Morphological Awareness Development and Assessment: What Do We Know?

by Kenn Apel

According to the National Assessment of Educational Progress (NAEP, 2015), 64% of U.S. fourth-grade students and 66% of U.S. eighth-grade students are at or below the basic level of reading and writing, respectively. Further, 14% of the country's fourth-grade students and 13% of its eight-grade students have identified reading and writing disabilities (NAEP, 2013). To address their concerns and to improve students' literacy skills, educational researchers and educators recently have begun to target students' morphological awareness skills. In its broadest sense, morphological awareness refers to the ability to consciously consider and manipulate the smallest units of meaning in spoken *and written language*, including base words and affixes, or prefixes and suffixes (e.g., Apel & Henbest, 2016; Carlisle, 2000; Wolter, Wood, & D'zatko, 2009). The focus on morphological awareness to improve literacy skills makes sense intuitively, given written English is a morphophonemic system; that is, English spelling relies on morphemes as much as it does phonemes (i.e., the smallest units of sound to represent speech) to produce written words and convey their meaning (e.g., Moats, 1995; Treiman, 1998). Indeed, a growing research literature supports the important and powerful contributions morphological awareness makes to students' word-level reading, reading comprehension, and spelling abilities, explaining anywhere from 4 to 15% of students' performance on measures of these literacy abilities (e.g., McCutchen, Green, & Abbott, 2008; Singson, Mahony, & Mann, 2000; Wolter et al., 2009). Further, reviews of morphological awareness interventions corroborate the important impact of morphological awareness instruction on students' literacy skills (Bowers, Kirby, & Deacon, 2010; Goodwin & Ahn, 2013).

Given the positive effects of morphological awareness on literacy development and instruction, this paper first will focus on a brief review of how the skill develops in English-speaking students followed by a discussion on how educators might assess students' morphological awareness skills. The factors that may impact morphological awareness assessment will be discussed as part of this review.

Morphological Development

Children produce morphemes, the smallest units of language that have meaning, beginning with their first spoken word, which typically occurs at age 1. However, when toddlers and preschoolers are producing one and two word utterances, and even when they are producing simple sentences as 3- and 4-year-olds, they are producing these morphemes without consciously considering or thinking about them. Simply put, they are engaged in *morphological production*. It is only when children, sometime around the age of 5, begin to implicitly or explicitly think about or consider morphemes, that *morphological awareness* occurs.

Currently, no researcher has systematically investigated morphological awareness longitudinally; thus, it is difficult to report on when children and students achieve specific milestones in their morphological awareness abilities using different morphological awareness tasks. Additionally, researchers have used different tasks that have either included items that targeted inflectional and/or derivational morphemes. Inflectional morphemes, which always occur as suffixes, provide information about time or quantity without changing the meaning or class of word (e.g., talk<u>ed</u>, talk<u>ing</u>, talk<u>s</u>). Derivational morphemes, which can be prefixes or suffixes, change the meaning and/or word class of the base word to which they are attached (e.g., teach<u>er</u>; <u>un</u>fair). Thus, item difficulty may impact results that are separate from age- or grade-level differences. That is, tasks that contain more items requiring awareness of derivational morphemes may be more challenging than those tasks that require awareness of inflectional morphemes.

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In addition to the minimal longitudinal research that exists and the challenges in comparing results across studies that have used different measures, there has not always been solid agreement about when students develop morphological awareness. Although some experts initially suggested that students first demonstrate awareness of morphemes during the mid-elementary school years (e.g., Adams, 1990; Anglin, 1993), others have shown that young students demonstrate at least implicit awareness of morphology as early as kindergarten and first grade (e.g., Berko, 1958; Treiman, Cassar, & Zukowski, 1994). Other researchers have demonstrated that morphological awareness skills begin early in childhood and continue to strengthen over the elementary (and later) school years (e.g., Apel, Diehm, & Apel, 2013; Berko, 1958; Berninger, Abbott, Nagy, & Carlisle, 2010; Carlisle, 2004; Ku & Anderson, 2003; Treiman, Cassar, & Zukowski, 1994).

Young children demonstrate at least implicit morphological awareness even before they enter first grade. For example, Berko showed children between the ages of 5½ to 7 picture cards of novel objects along with their novel labels (e.g., "wug") and asked them to complete sentences about the objects that

required the children to produce the inflected forms of the novel label (e.g., "this is a wug. Now there is another one. There are two of them. There are two ___"). Children at 5 years of age were able to complete the task above chance level. Other researchers have demonstrated that first-grade students' spelling of consonant clusters, a task known to be challenging, depends on the number of morphemes in the word (e.g., Bourassa, Treiman, & Kessler, 2006; Wolter et al., 2009). When asked to spell words with final clusters, students are more likely to spell these clusters with more than one consonant when that cluster represents two morphemes versus one (e.g., *bind* vs. *rained*), suggesting at least an implicit awareness of words containing two morphemes.

Other research teams have examined the morphological awareness skills of young students using tasks that require more explicit or conscious awareness of morphology. For example, Berninger et al. (2010) assessed the morphological awareness skills of first- through sixth-grade students using several morphological awareness tasks that required the students to judge whether one word "came from" another (e.g., teach from teacher) or to complete sentences with derived forms of a base word (farm – The ___ is plowing his fields). Berninger et al. found that the most pronounced growth in morphological awareness occurred within the first three grades, but that growth continued to occur across the remaining three grades. Similarly, Ku and Anderson (2003) assessed the morphological awareness skills of students in second, fourth, and sixth grade using a variety of morphological awareness tasks. They found that the students in second grade performed above chance level on at least some of the tasks and that the students' morphological awareness abilities increased with grade level.

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Apel et al. (2013) demonstrated a developmental progression in morphological awareness abilities among kindergarten, first-, and second-grade students. Awareness of the relation of base words and their inflected and derived forms (e.g., knowing *farm* and *farmer* were related by meaning) grew across students in those three grades. Further, a conscious knowledge for the written form of affixes (i.e., an ability to recognize the printed forms of prefixes and suffixes), developed across first and second grade. In this latter task, the children were provided written pseudowords containing affixes and asked to circle all of the "add-ons" (i.e., prefixes or suffixes) they saw.

Overall, children in the earliest primary grades demonstrate some morphological awareness on tasks that require them to identify or recognize morphemes as well as on tasks that ask them to generate morphemes. Children in the primary elementary grades demonstrate greater awareness of inflectional forms than derivational forms; it is around third grade that children typically demonstrate greater awareness of derivational morphology (e.g., Kuo & Anderson, 2006). Not surprisingly, then, inflectional morphological awareness is mostly associated with literacy abilities in younger elementary school students rather than upper-grade elementary school students (e.g., Carlisle & Nomanbhoy, 1993). However, much more research, particularly longitudinal research, is needed to obtain a full understanding of morphological awareness development in children and students. One of the challenges with the current research is that different researchers have used different measures to assess children's morphological awareness abilities.

Morphological Assessment

Before discussing how educators might assess morphological awareness, it is important to first provide a rationale for why they would assess this linguistic awareness ability. First, assessing students' morphological awareness will provide educators with a better understanding for what students know about words and word parts (morphemes) and how they apply that knowledge to reading and writing which, in turn, will help guide those professionals in developing optimal instructional practices for all types of learners in all kinds of literacy experiences. Consider, for example, reading comprehension. When confronted with an unknown morphologically complex word during reading, students may use their morphological awareness skills to break down the word into its component parts (base word or root, prefix, and/or suffix). When students are able to break down the word into its component parts, and assign meaning to each component, they likely then can generate the meaning for the unknown word (go from part(s) to whole, e.g., Anglin, 1993; Kruk & Bergman, 2013; Pacheco & Goodwin, 2013) which then can aid in understanding the meaning of the word and, potentially, the sentence and even the passage. Thus, morphological awareness (or what Anglin labeled "morphological problem solving") aids comprehension of text at the word, sentence, and passage levels (see Table 1 for an example).

Morphological awareness assessment also is important because if students are struggling with morphological awareness, they likely will not receive the intervention they need, given that little morphological awareness instruction regularly occurs in classrooms (e.g., Moats, 2009). Thus, assessment that specifically examines students' morphological awareness will guide educators in identifying deficits with this linguistic awareness area that might typically be overlooked. Finally, with a well-informed assessment protocol, educators will be better guided to particular weaknesses in students' morphological awareness skills (e.g., lack of understanding for root and derived word relations, poor knowledge of affix spelling) that

TABLE 1. Example of Morphological Problem Solving

Sentence from a middle school student's science book: *Mortality among rats is said to precede the appearance of human plague, but the evidence of this is always* **retrospective.**

Example of problem solving meaning of unknown derived word: **retrospective:**

1) Retro – I've heard or seen that part of the word before in other words, like retroactive – as in, Mom got retroactive pay – that means, money dating back before today. Also, I've heard about retro clothes – those are clothes from the "old days." I'm thinking retro might mean: from before or before?

2) Spect – means like vision or see, like spectacles (glasses), or inspect (look at).

3) Retro-spect(ive) – maybe that means looking back? Let me try that in the sentence.

4) The evidence is always based on looking back? So, it means they don't have the evidence until they look back at the history of what happened. They can't figure it out ahead of time. That fits the sentence and makes sense for meaning!

will help them select specific interventions. Again, this latter point is crucial in the application of morphological awareness instruction, the main goal of assessment. For example, identifying particular weaknesses in morphological awareness (poor knowledge of affix meanings, reduced understanding of relations between base words and their derived forms) may explain difficulties in morphological problem solving that then can be specifically remediated to improve comprehension of morphologically complex words. When students have improved understanding at the word level, comprehension of the sentence and passage levels becomes the focus, the ultimate goal of reading. The same benefits would occur for writing instruction. For example, improvements in students' morphological understanding for how to spell more complex, multimorphemic words would lead to higher-level, more-literate style written compositions.

Armed with a rationale for assessing morphological awareness, educators should understand the range of morphological awareness tasks they may use to assess their students' abilities. These tasks will vary in whether they are norm- or criterion-referenced. Norm-referenced measures provide educators with the ability to compare a student to national-level data to determine whether a student's performance falls within or outside typical limits. Criterion-referenced measures are tasks designed by the educator; although no normative data are available, they often provide insights into why a student might be struggling and what objectives might be set for instruction/intervention. Task items also will differ on whether they require students to orally produce responses or respond in written or manual modes (i.e., via technology). Finally, the task items will vary in whether they are inflectional or derivational morphemes and in how "transparent" the base words and their related inflected and derived forms are with one another (i.e., how much the base word is represented orthographically and phonologically in the inflected and derived forms).

Norm-referenced Measures

For the most part, there are no norm-referenced tests that are designated as measures of morphological awareness.

The *Process Assessment of the Learner – Second Edition* (*PALS-2*; Berninger, 2007) appears to be the only norm-referenced test that overtly claims to have a few subtests that measure morphological awareness (e.g., students are shown printed words and asked to identify those containing affixes). There are other norm-referenced measures, or subtests of norm-referenced measures, that assess some aspect of morphological awareness, including the *Test of Language Development-Primary 4* (*TOLD-P*; Hammill & Newcomer, 2008a), the *Test of Language Development – Intermediate 4* (*TOLD-I*; Hammill & Newcomer, 2008b), and the *Clinical Evaluation of Language Fundamentals 4 (CELF*; Semel, Wiig, & Secord, 2003*)*. These three norm-referenced tasks, plus others, have subtests that require students to consciously think about morphemes. For example, on the *TOLD-P*, students are asked to complete a sentence with an affixed word given its base form (e.g., Carla has a dress, Denise has a dress. They have two ____[dresses]). Students complete a similar task on the *CELF*: This man sings. He is called a _____[singer]. On the *TOLD-I*, students are asked to read a sentence and must judge whether the sentence sounds grammatically correct (e.g., "Those boys is happy."). None of these subtests, or others like them on other norm-referenced tests, are referred to as measures of morphological awareness; instead, they are listed as measures of "morphological completion," "morphological comprehension," "morphological closure," "word structure," and the like.

For educators, then, norm-referenced measures for morphological awareness are highly limited. These professionals can find subtests that can measure some aspects of morphological awareness; however, they will be faced with the dilemma that the task's names do not reflect their true function. Further, the norm-referenced measures that are available are highly limited in scope. Most of these assess inflectional morphology more than derivational morphology. Further, the range of affixes assessed is highly constrained in number and types.

Criterion-referenced Measures

Perhaps the most popular task used by researchers who have investigated students' morphological awareness skills is a production task, in which students are asked to produce an inflected or derived form of a given base word, or the reverse. Typically, this takes the form of a cloze procedure (e.g., "*Art.* Ms. Jones is an _____." or "*Farmer.* Mr. Wilson lives on a _____; Apel et al., 2013; Apel & Lawrence, 2011; Casalis & Colé, 2009; McCutchen et al., 2008; Wolter et al., 2009). Another popular task involves making a judgment about the semantic relation between two words (e.g., "Does moth come from mother? Does magic come from magician?" Berninger et al., 2010; Kuo & Anderson, 2003; Mahony, Singson, & Mann, 2000; Nagy, Berninger, Abbott, Vaughan, & Vermeulen, 2003). A few researchers have used blending or segmenting tasks, similar to those used in phonological awareness tasks, such as asking students to blend and segment base words and their affixes to either create or decompose, respectively, a multimorphemic word (e.g., Casalis, Colé, & Sopo, 2004; Lyster, 2002). In blending tasks, given a base, *friend*, and a suffix, *ly*, the student needs to blend the two morphemes to produce the multimorphemic word, *friendly*. In segmentation tasks, the student hears a multisyllabic word (e.g., *friendly*), and is asked to segment or break the word down into its base (i.e., *friend*). Other researchers have used word analogies (e.g., *anger*: *angry*, *strength*: _____) to assess students' morphological awareness skills (e.g., Bryant, Nunes, & Bindman, 1997; Kirby et al., 2012; Roman, Kirby, Parrila, Wade-Woolley, & Deacon, 2009; Tsesmeli & Seymour, 2006). Finally, one research team used a specific written task to measure students' identification of written affixes (Apel et al., 2013; Apel & Diehm, 2014). The students were provided a list of pseudowords with real affixes (e.g., 'rinning') and then given three minutes to circle all the affixes they saw in the words.

Across these tasks, specific item features may affect the students' performance on the tasks, including the type of morpheme targeted and the transparency between the base words and their inflected or derived forms. As mentioned earlier, children in first and second grade demonstrate greater awareness of inflectional forms than derivational forms; by third grade, children typically demonstrate greater awareness of derivational morphology (e.g., Kuo & Anderson, 2006). Thus, the type of morpheme assessed on the morphological awareness task should be considered in regard to the grade level of the student being assessed.

As noted earlier, one can consider the transparency of multimorphemic words with their related base words. Some inflected and derived words are completely transparent, meaning the base word is both phonologically transparent (heard) and orthographically transparent (seen) in the related word (e.g., friend/friendly). Other combinations, however, are less transparent, either phonologically (e.g., music/musician), orthographically (e.g., silly/silliness), or both phonologically and orthographically (e.g., admit/admission). Task items that represent transparent relations between base words and their inflected or derived forms are typically easier to complete than items that represent a shift phonologically and/or orthographically (e.g., Apel & Thomas-Tate, 2009; Carlisle, 2000).

Finally, word frequency may affect students' performance on a morphological awareness task. Several researchers (e.g., Carlisle & Stone, 2005; Goodwin, Gilbert, & Cho, 2013) have shown that later elementary (fourth and sixth) and middle school students are able to read derived words better when those words' frequencies and/or frequencies of their base words are relatively high. In the latter case, researchers suggest better performance occurs because students use their base word knowledge to decode and understand the derived words. For elementary students, average family frequency (the number of words that share the same base word), appears to affect derived word reading (Carlisle & Stone, 2005), likely reflecting the influence of using base word knowledge to read derived words.

For educators, assessing morphological awareness should be a routine procedure as part of their educational practices in determining how best to help students develop their literacy skills.

Tools for Educators

Morphological awareness uniquely predicts reading and writing skills even when other linguistic awareness (e.g., phonemic awareness, orthographic awareness) and/or language abilities (e.g., vocabulary) are considered simultaneously (e.g., Apel, Wilson-Fowler, Brimo, & Perrin, 2012; McCutchen et al., 2008; Nagy, 2003; Roman et al, 2009; Tighe & Schatschneider, 2016; Walker & Hauerwas, 2006). In some cases, morphological awareness is the sole or strongest predictor for reading and spelling ability (e.g., Apel et al., 2012; Nagy et al., 2003; Siegel, 2008). This latter finding likely occurs because morphological awareness requires a concomitant focus on sound, pattern, and meaning; thus, it incorporates aspects of several other types of linguistic awareness (e.g., phonemic and orthographic awareness; Apel & Henbest, 2016; Bowers, Kirby, & Deacon, 2010). For educators, then, assessing morphological awareness should be a routine procedure as part of their educational practices in determining how best to help their students develop their literacy skills.

Educators have several options when it comes to morphological awareness assessment. There are norm-referenced tasks that can be used to assess morphological awareness; the caveat is that all but one do not label themselves as measures of morphological awareness. However, if the professional understands what morphological awareness is, then that professional should be able to determine what the norm-referenced measure is actually assessing and use the task for the function it

actually serves. There also are a number of examples of criterion-referenced morphological awareness measures that have been used by researchers that professionals could use to obtain some knowledge of students' morphological awareness skills. One benefit of using a variety of these tasks is that professionals will obtain a range of the students' abilities, providing a broad picture of the students' skills in this particular linguistic awareness area. As these measures are used, professionals should be aware of factors that may affect students' performance, such as the type of morpheme assessed (i.e., inflectional and/or derivational), the transparency of the base word and its related form, and the word frequency values of the base word and its related forms. Ideally, in the near future, a norm-referenced measure of morphological awareness that contains multiple subtests that assess a range of subskills will be developed. In the meantime, however, educators can use their knowledge of morphological awareness, its development, and the research findings from current investigations, to help them assess their students in this important area of literacy development.

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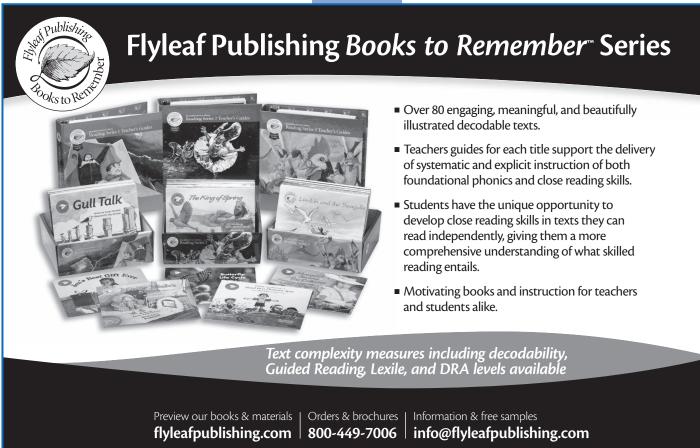
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