

Morphological Awareness Intervention for Students Who Struggle with Language and Literacy

by Julie A. Wolter and Ginger Collins

Language and literacy development are tightly interwoven skills, and the active processing of morphemes, or the smallest units of linguistic meaning, is one foundational language skill that influences reading and writing success (Carlisle, 2003). Morphological awareness (MA) refers to the student's ability to understand, analyze, and manipulate morphemes within words, and this explicit awareness of meaning provides a valuable mechanism to help students of all abilities read and write (Carlisle, 2010). In fact, MA may be an especially important skill to improve reading success for students at risk for or diagnosed with specific learning disabilities such as dyslexia and oral and written language learning disability as this skill promotes written word decoding and identification as well as related vocabulary abilities. Indeed, two recent meta-analyses revealed this language skill to have significantly increased benefits for students with such deficits (Bowers, Kirby, & Deacon, 2010; Goodwin & Ahn, 2010). In the following sections, we will examine best intervention practices for students with specific learning disabilities that are related to language and/or literacy deficits (LLD). Finally, intervention ideas and examples will be provided for how to provide support for students with LLD in the academic context.

Morphological Awareness and Literacy

Morphological awareness has been shown to positively influence sight word reading and decoding abilities (e.g., Apel & Diehm, 2014; Deacon & Kirby, 2004; Wolter & Dilworth, 2014; Wolter, Wood, & D'zatko, 2009). The awareness of morphological word structure appears to aid in rapid word recognition and written word pronunciation resulting in efficient decoding of words that contain multiple morphemes. Additionally, through the positive influence of MA, and thus understanding of vocabulary, this skill appears to support the process of text comprehension in students with and without LLD (Nagy, Berninger, & Abbott, 2006; Carlisle, 2010; Tong, Deacon, & Cain, 2014; Tong, Deacon, Kirby, Cain, & Parrila, 2011; Wolter & Dilworth, 2014). Students may apply MA knowledge by using familiar base words and suffixes to infer the meanings of unfamiliar derivatives to fully comprehend the meaning of text. For example, the student may use past knowledge of the meaning of the base word *giant* and the suffix *-ess* (i.e., referring to the female gender from the known word *princess*) to infer the meaning of the unknown word *giantess* in the sentence "*The giantess bellowed for her food.*"

Morphological Awareness Intervention

As noted in this issue, children with typical language and literacy skills begin developing morphological awareness skills early, often in kindergarten and first grade. Students with LLD appear to produce fewer morphological forms, are less accurate in the forms they do produce, and perform similarly to younger children on tasks of morphological awareness (Carlisle, 1996; Curtiss, Katz, & Tallal, 1992; Moran & Byrne, 1977; Windsor, 2000). Based on that research, it would be expected that school-age children with LLD may continue to struggle with earlier developing inflectional morphology and experience difficulty acquiring later developing derivational morphology. Moreover, based on this knowledge, these students may still experience significant difficulty developing complex and opaque derivational forms well into adolescence (Deacon et al., 2014; Larsen & Nippold, 2007).

Across multiple studies, several common intervention practices appear to consistently result in effective morphological awareness intervention for students with LLD.

Across multiple studies, several common intervention practices appear to consistently result in effective MA intervention for students with LLD (Bowers et al., 2010; Goodwin & Ahn, 2012; Wolter & Green, 2013; Wolter & Dilworth, 2014). Students with LLD appear to benefit from MA interventions that a) integrate intervention in a reading and writing context, b) include explicit instruction, c) provide repeated opportunities to actively reflect on and think about the meaning of base words and affixes (i.e., "add-ons"), and d) incorporate and consider student motivation (Bowers et al., 2010; Goodwin & Ahn, 2010; Goodwin, Lipsky, & Ahn, 2012; Reed, 2008). Intervention will be reviewed according to these suggested practices in the following sections.

Goals and Language and Literacy Integration

Morphological treatment goals can be easily linked to national or state standards and benchmarks that target reading, writing, vocabulary, and language. For example, the English

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Abbreviations

CCSS: Common Core State Standards
IEP: Individualized Education Plan

LLD: Language and/or literacy deficits
MA: Morphological awareness

TABLE 1. Examples of Morphological Awareness Activities

Word segmentation	Word building	Teach affix and root meanings	Word sorts	Word hunts
Students are provided with a list of multi-morphemic words and are instructed to identify each word, identify each of the morphemes comprising that word, and explain how the affixes relate to the meaning of the word.	Students are provided with roots and affixes and are instructed to combine them into multimorphemic words. Students should also identify the meanings of the new words they generate.	Students are given explicit instruction in affix and root meanings, followed by practice identifying roots and affixes in multimorphemic words.	Students are provided with words written on cards and are instructed to sort them into categories based on orthographic, morphological, or phonological patterns.	After students have engaged in isolated morphological awareness activities, they are instructed to locate words that share the same roots or affixes contained in the words targeted for instruction.

Language Arts, Language Skills section of the Common Core State Standards (CCSS) delineates standards of inflectional MA, e.g., CCSS.ELA-Literacy.L.4.1.b. “Form and use the progressive (e.g., *I was walking; I am walking; I will be walking*) verb tenses”; and derivational MA, e.g., CCSS.ELA-Literacy.L.4.4.b “Use common, grade-appropriate Greek and Latin affixes and roots as clues to the meaning of a word (e.g., *telegraph, photograph, autograph*).” Other related standards can be found in the reading and writing sections, such as the following in the Reading and Foundational Skills CCSS.ELA-Literacy.RF.4.3 (“syllabication patterns, and morphology (e.g., roots and affixes) to read accurately unfamiliar multisyllabic words in context and out of context”). These standards can be integrated into an Individualized Education Plan (IEP) goal for children with LLD, such as the following: “When reading aloud from an instructional text book, the student will improve word reading and determine the meaning of targeted grade-level academic English words by identifying their roots and affixes and explaining their meanings with 80% accuracy across two of three sessions.” (See Gabig & Zaretsky, 2013 and Zygouris-Coe, 2012 for more on MA and common core standards).

These goals that are linked to the CCSS lend themselves to focus on MA intervention in a manner that is applied to the educational context. Students can be explicitly taught to identify morphologically complex words in academic materials throughout class literature, spelling assignments, and content area textbooks. Moreover, they can be taught to apply their morphological knowledge to discern word meanings using both the context (e.g., clues that help us figure out the meaning, and morphological reasoning by analogy) while reading a provided passage from a textbook. This may be linked to specific academic contexts and thus will provide a strategy particular to a specific academic discipline or disciplinary literacy (Shanahan & Shanahan, 2012). For example, given the aforementioned sample fourth-grade IEP goal that is linked to common core standards, a fourth-grade student may work toward this goal by using an MA strategy to break down a word and infer its mean-

ing while reading a science text book. The science lesson may focus on key multimorphemic words such as the following that were all found in a fourth-grade natural science lesson: *photosynthesis, evaporation, thermometer*. Depending on the background knowledge of the student, the student may be then directed to think about a) how to pull out parts of words with which he or she is familiar from other known words (e.g., *photo, vapor, thermo, meter*), and b) how these meanings can be applied to the newly encountered multimorphemic words and then use the reading text to confirm hypothesized meanings. In this way, the student is being taught the strategy of developing inferences about unknown words using morphological knowledge and context. Through this process, students are provided with opportunities to practice a morphological strategy in the context in which they are regularly being required to practice this strategy (see Goodwin, Lipsky, & Ahn, 2012; Gibson & Wolter, 2015; Wolter & Dilworth, 2014; Wolter & Green, 2013 for samples of applied contextual activities).

Explicit Intervention

Across multiple interventions in multiple areas focused on evidence-based practice, researchers find that effective intervention is explicit such that students understand and have a reason for doing what they are doing (Ukrainetz, 2015). An MA intervention approach is no exception to this rule, and treatment should begin with introducing the concept of MA and providing a rationale emphasizing the importance of MA related to language and literacy success (e.g., application of an MA strategy is a way to increase vocabulary knowledge and may result in better reading and spelling). The terminology used when explaining the concepts involved can be adjusted for the cognitive level of the student and the language-literacy specialist can either directly teach and use morphological jargon terms (e.g., suffix) or simpler terms (e.g., word ending). The key in MA intervention is to help students to understand that the active reflection on meaning and the corresponding parts in words is what will help them to read and write better.

TABLE 2. Sample Word-building Activity

Prefix/meaning	Word root/meaning	Suffix/meaning	Multimorphemic word/student-friendly definition
trans-/ across or through	mit/ send	-able/ able to be	Something is <i>transmittable</i> if you are <i>able to send</i> it <i>through</i> something
de-/ remove or reduce	tox/ poison	-(i)fy/ to cause	To <i>detoxify</i> means to <i>remove</i> or <i>cause the removal</i> of <i>poison</i> from something
bi-/ two	ped/ foot	-al/ having to do with	If something is <i>bipedal</i> , it <i>has to do with two feet</i>

For example, intervention may be introduced for teaching inflectional morphological awareness in the following way: *Learning about word parts may allow you to become better at reading and spelling words. Words can be broken up into parts that we call morphemes and include base words and suffixes. A base word can stand all by itself and is the power of the word that tells what the word is about. A suffix is the small ending added to the base word that may change a word's number, or tell when a verb happened or is happening, or refers to more than one. These endings are spelled the same each time but may sound different* (Wolter & Green, 2013).

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Activities for Active Reflection on Meaning

Following an explicit explanation of MA, multiple activities can and should be provided to allow for active reflection on word meaning changes due to affix additions. Activities may focus on the receptive or identification level of MA and provide students with repeated opportunities to identify patterns of meaning via morphology. One common way to do this is through word sort activities; these activities support the development of the strategy of identification and active analysis of morphological patterns among words (see Templeton et al., 2015; Wasowicz, Apel, Masterson, & Whitney, 2012 for word sort resources). A common word sort associated with inflectional morphology may be to sort words according to the final suffix past tense *-ed* according to sound (final *-ed* pronounced as /d/ as in *grabbed*, /t/ as in *popped*, /Ed/ as in *waited*). Students are encouraged to self-discover patterns and sort words according to these different pronunciations of past tense *-ed*. This activity demonstrates that despite different pronunciations, when a meaningful inflectional morpheme is included (past tense), the spelling remains consistent (*-ed*). Thus, this type of instruction focuses the student not only on MA or the meaning component, it simultaneously increases the student's awareness

of phonology or pronunciation and spelling rules.

Other word sorts might focus on the identification or awareness of derivational morphology, and the relations between base words and their derived forms can be made explicit through word sort activities which require students to identify transparent versus opaque relationships. A transparent relationship is one in which the base morpheme retains its pronunciation and spelling within the derived form (e.g., *quick - quickly*). An opaque relationship occurs when changes occur in both the spelling and the pronunciation of the base word (e.g., *long - length*). One way to create a word sort based on these relationships is through an analogy regarding "family and friends." An explanation is provided which notes that word derivatives can be related in meaning but look similar or different from each other. That is, just like *family* members, words can look and sound similar and be related (transparent relationship: *hit-hitting*) or not look or sound similar but still be related (opaque relationship; *five-fifth*) words. Similarly, *friends* can look and sound similar but not be related just as words can look and sound alike but not be related in meaning (nonrelated foils: *pill-pillow*). Picture cards showing family members or friends, or written cards with the relationships delineated, which depict these previously described relationships could then be used as category markers to help students sort the word-pairs written on notecards in the corresponding categories (see Wasowicz et al., 2012; Wolter, 2015; Wolter & Gibson, 2015 for full details regarding such an activity).

After developing morphological awareness, students may benefit from a strategy based on word building with morphological components. The MA task of word building provides an ideal medium to reflect on and develop the strategy of inferring word meaning from the individual components of words. MA word-building activities may ideally encourage students to create and reflect on the meaning of both real and nonwords. Indeed, the development of nonwords can provide an ideal tool for students to actively reflect on the meaning of affix(es) and the base word to create unique meaning; this reflects the process required of students when reading an unknown multimorphemic word. An example of a word-building activity might be to provide a series of base words, prefixes, and suffixes and create new words that can be defined (see Goodwin, Lipsky, & Ahn, 2012; Wolter & Dilworth, 2014; Wolter & Green, 2013; Wolter & Gibson, 2015 for further examples of word building).

In conducting word-building activities, the language-literacy specialist can select base words and/or roots that are likely

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to occur across curricular content areas. This will not only allow for repeated exposure to that root and active reflection on its meaning, it will also facilitate flexibility of meaning. That is, a student exposed to the word *medieval* during a unit in social studies may learn that *medi* means *middle* and that *eval* means *ages*. However, this meaning may be fossilized within the original word in which it was encountered (e.g., this student may believe that *medi* must always refer to a time period). As students encounter a word root in other contexts, the less rigid and more flexible their comprehension of the meaning becomes. These same students might encounter the word *mediocre* in English Language Arts class, with *medi* meaning *middle* and *ocre* meaning *point*. This subtle difference (i.e., middle referring to time and middle referring to place or state) helps to expand students' interpretation of root words, and in turn, increases facility with word-building activities.

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Motivation with Problem Solving

Researchers have found that an element of student-facilitated problem solving or self-discovery was highly motivating to students, and the theme of student "detectives" was repeatedly used in the context of effective MA literacy instruction (Bowers et al., 2010; Goodwin et al., 2012). This type of problem-solving approach is likely valuable because many children who have LLD exhibit deficits in executive functioning, or the ability to plan, coordinate, and monitor one's thinking and processing (Berninger & O'Malley May, 2011). Thus, these children may benefit from instruction which requires them to use their executive functioning to problem solve. One way to foster motivation during word-building activities is to present the activity as a game. Students can compete to create novel words consisting of a specific number of morphemes and challenge one another to guess the novel word based on the student-created definitions. Instructional models that incorporate elements of problem-solving "play" and self-discovery have a greater chance of sustaining student involvement than models that focus on memorization (Hidi & Renninger, 2006).

Guiding Students in Semantic Awareness

Another important part of MA intervention is to help students to link morphology to vocabulary or semantics. Explicit instruction can begin by presenting roots through the use of a vocabulary journal. For example, the word roots *photo*, *bio*, *graph*, *vis*, *auto*, *scope*, and *tele* could be selected for explicit instruction due to frequency of occurrence in school English (Blevins, 2001). Instructors ask students to write roots in one column of their journals and then lead a discussion about what

the roots mean, drawing upon students' knowledge of familiar words contained in them. The instructor provides scaffolding, or cues and prompts as needed, including guidance about familiar words and meanings when students do not have that knowledge. Students can then write student-friendly definitions in the column adjacent to the word roots. On a new page of their journals, students can create and write novel words using the presented word roots, along with student-created definitions of each (e.g., *televio* = *distant life*).

Additional pages in the journal can be added to include prefixes and suffixes to further expand morphological complexity of created words. For example, for students presented with the Latin root *vis*, explicit instruction can include not only discussion of the semantics or meaning, *to see*, but also discussion of the various words in which it appears. Through these examples, students can be guided through the process of self-discovery in identifying the root within each of the words. Words such as *visible*, *visual*, and *revise* could be used for comparison (see Figure 1). After locating the Latin root *vis* in each word, students can be directed to the original index card listing the root word and its meaning, *to see*. Since these are words familiar to students in the upper elementary grades, students can then be prompted (and scaffolded as needed) to produce a student-friendly definition of each word that includes *vis*. Possible definitions include examples such as, *visible means that you are "able to see" it*, and *visual means "it has something to do with seeing"* (see Figure 1). These student-created definitions can be used to investigate the other morphological units within the presented words. Rather than presenting the students with definitions, students are guided through discussion of what they think those morphemes mean based on their knowledge of the words in which they are encountered. For example (see Figure 1), "*We know that vis- means to see, and you told me that visible means able to see. So, what do you think -ible in visible means?*" Following this activity, students create their own morpheme cards or morpheme bank in a journal or word wall.

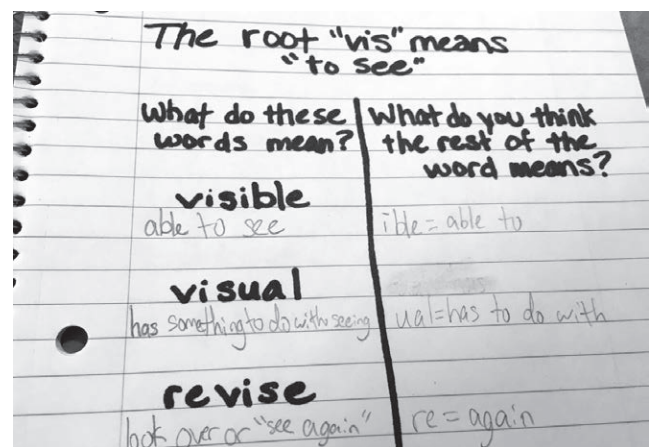


Figure 1. Word journal activity for increasing morphological and semantic awareness

Guiding Students in Phonological Changes

In addition to discussing the meanings of the morphological units, instruction can include discussion of pronunciation or phonological changes. This is particularly beneficial to students with LLD who may not be aware that some words they encounter share the same base words or roots because of changes in consonant production (e.g., *magic/magician*, *vis/visual*), vowel shifts (e.g., *wise/wisdom*, *relate/relative*), and letters that are silent in some contexts, but not others (e.g., *autumn/autumnal*, *sign/signal*). Increasing students' awareness of these similarities in spellings despite differences in pronunciation (an aspect of phonological awareness), is another means for increasing morphological awareness. For example (see Figure 2), after identifying the roots and affixes in the presented words, guide students in a discussion of the differences and similarities in how those roots sound in different contexts. For example, "Which words sound similar at the ends? *Revision* and *decision*. Now just say that part that sounds the same in both words (-sion). Now write it down in your journal or on an index card. Does this word part match the way it sounds?" Encourage students to write a pronunciation guide in a journal or on their index cards (e.g., *-sion* = shun). Presented examples can include several words with final stable syllables, such as *-tion*, *-cian*, and *-sion*, and the concept of final "stable syllables," or syllables that do not change in pronunciation or spelling, can be introduced. Words can then continue to be presented containing the targeted root words (e.g., *vis*) and the stable syllables (e.g., *-sion*). Although *vis* is spelled identically in *visible*, *visual*, and *revise*, the pronunciation varies slightly.

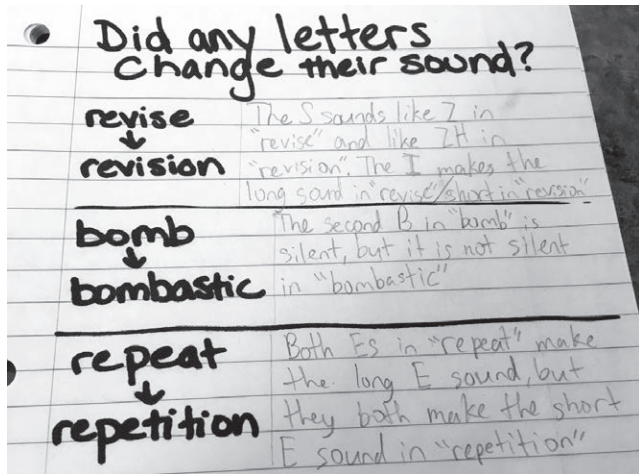


Figure 2. Word journal activity for increasing morphological and phonological awareness

Guiding Students in Orthographic Awareness

Finally, morphological awareness instruction should include discussion of spelling patterns or orthographic awareness (Wolter, 2015; Wolter & Squires, 2013). Students must understand that while some suffixes have stable spelling and stable pronunciation patterns (e.g., *-tion*), others have stable spelling but unstable pronunciation patterns (e.g., past tense *-ed* has consistent spelling but is pronounced /t/, /d/, or /Ed/), and still others have neither stable spelling nor pronunciation patterns (e.g., plural *-s* can be spelled *-s* or *-es* and pronounced /s/, /z/, or /əz/) (see Figure 3).

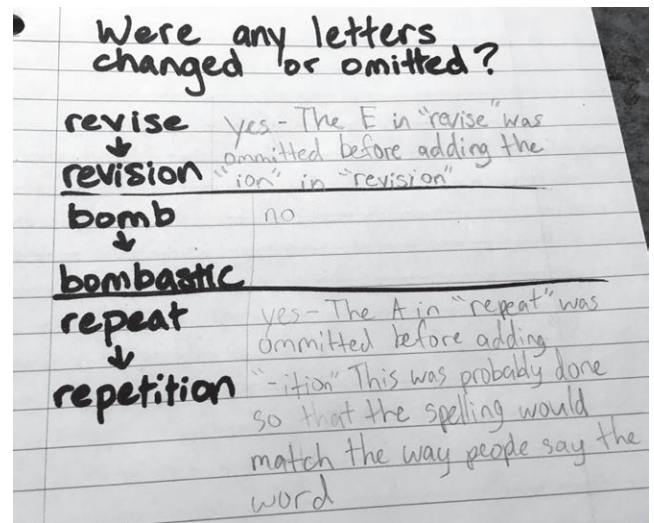


Figure 3. Word journal activity for increasing morphological and orthographic awareness

Achieving Literacy Success

Morphological awareness is essential for literacy success; interventions that promote MA in students with LLD must be a) explicit, b) occur within a language and literacy context, c) allow for repeated opportunities to actively reflect on morphological meanings, d) link MA to sound and spelling patterns, and e) include a focus on student motivation. In addition to meeting these requirements, the MA intervention activities presented in this article also promote student self-discovery. The self-discovery process is not only beneficial in motivating students to engage in literacy-based problem solving; it also promotes self-regulated learning. When guided in the use of these activities, students with LLD may attend to unfamiliar words in texts, identify any familiar morphemes, and attempt to construct meaning based on what they know. These students also learn to monitor and evaluate their own metalinguistic decisions. In sum, the presented activities are designed to improve decoding, reading comprehension, and spelling abilities through scaffolding students' self-discovery of morphological units.

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