Morphological Awareness Intervention in School-Age Children With Language and Literacy Deficits
A Case Study

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This article highlights the clinical application of morphological awareness intervention to facilitate phonological, vocabulary, reading, and spelling success in children with language and literacy deficits. First, the research-based benefits of morphological awareness instruction are reviewed and current theoretical and research-based perspectives on this type of intervention in school-age children with and without language and literacy deficits are discussed. This is followed by a discussion of some evidence- and theory-based techniques and strategies speech-language pathologists can utilize in their intervention with children who have language and literacy deficits. Finally, a case study is provided of how morphological intervention was applied, and resulting language and literacy outcomes for one eight-year-old child with a speech, language, and literacy deficit are discussed.

Key words: language/learning disabilities, literacy, morphological awareness, reading, spelling, vocabulary, word study

Morphological awareness, defined as the awareness of morphemic structure of words and the ability to reflect on that structure, may be a valuable linguistic tool to facilitate language and literacy success for school-age children with and without language and literacy deficits. With the awareness of affixes and base words, readers learn to see words as the sum of these component parts, which potentially allows for them to infer meaning and pronunciation of unfamiliar words. As such, morphological awareness instruction may provide an opportunity to facilitate success in skills such as vocabulary comprehension or reading decoding in children with language and literacy deficits.

In this article, when the general term of language and literacy deficits is used, we are referring to difficulties associated with the form, content, and use of language and/or with phonemic awareness and reading decoding skills that can negatively impact academic performance and literacy success. Regardless of whether a deficit is inherent in basic language skills, reading decoding, or both, there is evidence that morphological instruction can improve linguistic and reading abilities. Thus, the purpose of this article is to review the evidence and offer recommendations for ways to implement
morphological awareness instruction with school-age children with language and literacy deficits. Moreover, we include a case study as an evidence-based example for how one speech-language pathologist provided morphological awareness intervention with a child diagnosed with a language and literacy deficit.

MORPHOLOGICAL AWARENESS INSTRUCTION: RESEARCH PERSPECTIVE

In recent meta-analyses, morphological awareness instruction has been found to significantly improve language and literacy outcomes and to be a valuable instructional tool for elementary children with language and literacy deficits (Bowers, Kirby, & Deacon, 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Goodwin, Lipsky, & Ahn, 2012; Reed, 2008). In a review of 22 studies, Bowers et al. (2010) found the strongest effect sizes for morphological awareness instruction for readers in early elementary school who struggled with literacy. In a similar meta-analysis of 17 studies, Goodwin and Ahn (2010) found morphological awareness instruction to be particularly effective for children with speech, language, and/or literacy deficits. School-age children who received explicit morphological awareness instruction appeared not only to improve significantly in the linguistic areas of phonological awareness, morphological awareness, and vocabulary knowledge, but also in the related literacy areas of reading and spelling (Bowers et al., 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Goodwin et al., 2012; Reed, 2008).

MORPHOLOGICAL AWARENESS AND PHONOLOGICAL AWARENESS

Morphological awareness may be an important instructional focus when facilitating improvements in phonological awareness for school-age children with language and literacy deficits (Bowers et al., 2010; Carlisle, 2010; Goodwin & Ahn, 2010). Children who struggle to learn speech, language, and/or reading skills often experience difficulties with phonological awareness (Catts, Fey, Tomblin, & Zhang, 2002; Catts, Fey, Zhang, & Tomblin, 1999; National Reading Panel, 2000; Stanovich, 1996).

Instruction in morphological awareness may improve phonological awareness because morphologically based instruction incorporates the awareness of phonemes or sounds by linking this information to meaning. For example, when speaking of the relationship between the words music and musician, the base word music is used to ascertain the meaning of the derived form musician, despite the shift in phonology or pronunciation of the letter c from /k/ to /ʃ/ in the derived form. Thus, morphological awareness, or a focus on meaning, may help to mediate or scaffold a child's understanding of the phonological relationship between words. Researchers such as Casalis, Cole, and Sopo (2004) suggest morphological awareness may potentially mediate or help in the processing and production of phonological skills for individuals with dyslexia. Thus, for elementary school children with language and literacy deficits, morphological awareness instruction may provide an ideal medium to target phonological awareness.

MORPHOLOGICAL AWARENESS AND VOCABULARY AND READING COMPREHENSION

Just as morphological awareness may provide a bridge to phonological awareness learning, morphological awareness instruction is thought to mediate and facilitate vocabulary acquisition which, in turn, may facilitate reading comprehension (Bowers & Kirby, 2010; Carlisle, 2005, 2010; Guo, Roehrig, & Williams, 2011; Tong, Deacon, Kirby, Cain, & Parilla, 2011). Morphologically complex words make up more than half of the words in the English language (Anglin, 1993; Nagy & Anderson, 1984). As children progress through the elementary grades, a large percentage of the new words they encounter are morphologically complex, with a clear
internal structure (Nagy & Anderson, 1984). Because the meanings of most morphologically complex words can be predicted from the meanings of their individual components, an awareness of the morphological structure of words can help children in learning new vocabulary and, ultimately, understanding novel words they encounter in their reading (Baumann et al., 2002; Baumann, Edwards, & Kame’eneue, 2003). In fact, it is thought that typically developing children implicitly learn many and comprehend new words in the classroom through the application of morphological awareness knowledge while reading (Anglin, 1993; Carlisle, 2003, 2010; Nagy & Anderson, 1984; Nagy, Berninger, & Abbott, 2006). Despite the documented importance of morphological awareness, it is not routinely or explicitly taught in the classroom (Nunes & Bryant, 2006).

Explicit vocabulary instruction based in morphological awareness may be especially important for children with language and literacy deficits. Vocabulary plays a fundamental role in a child’s ability to communicate (Hart & Risley, 1995) and read (National Reading Panel, 2000), and the vocabulary skills of typically developing students likely increase when they apply morphological awareness while reading and spelling (Carlisle, 2003). On the other hand, children with language and literacy deficits have been found to produce vocabulary and morphological forms that are less complex than typically developing peers (Curtiss, Kutz, & Tallal, 1992; Windsor, 2000). Without explicit instruction, individuals with language and/or literacy deficits may not develop and apply morphological awareness while reading and spelling (Carlisle, 2003). But consider the following, often-challenging “silent letter” spelling words: sign, bomb, and hymn. Although these spellings may seem mysterious at this base word level, morphological awareness can provide the auditory “identity” of the silent letters via the derivations such as in signature, bombardment, and hymnal. Thus, an awareness of the morphemic structure of words would be useful for students of all abilities and ages who are learning to decode and spell words (Deacon, Kirby, & Casselman-Bell, 2009; Kirby et al., 2012; Kirk & Gillon, 2009; Wolter, Wood, & D’zatko, 2009).

Explicit instruction regarding the morphological structure of words may be of particular importance for children with language and literacy deficits, given that they may not have the foundational morphological knowledge that would typically aid in successful reading and spelling. Researchers have found that these students produce fewer morphological forms, are less accurate in the forms they do produce, and perform similarly to younger
children on morphological tasks (Carlisle, 1996; Curtiss et al., 1992; Moran & Byrne, 1977; Windsor, 2000). Based on such research, it would be expected that school-age children with language and literacy deficits may continue to struggle with earlier developing inflectional morphology, which refers to affixes that change tense (e.g., -ing, -ed), plurality (plural -s), and possession (possessive -s). They also may experience difficulty acquiring later developing derivational morphology, which refers to those affixes that change word class (e.g., changing the verb teach to the noun teacher). Thus, it is not surprising that recent meta-analysis findings revealed that children with language and literacy deficits particularly stand to benefit from explicit instruction in base words and affixes and the application of morphological information for efficient decoding, spelling, and reading comprehension (Bowers et al., 2010; Goodwin & Ahn, 2010).

EVIDENCE-BASED INTERVENTION AND TECHNIQUES

Given the theoretical and empirical support, along with the possibility that base words and their affixes are not necessarily being systematically taught in the school setting (Nunes & Bryant, 2006), it appears morphological awareness instruction offers an opportunity to facilitate language and literacy success for elementary school-age children. Several features of morphological awareness instruction have consistently been found to be effective with children with language and literacy deficits. These include the integration of problem solving or a motivating “detective” theme, the explicit focus on morphological meaning units, and the incorporation of morphological awareness in contextual or language-literacy-related instruction (Bowers et al., 2010; Goodwin & Ahn, 2010; Reed, 2008).

Some researchers have suggested that a problem-solving self-discovery approach can motivate student effort, result in deeper processing, and enhance long-term memory. In this type of approach, children are encouraged to infer meaning, decode in reading, and spell by actively reflecting on morphological information (e.g., using base word knowledge and affix knowledge) (Goodwin et al., 2012). For example, knowledge of the base word tooth and the affix of -less might be used to infer the meaning, decoding, and spelling of the novel vocabulary word of toothless. In their meta-analysis, Bowers et al. (2010) cited four studies that were found to motivate children and improve language and literacy through the integration of problem solving (Baumann et al., 2003; Berninger et al., 2003; Bowers & Kirby, 2010; Tomesen & Aarnouste, 1998). Bowers et al. suggested that the inclusion of a problem-solving approach may be a critical feature in obtaining transfer and is worthy of further investigation.

For children with language and literacy deficits, it appears that an explicit intervention approach, which focuses on providing students with repeated opportunities to actively reflect on and think about the meaning of base words and affixes in language and literacy contexts, is most effective in improving language and literacy skills (Bowers et al., 2010; Goodwin & Ahn, 2010; Goodwin et al., 2012; Reed, 2008). Based on their meta-analysis, Goodwin and Ahn (2010) derived 16 evidence-based foci for morphological treatments. These include focused and practice-based instruction in affix and root/base words, recognition and application of inflectional and derivational morphology, identification of morphological patterns related to spelling rules using word sorts, reflection on morphological word-relatedness and word origins, and the understanding and creation of multimorphemic words. In addition, when appropriate, these types of activities should be routinely integrated into academic contexts (e.g., science, math, language arts) with functional linguistic applications in spelling, reading, and writing (Goodwin et al., 2012; Reed, 2008).

In the following sections, we will further discuss some of the evidence-based morphological awareness interventions highlighted
by Goodwin and Ahn (2010). In particular, we will describe and provide examples and techniques for introducing morphology (e.g., instruction in base words and affixes), identifying morphological patterns, emphasizing inflectional and derivational morphological awareness, and building words from morphemes. The example activities will integrate evidence-based techniques such as word sorting (e.g., grouping words based on inflectional endings) and application of “detective” strategies (e.g., gaining meaning by breaking words into their constituent morphemes, reasoning by analogy). Finally, activities are presented in which links to spelling, reading, and grammar are utilized to connect morphological awareness within meaningful academic contexts.

**Introducing morphology and identifying patterns**

Intervention should begin with an introduction of the concept of morphology and provision of many relevant examples. This introduction should include an emphasis on the importance of morphology, explanation of target patterns (i.e., inflectional or derivational), and provision of multiple examples. Depending on the grade and cognitive level of the student, the jargon terminology may be taught directly (e.g., derivative, suffix), or it may be preferable to teach and use simpler terms (e.g., base word, word ending). The rationale should be provided that students will learn about morphemes to increase their vocabulary skills and/or to become better readers and spellers. For example, if a student is struggling with derivational morphology, we would begin with the explanation that there are base (root) words to which affixes, or word beginnings or endings, can be added to change meaning. A base word can stand all by itself and tells us what the word is about—it is the “power” of the word. For example, one might present base words such as the words fear or friend. Adding a suffix or prefix can “make a change.” So we can change the word fear to fearful, and adding suffix -ful means we are “full of” the base word. Or, we can change the word friend to friendly, in which the suffix -ly means “like the base word,” or change it to unfriendly in which the prefix un- means we are not friendly (see Figure 1 [Supplemental Digital Content available at http://links.lww.com/TLD/A14] for a sample introductory morphological activity).

Once the terminology and rationale for why morphology may prove helpful in determining word meaning are established, intervention may include a focus on identifying the regularities or patterns of morphology in language. Patterns and consistency are useful in helping students see that the English language is systematic in many ways. This systematicity can be illustrated through instruction in the rules that govern the addition of suffixes to base words and in the consistent spellings of prefixes and suffixes. There are a variety of such rules and regularities that can be addressed in intervention to facilitate decoding and spelling. Whether inflectional or derivational in nature, word sort and pattern identification activities are excellent avenues for discovering and applying rules such as these. The following sections provide examples of how inflectional and derivational patterns may be presented and emphasized to students.

**Emphasizing inflectional morphological awareness**

Some school-age children struggle with correct use and spelling of inflectional morphemes, which frequently occur in the English language. Targeting awareness of inflectional morphemes should focus on associating the grammatical forms with their meanings. This may involve mapping the concept of “more than one” with the plural -s or the concept of an action occurring in the present with the present progressive -ing. An additional instructional point would address the fact, that these endings are spelled the same way, even though they may sound different (e.g., /s/ in cats, /z/ in girls). Sorting activities (examples found...
in Figure 2 [Supplemental Digital Content available at http://links.lww.com/TLD/A14]) can provide a mechanism for discovery of these inflectional patterns and their spellings along with increasing overall awareness of morphemes in words.

**Emphasizing derivational morphological awareness**

Whereas inflectional morphemes modify number, tense, or aspect, derivational morphemes change the semantic roles played by words within sentences. Derivational modifications can transform an adjective to a noun (electric, electrician), a verb to a noun (retalliate, retaliation), or a verb to an adjective (create, creative). These forms allow for syntactic flexibility in speaking and writing. Knowledge of the association between derivational endings and parts of speech can facilitate sentence comprehension via reasoning by analogy. For example, when encountering a less frequent word like “centenarian,” knowledge of the derivational suffix -ian as indicative of a noun and a person can provide partial insight into the word’s meaning as referring to a person, similar to “librarian.” Using morphology to make words fit into sentence slots or to change a word’s part of speech provides important application in grammatical context (see Figure 3 [Supplemental Digital Content available at http://links.lww.com/TLD/A14] for examples of derivational morphology activities).

**Building words from morphemes**

Another intervention focus includes the production of multimorphemic words or word building. Thus far, we have described and provided intervention activities that focus on the recognition of meaning and patterns in words. Word building, however, provides a vehicle to begin to focus on the expressive production or productive power of morphology. There is power in knowing that new words can be created from knowledge of morphemes. This concept can be illustrated at the compounding level when known words are combined to form new words (e.g., fire-

man). In addition, knowledge of the meaning of Greek and Latin roots and derivations (e.g., the prefix mono- means “one” or “single”) also can allow students to create novel words which may ultimately lead to a better understanding of unfamiliar words students might encounter in text. The activities in Figure 4 [Supplemental Digital Content available at http://links.lww.com/TLD/A14] provide a way for students to see the power of meaning making. These introductory activities could be accompanied by specific instruction in the meaning of affixes, base words, and/or common Greek and Latin roots to facilitate increased vocabulary knowledge.

**Linking morphological awareness to an academic context**

Students need to see the applicability of their new morphological skills in everyday situations. Students can be taught to identify morphologically complex words in class literature, spelling assignments, and content area textbooks and then use their morphological knowledge and “detective skills” to discern meaning. Context (e.g., clues in the text that help us figure out meaning) and morphological reasoning by analogy can be used to sort out the meaning of an unknown word (e.g., If you know piglet means little pig, then what would owlet mean?). To refer back to the example of the less frequent word like centenarian, the grammatical category was identified based on prior knowledge that the suffix -ian indicates a noun and specifically a person. Now it can be reasoned that centi-can be found in more familiar words like centimeter and inferred that the Latin root cent means one hundred. Thus, it could be concluded that centenarian may refer to “a 100-year-old person” and context can be used to determine whether the meaning makes sense (e.g., “The retirement facility was home to many centenarians.”). Key words like “retirement facility” help to confirm whether the correct inferences were made. (see Figure 5 [Supplemental Digital Content available at http://links.lww.com/TLD/A14] for example activity).
Evidence-based intervention summary

For children with language and literacy deficits, explicit activities that require active reflection on morphological word parts and patterns linked to language and literacy contexts were found to significantly improve language and literacy skills (Bowers et al., 2010; Goodwin & Ahn, 2010; Goodwin et al., 2012; Reed, 2008). We have highlighted techniques and provided example activities for how a language or literacy specialist may introduce and explicitly teach inflectional and/or derivational morphology. Intervention should focus on both the recognition of meaning and patterns in words and include production activities such as word building. Moreover, a link to reading and spelling provides a functional context for students to apply their newly learned morphological awareness skills. The following case study now serves to demonstrate and exemplify the principles thus far discussed in an eight-year-old boy with speech, language, and literacy difficulties.

CASE STUDY

Simon1, age 8:1, had a diagnosed speech and language impairment along with reported reading deficits and was referred to the first author for summer language and literacy services at the end of second grade. Per the school speech-language pathologist’s report, Simon’s hearing and cognition were within normal limits and initial first grade testing placed Simon at or below 1.5 standard deviations from the mean in speech production and receptive and expressive semantics. As a result of that testing, Simon received direct speech and language intervention services during his first and second grade academic school years. At the time of the referral to the first author, his speech and language goals included articulation of the /r/ and /l/ phonemes and increased receptive and expressive vocabulary. In addition, the school speech-language pathologist had recently addressed his language goal through direct instruction of words from vocabulary lists provided by his regular education classroom teacher.

In the area of literacy, Simon also received special education reading support at school during first and second grade. At the time of the referral to the first author, Simon was reportedly struggling in the areas of sight-word reading and word-level decoding. His resource room teacher was targeting his sight word reading abilities through drill activities such as sight-word flash cards and reading decoding by teaching phonemic blending. Simon’s reading fluency rate was being monitored through timed readings in the classroom and resource room. Simon’s mother and teachers were concerned about whether Simon’s literacy and vocabulary skills were appropriate for him to succeed in the upcoming third grade school year, and summer literacy services were sought to supplement those implemented during the school year. No additional information was available from the school.

Preintervention testing

Initial testing was conducted in the areas of vocabulary, sight-word reading, reading decoding, reading comprehension, reading fluency, and spelling. Subsequent linguistically based measures in the areas of morphological awareness and phonological awareness were administered to further investigate the underlying language skills related to Simon’s specific literacy struggles.

Vocabulary

The Peabody Picture Vocabulary Test-4 (PPVT-4), Form A (Dunn & Dunn, 2007), was administered as a measure of Simon’s receptive vocabulary or semantic skills. Simon’s standard score of 93 ($M = 100, SD = 15$) indicated that he was functioning within the low-average range for receptive vocabulary.

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1A pseudonym was used to protect privacy. Human Subjects Institutional Review Board approval and informed parental and client consent granted for case study purposes.
Simon’s vocabulary continued to be a concern to the clinician because a receptive-only word-level vocabulary score, such as that found in the PPVT-4, is often much higher than a child’s expressive vocabulary abilities which are required in everyday contextualized language. Indeed, in the everyday context of using expressive vocabulary in a spoken conversation with the first author, Simon used simple vocabulary and demonstrated multiple mazes that included talking around the subject (i.e., circumlocutions), using nonspecific words (e.g., thing, stuff), and relying on gestures when he appeared to not know the exact word. In samples of Simon’s written academic work (e.g., an assignment that required him to define key words taken from his grade-level reading curriculum), he demonstrated a limited ability to provide definitions for words learned in class, independently doing so in only 4 of 10 words sampled. Taken together, it appears that although Simon’s receptive vocabulary skills were within the average range, he continued to struggle with expressive vocabulary in functional spoken and written contexts.

**Reading**

Initial reading testing was conducted using the Word Identification, Word Attack, and Passage Comprehension subtests of the Woodcock Reading Mastery Test-Revised (WRMT-R) Form A (Woodcock, 1998) to assess sight word reading, decoding, and reading comprehension, respectively. Based on the results, which are reported in Table 1, reading abilities were in the low-average range. In addition, the Test of Silent Word Reading Fluency (TOSWRF; Mather, Hammill, Allen, & Roberts, 2004) was administered to assess reading fluency, which also was found to be in the low-average range (See Table 1).

Further testing of Simon’s reading was conducted through a miscue analysis to assess his reading skills in the more functional context of reading and to determine whether he demonstrated many mistakes or miscues when reading text (i.e., word substitutions, reversals, deletions, misarticulations, insertions). Simon was directed to read aloud an age-appropriate reading passage. Simon read the passages with 88.2% accuracy and demonstrated the miscues of text item substitutions (e.g., roller for rolled), reversals (e.g., she hard looked for she looked hard), grammatical-morpheme deletions (e.g., circumstance for circumstances), misarticulations (bag for badge), intonation shifts, insertions (e.g., just), and multiple repetitions. Simon’s use of intonation and pausing during reading did not consistently reflect text punctuation markers (e.g., no pauses at periods, no rising intonation when reading questions). Overall, the multiple miscues provided evidence that Simon found grade-level reading passages challenging to read and comprehend.

**Spelling**

The Test of Written Spelling-4 (TWS-4) Form A (Larsen, Hammill, & Moats, 1999) was administered to assess Simon’s overall spelling abilities and Simon scored two standard deviations below the mean (see Table 1). The Spelling Performance Evaluation of Language and Literacy, 2nd Edition (SPELL-2; Masterson, Apel, & Wasowicz, 2007), a comprehensive computer software assessment tool, was administered to further analyze the language domains and patterns of spelling errors. Simon’s spellings reflected decreased phonological awareness as his patterns were inconsistent with the use of letter-sound correspondence, and he did not consistently produce phonetic spellings (“hunde” for “honey”). Simon’s orthographic knowledge appeared to be in deficit and he did not accurately apply orthographic rules such as long- and short-vowel rules in a majority of his spellings (e.g., “chan” for “chain”). In addition, Simon seldom demonstrated the morphological rules for spelling suffixes (e.g., spelling regular past-tense -ed) and did not use base words to spell word derivatives in 20% of the opportunities given (e.g., using base word magic to spell the word magician).
Table 1. Pre- and postintervention language and literacy results

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<th>Preintervention</th>
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<td><strong>Vocabulary</strong></td>
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<td>PPVT-4</td>
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<td>103&lt;sup&gt;*a&lt;/sup&gt;</td>
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<tr>
<td>WRMT-R Passage Comprehension</td>
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<td>96&lt;sup&gt;a&lt;/sup&gt;</td>
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<td>TWS-4</td>
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<td>79&lt;sup&gt;a&lt;/sup&gt;</td>
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<td><strong>Phonological Awareness</strong></td>
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<tr>
<td>C-TOPP Segmenting Nonwords</td>
<td>8&lt;sup&gt;b&lt;/sup&gt;</td>
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<td><strong>Relational Task</strong></td>
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<td>Words with transparent relationship</td>
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<td>Words with opaque relationship</td>
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<td><strong>Production Task</strong></td>
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<td>Words with transparent relationship</td>
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<td>Words with opaque relationship</td>
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<td>67&lt;sup&gt;%c&lt;/sup&gt;</td>
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<sup>a</sup>Standard score, based on a mean of 100, standard deviation of 15.
<sup>b</sup>Standard score, based on a mean of 10, standard deviation of 3.
<sup>c</sup>Percentage correct.
<sup>*</sup>Substantially or clinically significant improvement denoted by nonoverlapping SEMs.

**Phonological awareness**

The Nonword Segmentation subtest from the Comprehensive Test of Phonological Processing (CTOPP; Wagner, Torgeson, & Rashotte, 1999) was administered to examine phonemic awareness skills. This test required Simon to tap out and say each sound in several “made-up” words. Simon achieved a score in the low-average range (see Table 1).

**Morphological awareness**

To further assess Simon’s derivational knowledge, two spoken tasks were administered. These morphological awareness measures were based on the work of Carlisle (1995, 2000) (see Apel & Masterson, 2001 and Wolter et al., 2009 for published adaptations). The first was a relational task in which Simon identified the derivational relationship of paired words. Given paired words with little sound or spelling change between the two (e.g., quick and quickly), sometimes referred to as a transparent relationship, Simon was 100% accurate in identifying the derivational relationship. He was approximately 33% accurate when identifying a derivational relationship between words with a sound or spelling change between derivations (e.g., steal and stolen), sometimes referred to as an opaque relationship. An additional task of generating derivations of words to complete sentences was administered. On this production task, Simon was able to generate derivations with little sound or spelling change (e.g., swim to swimming) approximately 100% of the time, and was able to generate words requiring a sound and spelling change (e.g., five to fifth) approximately 33% of the time. Thus, it was concluded that Simon was aware that words can be derived from other words in very similar sounding or “transparent” words, and he demonstrated an emerging awareness that word derivatives with different spellings and sounds or “opaque” words may also share meaning.
Preintervention summary

In summary, Simon appeared to have deficits in expressive vocabulary and spelling abilities. He appeared to be functioning in the low-average range in the areas of reading and phonemic awareness and was emerging in his ability to identify morphological relationships between words in opaque circumstances. Simon’s literacy struggles appeared to be due to linguistic deficits in the areas of morphological awareness, orthographic knowledge, and phonological awareness abilities.

Intervention

A morphological awareness approach was determined to be ideal for addressing Simon’s vocabulary, phonemic, reading, and spelling difficulties. A focus on morphological awareness linked to reading and spelling contexts would allow the clinician to focus on sound (phonological awareness), spelling (orthographic knowledge or patterns), and meaning (morphological awareness) simultaneously. Based on the research reviewed in this article, it was hypothesized that morphological awareness instruction linked to literacy might improve not only Simon’s ability to identify morphological relationships between words but also his vocabulary, phonemic awareness, reading decoding, and potentially reading comprehension skills.

Thus, Simon attended daily 1-hr sessions for 10 consecutive weekdays over 2 weeks. The first author, a certified speech-language pathologist, conducted all instruction. Within the daily 60-min time period, Simon received focused and directed explicit instruction, that involved guided self-discovery of morphological patterns, repeated opportunities to work with common affixes and base words, and multiple opportunities to apply morphological awareness in functional reading and spelling contexts.

Problem-solving/self-discovery focus

A detective theme was integrated into intervention to provide motivation and structure for each therapy session. Simon and the clinician referred to therapy sessions as “detective camp” and within each therapy session the focus was to “crack codes,” “solve mysteries,” and “analyze clues.” In addition, props such as magnifying glasses and decoder rings were integrated to facilitate the detective theme and provide a fun and motivating learning environment. Simon was presented with morphological patterns and asked to self-discover or identify the patterns through word sorts and word-building activities. The clinician facilitated self-discovery through “think alouds,” in which she actively talked about her problem-solving process and provided numerous opportunities for Simon to talk through his own executive functioning or thought process.

Instructional focus and activities

Each 60-min therapy session followed a time-ordered agenda and included instruction focused on decoding practice of morphologically complex words (10 min), word sorts for inflectional and derivational morphology patterns (15 min), games using newly learned morphological patterns (10 min), base word- and affix word-building activities (15 min), and morphological instruction linked to readings (10 min).

Decoding practice included detective activities where Simon was required to decode words that included common and/or previously learned morphological patterns. These words all provided clues to a key word to be solved (e.g., clue words: reuse, prevention, renewable, sorted, preparation, resourceful; answer: recycle). This activity allowed for the review of previously taught morphological patterns and provided multiple opportunities to practice decoding multisyllabic words by applying knowledge about base words and affixes.

Word sorts, related games, and word-building activities, such as those described in the previous section, were provided on both inflectional and derivational morphological spelling patterns. Targeted inflectional morphological patterns included plural -s (spelled s, es, and ies), past tense -ed (spelled -ed but pronounced /t/, /d/, /ed/), and present progressive tense -ing (how -ing changed
Morphological Awareness Intervention

base words). Derivational targets included instruction on common early-developing prefixes (e.g., pre-, re-, over-, un-) and suffixes (e.g., -able, -ion, -er, -est, -ful, -less) and how they changed meaning. Word sorts focused on the transparency or opaqueness of word relations and sort activities, such as the sample activity shown in Figure 3 (Supplemental Digital Content available at http://links.lww.com/TLD/A14), were used to teach “word relatives.” Word sort activities were followed by games that required the use of the newly learned word patterns. These game ideas came from sources such as *Words Their Way* (Bear, Invernizzi, Templeton, & Johnston, 2004) and included activities such as *Jeopardy*© where categories were patterns (e.g., Plural-<s, -es, -ies>) and clues were provided (e.g., “Under the -ies category the clue of “more than one party””) to provide opportunities to use newly learned morphological patterns (e.g., answer: *parties*). In addition, word-building activities were provided in which base words and newly learned affixes were added to build new words with new meanings. These activities provided multiple opportunities to actively discuss meanings of newly developed words. In every word sort, game, or word-building activity, Simon wrote the words in his journal to practice spelling his newly learned morphological patterns.

Finally, at the conclusion of every session, Simon and the clinician focused on using morphological awareness as a strategy to infer meaning when reading connected text. Simon and the clinician searched for morphologically complex words in age-appropriate readings and actively discussed how to use one’s knowledge of morphology when attempting to discern meaning in text. Simon was then directed to find words that followed newly learned morphological patterns when reading at home.

**Postintervention results**

Simon’s language and literacy skills were assessed immediately following the completion of the intervention program. All testing measures reported preintervention were readministered (see Table 1 for results). Standardized measures were examined for nonoverlapping standard error of measurement (SEM). The SEM denotes a range of performance or how an individual may perform on a test on any given day. If the preintervention SEM did not overlap with the range of possible performance, or SEM, on the postintervention, then it could be inferred that a substantial change in performance had occurred (Apel & Master-son, 2001).

**Vocabulary**

Simon’s standard score on the PPVT-4 Form B was 103, a clinically significant or substantial increase in receptive vocabulary abilities. The SEMs for the PPVT-4 Form A and Form B are 3.6 and 3.3 (standard score units), respectively. Thus, Simon needed to score above a 96.6 (preintervention score of 93 + 3.6), the highest possible score he might have scored on his “best” day preintervention, as well as above the score of 99.7, the lowest score he might have achieved on his “worst” day postintervention (postintervention standard score of 103 – 3.3). Thus, it appeared Simon achieved a score that did not overlap in the range of possible scores, indicating a clinically significant or substantial increase in vocabulary performance.

**Reading**

In the area of reading comprehension, it appeared that Simon improved substantially earning a score of 96 on the Form B WRMT-R Passage Comprehension subtest. When the rule of nonoverlapping SEMs is once again applied, Simon scored outside of the SEM range. That is, his preintervention Form A true score fell between the standard score range of 88 and 93, and postintervention Form B true score range between 94 and 98.

Simon’s sight word reading, reading decoding, and reading fluency skills did not increase substantially (see Table 1). A subsequent miscue analysis of an age-appropriate reading passage revealed, however, a slight increase of
reading ability to a 90.1% accuracy reading level with only 9.9% of words read in error (an increase from a pre-intervention accuracy rate of 88.2%).

**Spelling**

The TWS-4 Form B was administered and a significant improvement in spelling performance was not indicated as the SEM overlapped pre- and postintervention. The SPELL-2 computerized assessment tool was readministered to further analyze the language domains and patterns of spelling errors. Although the TWS-4 did not reveal clinical improvement, analysis of spelling errors using the SPELL-2 reflected an improved application of linguistic strategies. In the area of phonological awareness, Simon appeared to improve in his spellings and demonstrated spelling patterns consistent with the use of letter-sound correspondence and phonetic spellings (e.g., “hune” for “honey”). Although there were no noteworthy changes in his application of orthographic spelling rules (a skill not directly targeted in therapy), his application of a morphological awareness strategy appeared to improve, in that he accurately spelled a majority of affixes and applied his base word knowledge to spell word derivatives in 70% of the provided opportunities. That is, although the base word was often still misspelled (e.g., spelling magic for magic) he consistently applied the base word to spell the derivative (e.g., using misspelled majuc to spell majucian for magician), which was a notable improvement.

**Phonological awareness**

Simon earned a postintervention CTOPP standard score of 11 (above average). This represented a clinically significant or substantial increase in phonemic awareness abilities from his preintervention low-average score. The SEM for the CTOPP is 1 (standard score unit). Thus, Simon’s postintervention true score range of 10–12 did not overlap with the preintervention standard score range of 7–9.

**Morphological awareness**

In addition to the aforementioned improved application of a morphological awareness strategy in his spellings, Simon improved in his ability to identify and generate spoken derived word forms that were not easily recognizable or transparent in relationship. Simon was approximately 67% accurate when identifying and producing words requiring a sound and spelling change (e.g., *five* to *fifth*) as compared to his preintervention accuracy rate of 33% (see Table 1).

**DISCUSSION OF SIMON’S PROGRESS**

Individualized morphological awareness instruction that integrated a problem-solving detective theme and included an explicit focus on morphology in a contextualized manner appeared to improve the language and literacy skills of an eight-year-old boy with speech, language, and literacy deficits. Clinically significant improvements were found in the areas of phonological awareness, vocabulary, and reading comprehension. Reading accuracy improved (evidenced by a miscue analysis) and the specific application of morphological awareness skills in spelling appeared to improve as well.

It is noteworthy that phonemic awareness appeared to improve substantially in conjunction with morphological awareness, as this linguistic skill was not directly targeted. Perhaps the morphological component or reflection on meaning when discussing sounds in words (e.g., discussing the ending sounds of /t/, /d/, /ed/ when discussing past tense -ed) provided a scaffold or bridge for which to store and think about phonemic information. In turn, this appeared to improve Simon’s awareness of phonological information in other morphologically simple words, evidenced in his CTOPP score and his application of phonology in postintervention spelling tasks. This finding is consistent with previous findings (Bowers et al., 2010; Goodwin & Ahn, 2010) and is of particular importance for children with speech and language impairments whose
difficulties with reading and spelling are often linked to weak phonological awareness (Catts et al., 1999, 2002).

In addition, morphological awareness instruction appeared to generalize to overall increases in vocabulary knowledge, which, in turn, appeared to improve Simon’s reading comprehension abilities. An improvement in PPVT-4 scores was noteworthy as these were not necessarily multimorphemic words nor words directly targeted in therapy. Perhaps the instructional focus on using morphological units to infer meaning provided an additional benefit of increasing an overall general awareness of meaning. These findings may indicate that morphological awareness instruction is a powerful strategy for facilitating vocabulary development for children with language and literacy deficits as this skill can generalize to untaught vocabulary words.

In addition, Simon’s increase in reading comprehension skills may have been due to explicit instruction on how to apply morphology to infer meaning in the context of reading. This brief but daily two-week instruction appeared to increase Simon’s confidence and enthusiasm for using this strategy on his own. Indeed, Simon came to therapy excited to share the instances in which he found words of newly learned morphological patterns in context such as his own books at home. In fact, he reported the inclusion of a multimorphemic word in his environmental print (e.g., “book return” sign at the library), which reflected a generalization of skills.

Although standardized measures did not reveal substantial increases in spelling and reading abilities, a finding consistent with other literature in which the same standardized reading and spelling assessments were used (Apel & Masterson, 2001; Goodwin & Ahn, 2010), the linguistic spelling analysis and the reading miscue analysis revealed improvement in application of morphological strategies. This is an encouraging finding and provides direction for a future intervention focus.

It should be noted that, although differing versions of standardized measures were administered pretest to posttest when available, there was a risk of test–retest effects which may have improved posttest outcomes. Despite that risk, one that is inherent to any treatment study with a short intervention duration, the case study outcomes provide one more research-based example demonstrating that morphological awareness intervention may be a valuable instructional tool when working with children with language and literacy deficits.

SUMMARY

Morphological awareness instruction appears to be a clinically relevant instructional approach for improving phonological awareness, vocabulary, reading, and spelling success in elementary school-age children with language and literacy deficits. Previous research, as well as results from the presented case study, provides evidence that morphological awareness instruction may be a valuable clinical tool when targeting this population. Speech-language pathologists and literacy specialists in school settings may find benefits from implementing an explicit and contextualized morphological awareness approach in the academic environment.

REFERENCES


