ($M=82.1$) and one-syllable words generated ($M=53.7$) were third grade equivalent. Two-syllable words ($M=24.2$) were fourth/fifth grade equivalent and three-syllable words ($M=3.8$) fourth grade. Only one student produced any four-syllable words, writing three of them. Together the three assessments suggested that the students' decoding and spelling of individual words were well below grade level expectations but well beyond beginning levels. That is, their reading and spelling of words demonstrated good understanding of letter-sound correspondences but difficulty with syllables and morphemes as words increased in length.

At the conclusion of the intervention, which also mirrored the end of the school year, the second author chose to devote what limited instructional time remained to student learning and consequently was able to readminister only the word identification subtest of the QRI-3 but none of the other word measures.

Existing Instruction

The students were included in many regular education classes with their hearing peers, so reading demands were significant. All participated in a daily, specialized English class that was taught by their homeroom teacher, a D/HH teacher, who was deaf herself. All instruction throughout the day was signed by either an American Sign Language (ASL) interpreter or the D/HH teacher. Because so much of their reading was assigned in texts well above their reading levels, the D/HH teacher had to sign, explain, and discuss each assignment with them in order to help them understand the material. Writing instruction was limited and focused almost entirely on exercises in grammar and conventions. No decoding or spelling instruction was provided.

Speech-Language Services

The second author is a licensed speech and language pathologist, who was assigned to provide speech and language services for students in the junior high school's D/HH program. Most of the students received her services for 60 minutes per week. She split her time with the group, providing small group instruction focused on speech intelligibility and language comprehension goals in the students' Individual Education Programs, and collaborating once a week with the D/HH teacher to teach a whole group reading comprehension lesson. One of the first indications that these students might have a deficit in morpheme knowledge occurred during speech intelligibility interventions. Almost all of the students with speech intelligibility goals regularly omitted morphemes in their speech (saying, e.g., *work* when they meant *worked* or *working*).

Intervention Selection

Our reading and discussion of the research literature provided little specific guidance as to a morphological instructional method for these students, so we took a pragmatic approach. Reading and writing assessments showed that the students had little difficulty reading or spelling one and two-syllable words, but they were more limited in their success with morphologically complex words, which they encountered with great frequency in their regular classroom reading assignments. All of the students had significant language needs, so we chose to avoid metalinguistic instructional approaches that might have them labeling types of words, categorizing word origins, or using print jargon (e.g., Henry, 1988), and instead sought instructional programs that would present morphemes in multiple contexts and require their use in order to learn to read and spell them. We knew that many students with disabilities whom we had taught previously had learned well by analogy, comparing and contrasting what they knew about letter-sound relationships, and so we thought they might do well using a similar approach with morphemes. We knew that students who are D/HH had struggled in learning to read and spell words in the past, so the instructional approach would need to be engaging and intensive.

We considered what we knew about the instructional opportunity. The school was about to begin its final trimester, and the second author had just 25 minutes weekly to provide any direct intervention. The extremely limited time available for instruction meant that there was no time for a developmental approach requiring further assessment or the use of instructional groups (e.g., Schlagal, 2001); the instruction would need to be delivered to the whole group simultaneously.

After much searching and discussion, we settled on the use of the Nifty Thrifty 50, a list of 50 words composed of common prefixes, suffixes, and spelling changes that enable students to spell many additional words once they learn the list (Cunningham & Allington, 2010). The program required no further assessment or grouping of students to implement, taught morphemes through use and analogy, and was implemented whole class. Two books provided clear descriptions of engaging instructional activities to employ with words on the list (Arens, Loman, & Cunningham, 2007; Cunningham & Hall, 1998),

and the second author augmented those ideas with Gill's (2007) ideas on using technology and graphic organizers to engage student interest using visual demonstrations of morpheme meanings and relationships.

Intervention Implementation

There was no time and little flexibility in the students' schedule to provide the needed intervention, so the second author created it. She was already meeting once a week with two of the students during their homeroom period. With the cooperation of the D/HH teacher, she was able to turn that 25-minute small group session into a weekly, whole class lesson in morphology for ten of the final 11 weeks of school. The second author taught two to three words and their component morphemes to the group each week. Because the second author had only a rudimentary knowledge of ASL, the D/HH teacher read her lips during the lessons and provided the students with ASL signed output. The second author also used a computer and LCD projector to guide the students through each lesson.

The second author began each lesson by displaying the two to three target words one at a time via the LCD projector. She also held up the words, which had been printed on tagboard, and asked if any of the students could read each word. Typically several students would make an attempt. Next the group would read each word aloud before chorally fingerspelling and chanting it.

The group discussed how to figuratively crack the word apart, making it easier to pronounce and understand the meaning. For the word *encouragement*, for example, the group broke the word into *en-*, *courage*, and *-ment*. The second author then asked, "Does anyone know what *encouragement* means?" She taught the students to use a three-finger strategy, raising one finger if they had never heard of the word, two if they had heard the word but didn't know what it meant, and three if they could use it in a sentence. That feedback enabled her to determine how much depth and breadth of experience to provide with the target word.

The second author used Inspiration software (<http://www.inspiration.com/>) to display each word and its morphemes as it was cracked apart. The group discussed possible meanings of prefixes like *en-* and suffixes like *-ment*, but spent the majority of time talking about the root word. In this example it was *courage*. Each student tried to make a connection to the root word. The goal was to increase the breadth and depth of each student's knowledge of the target words. In this example, one student talked about attending Camp Courage, while another talked about his favorite movie, *The Wizard of Oz*, and how the lion sought courage. A third student talked about the courage it took him to wear his hearing aids in public. The group also brainstormed words that contained the root word *courage*, providing *courageous* and *encourage*. Figure 1 shows what this discussion looked like projected in Inspiration.



Figure 1. Displaying Meaning Connections of Target Word in Inspiration.

For the final instructional activity of each session, groups of three students were given index cards of all the morphemes introduced in that lesson, and asked to combine the word parts to create as many words as possible. Results were then shared with the entire class. For the lesson involving encouragement, composer, and discovery, the students created dispose, encourage, and discouragement (see Figure 2). They did not compile an exhaustive list, leaving off many additional possibilities (e.g., poser, compose, discover). However, as they gained experience and accumulated more morphemes across the weeks, the lists became much more elaborated.

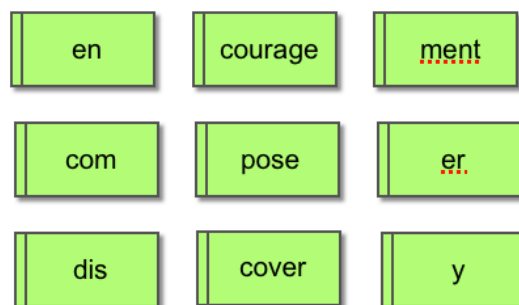


Figure 2. Sample morphemes identified in a three-word lesson.

Words that had been taught in each list were added to a Nifty Thrifty Fifty word wall in the classroom, where students could reference them, and the D/HH teacher could reinforce their use during instructional activities.

Results

The second author observed that the students were engaged by the constructive and interactive nature of the intervention, eager to share their personal connections with the morphemes of each lesson's targeted words. Within a few lessons, the students became reasonably proficient at breaking apart each morphologically complex example. Lessons were punctuated by regular cries of, "I get it!" Students reported that their favorite part of the lesson was creating new words in small peer groups from the cumulating morphemes. Groups competed for the longest list of real words from the available morphemes, checking their creations (and often those of groups with longer lists) in dictionaries to make sure they were real words.

With the intervention going so well, with such limited time available to work with the students, and with so few weeks left in school, the second author was reluctant to interrupt instruction to carry out post-testing. She did readminister the word identification subtest of the QRI-3. Eight of the nine students improved at least two grade levels from the beginning of the school year ($M=3.56$) to the end ($M=5.89$). This represented a substantial shift from the students' previous word identification progress, which had averaged approximately .5 years growth per school year (i.e., 3.5 grade levels in seven years of school).

Further review and informal assessments of the child who showed no growth, scoring second grade level on both pre- and post-tests, revealed that prior to entering the junior high school, she had received exclusively sight word instruction with an emphasis on rote memorization. While she could score at a second grade level in word identification using her knowledge of sight words, she did not understand basic letter-sound correspondences, let alone the complexities of the internal structures of words at the morpheme level. She likely would have benefitted more from instruction emphasizing letter-sound relationships and rime patterns (Bear, Invernizzi, Templeton, & Johnston, 2008; Nagy, Berninger, & Abbott, 2006).

Discussion

This example of community-engaged scholarship was initiated by a practitioner's working knowledge and hands-on experience in a classroom serving young adolescents who were D/HH and finding learning to decode and spell significant challenges. There was a "mutually beneficial exchange of knowledge and resources in a context of partnership and reciprocity" (Carnegie Foundation for the Advancement of Teaching, n.d., p. 2). The first author shared interpretations of the research literature and identified instructional materials, the second author knowledge of deaf education, speech and language methods, and classroom practice. The first author learned about the practical limitations placed on public school personnel seeking to improve the learning of young adolescent students who lag significantly behind peers in literacy learning, information that has been integrated into a reading methods class he teaches for undergraduate special education majors. The second author added a whole class method of morphemic decoding instruction to her repertoire and had reinforced for her how motivating

understandable materials and strategies, peer interactions, and technology integration can be for struggling learners. Ultimately, a public concern (i.e., a speech-language pathologist's frustration with the slow acquisition of decoding and spelling skills in seventh and eighth graders who are D/HH) led to capacity building (i.e., both the first author and the D/HH teacher gained sufficient experience and understanding to incorporate morphemic decoding instruction into their repertoires) while evaluating practice (i.e., the effects of a particular instructional approach on word identification of students who are D/HH).

Limitations

There are obvious limitations to this study that must be acknowledged. The greatest of these are the lack of a formal intervention design (e.g., single subject experiment or control group), the absence of standardized measures of decoding and spelling, and the lack of follow-up. The lack of a formal intervention design means we cannot attribute student outcomes directly to the intervention. It is clear from an informal word identification assessment and the second author's in-class observations while teaching that students increased their ability to seek out morphemes in polysyllabic words and to use them to decode and understand new words. It is not clear that these gains can be attributed to the intervention. Logical arguments can be made, of course, including the annual rate of decoding growth prior to the study (i.e., approximately .5 grade levels per year) that suddenly and simultaneously soared with the introduction of the intervention program.

Similarly, the absence of standardized measures of decoding and spelling leaves student gains open to challenge. Given the single, informal measure administered both pre- and post-intervention, perhaps the students merely learned the words on the assessment rather than a strategy for more effectively decoding morphologically complex words. Again, logical arguments can be made. First, the second author knew the words on both the QRI-3 subtest and the Nifty Thrifty Fifty and did not observe overlap. Second, as an experienced clinician, she provided students with no feedback as to the correctness of their responses during either pre- or post-testing. Finally, both educators and the students themselves observed changes in student understanding and use of morphemes both during lessons and in regular education reading assignments.

Follow-up was not possible because the second author was assigned to a new group of students with significant disabilities the following school year, and the D/HH program was moved to a different school. Such are the challenges of community-engaged scholarship in public schools and the realities of public school experiences for students and educators.

Educational Significance

While scholars have called for increased instruction in morphemic decoding strategy instruction for students who are D/HH, no one has specified what that instruction should look like. The current study employed an existing curriculum, the Nifty Thrifty

Fifty, with clear instructional guidelines (Cunningham & Hall, 1998; Arens, Loman & Cunningham, 2007). The program is structured, easily supported visually, engaging for students and educators, and enables students to manipulate morphemes as they learn to read and use them generatively. The curriculum and instruction are research-based (see, e.g., Nagy, Berninger, & Abbott, 2006; Nippold & Sun, 2008), and we observed positive changes in students' decoding and spelling abilities. We would encourage educators who may explore this approach to look for learning effects in their students by employing either periodic assessments, or pre- and post-test measures, of word identification, spelling, vocabulary generation, and silent reading comprehension.

Scientific Importance

Some scholars have proposed that morphology may be an alternative route to learning to read for students who are deaf (e.g., Gaustad, 2000), while others have suggested there is no escaping the need for phonology in learning to read, regardless of deafness or degree of hearing impairment (e.g., Perfetti & Sandak, 2000). Students in the current study seemed to benefit from experience searching for commonly occurring morphemes in real words and using them to decode and spell additional words. These informal results suggest an alternative instructional approach that may be more (cost-) effective and efficient than those proposed to date, which involve metalinguistic labeling and categorizing (e.g., Gaustad, 2000) or use of Signed Exact English (Nielsen, Luetke, & Stryker, 2011). Reading scholars might contribute significantly to questions such as this by examining the effects of different morphology instructional methods or programs on a range of literacy learning outcomes (e.g., decoding, spelling, vocabulary, silent reading comprehension, or reading fluency). The real test, of course, is not whether students learn the morphemes taught but whether they can employ that knowledge in generalizing to the reading and spelling of other morphologically complex words in text-based reading and writing.

Students, who are D/HH, present interesting challenges to literacy practitioners and reading scholars. These students lack a conventional understanding of the speech sounds represented in orthography, often lack the clarity of speech underlying speech to print or print to speech instructional approaches, and employ a language system in American Sign Language that is visual and signed rather than heard and spoken. In the informal intervention described here, students who are D/HH were taught a set of high frequency morphemes, a means of searching for meaning units in longer words, and a method for comparing and contrasting in order to use what they were learning to read and spell new words containing those morphemes. Given the apparent efficiency of the approach in student learning relative to financial investment or instructional time allocation, further examination in larger-scale, more tightly-constructed studies is warranted.

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