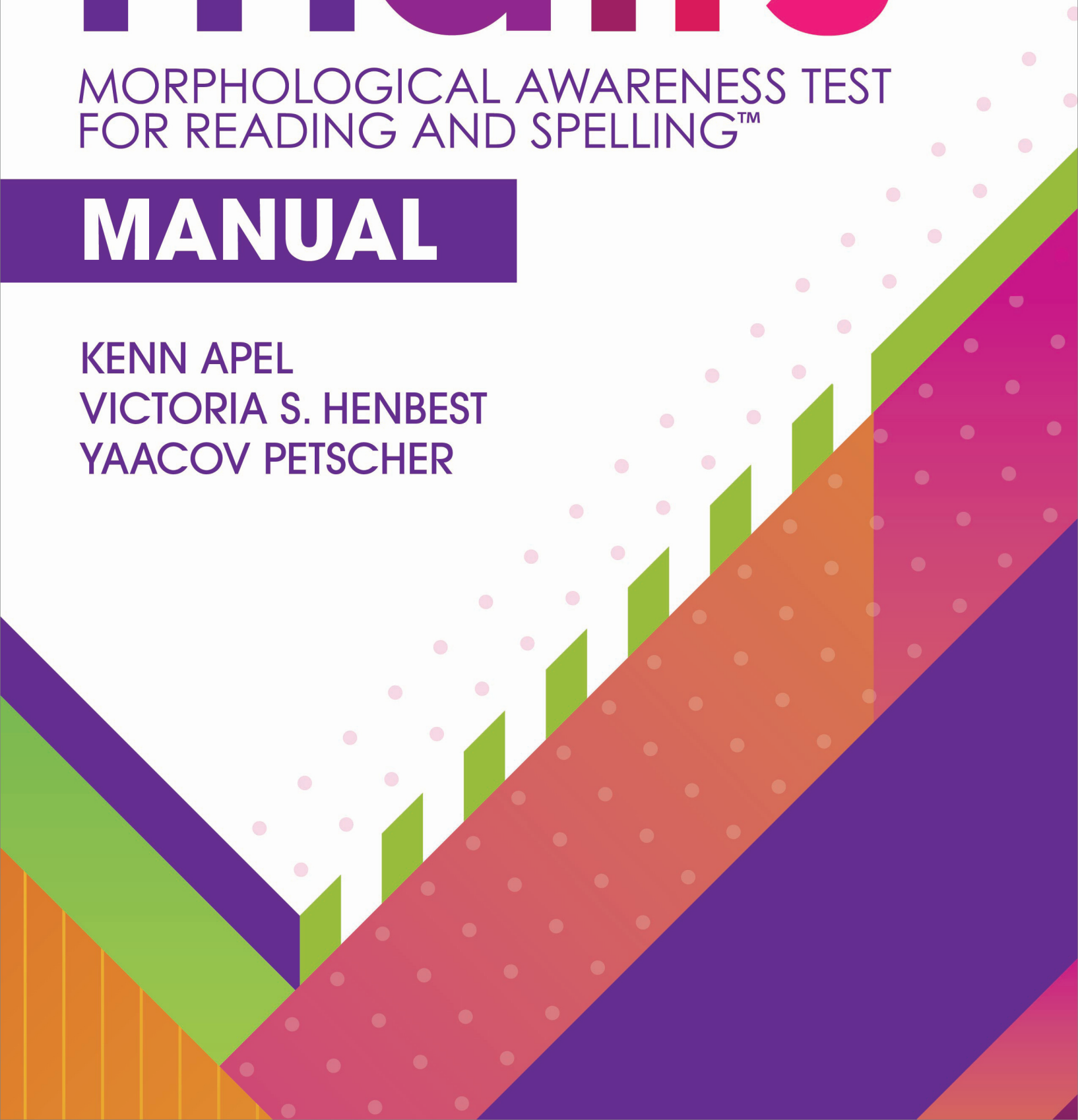


matrs™

MORPHOLOGICAL AWARENESS TEST
FOR READING AND SPELLING™

MANUAL

KENN APEL
VICTORIA S. HENBEST
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matrs™

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MANUAL

by

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About the Downloads

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In addition to the MATRS™ print materials, there are a number of resources available online to support implementation. Purchasers of the MATRS™ Kit may download, print, and/or photocopy the following resources for professional use:

- MATRS™ Examiner Administration Booklet Version B
- MATRS™ Student Response Forms Version B
- Conversion of Raw Scores to Standard Scores and Percentiles (interactive version of book Appendix C)
- MATRS™ Technical Report (download-only Appendix D)
- Digital audio recordings to use in administering Task 3
- Demonstration videos to prepare for administering each task
- Parent Guide to MATRS™

To access these materials:

1. Go to the Brookes Publishing Download Hub: <http://downloads.brookespublishing.com>
2. Register to create an account (or log in with an existing account).
3. Click Redeem Code on the top right and enter the code found on the inside cover of this book.

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Preface

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The Morphological Awareness Test for Reading and Spelling™ (MATRS™) is a norm-referenced, reliable test used to assess the morphological awareness abilities of students in first through sixth grades. *Morphemes* are the smallest units of meaning in a language, and *morphological awareness* is the ability to consciously consider and manipulate morphemes. Written English is a morphophonemic system; that is, English spelling relies on morphemes as much as it does phonemes to produce written words and convey their meaning (Moats, 1994; Treiman, 1998). As such, it makes sense intuitively to focus on morphological awareness to improve English literacy skills.

The research base on morphological awareness suggests that the correlations among morphological awareness and reading and spelling, as well as the direct effects of morphological awareness skills, are significant (Apel, Wilson-Fowler, et al., 2012; Grigorakis & Manolitsis, 2021; James et al., 2021; Metsala et al., 2021; Tighe & Schatschneider, 2016). The strong contributions of morphological awareness to reading and spelling 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 et al., 2010).

Based on a 3-year Institute of Educational Sciences (IES) grant (Grant Number: R305A170065), MATRS was developed to fill a void in the area of morphological awareness assessment tools. In the past, investigators and practitioners used tasks that varied from one another and did not align with a comprehensive view of morphological awareness. The latter likely occurred because those designing the tasks were operating with a narrow view of morphological awareness. MATRS, however, aligns with a conceptual framework that situates morphological awareness as a four-domain skill (Apel, 2014b) including 1) awareness of spoken and written morphemes; 2) the meaning of affixes and how they can alter the meaning and/or grammatical class of base words when they are applied; 3) how affixes are attached to base words, including any modifications to written base words when they are attached; and 4) the relation between base words and their inflected and derived forms. Details about this model are provided in Chapter 2.

Both practitioners and researchers will benefit from using MATRS. Practitioners, including speech-language pathologists, reading specialists, school psychologists, and educators, will gain an understanding of what students know about words and word parts (morphemes) and how they apply that to reading and writing. This knowledge will provide them with greater precision in identifying potential deficits and determining optimal instructional plans that can benefit word-level reading, spelling, reading comprehension, and writing composition. Researchers will benefit because MATRS ensures that the same set of skills are used to measure morphological awareness, providing uniformity across investigations and greater confidence in their findings. Researchers also will be more assured that their results are due to the question at hand and not to differences in tasks used to arbitrarily represent morphological awareness.

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About the MATRS Assessment Manual and Resources

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In this manual, individuals interested in assessing students' morphological awareness abilities will learn more about morphological awareness and its assessment. Chapter 1 provides a review of morphemes and morphological awareness, the background for the development of MATRS™, and ways in which the data collected during the development of MATRS provided new information about morphological awareness and its assessment. Chapter 2 describes the conceptual model for MATRS and each of the tasks, to acquaint examiners on what the tasks were designed to measure. Chapter 2 also covers preparation for administration of MATRS, along with steps on how to administer the test. Chapter 3 provides guidance on how to administer and score MATRS, as well as student factors to consider when assessing their skills. Chapter 4 provides three case studies of students who were assessed using MATRS and how findings from their performances guided the type of instruction/intervention they received. Chapter 5 presents the technical information that went into the development of MATRS, including item development, procedures for data collection and analysis, and task validation studies. Appendices A and B contain answer keys for the two versions of the MATRS tool. Appendix C provides look-up tables for raw score conversion of student results on Versions A and B; an interactive tool for score conversion is available from the Brookes Download Hub (see the About the Downloads page).

Before administering MATRS, examiners should be sure to read the manual and familiarize themselves with each task. Videos demonstrating each task are available on the Brookes Download Hub. Note that some nonsubstantive changes in wording and design in the MATRS material have been made since the creation of the videos. We recommend that you view the videos to see how the different tasks are administered but follow the specific instructions and scripts in the Examiner Administration Booklets and Student Response Forms.

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Acknowledgments

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We are grateful for the positive feedback we received on MATRS™ from nine experts and practitioners in the field. Their comments covered a range of topics, including contexts in which MATRS would be used, the extent to which MATRS is needed in the field, and the structure of the test itself. Reviewers noted the usefulness of MATRS for research and in educational and clinical settings, as well as the significant gap it fills in the assessment arena. We were encouraged that they found MATRS offers practitioners clear instructions and guidance to ensure fidelity of implementation and to support explicit instruction and student learning.

Finally, we would like to thank all those who helped gather the data on more than 5,000 students. In particular, we thank June Maranville, lab coordinator for Year 1 of the grant; Alexis Mitchell, lab coordinator for the last 2 years of the grant; and all of the undergraduate and graduate students who helped collect the data on which MATRS is based. Because of their diligence and attention to detail, MATRS came to fruition.

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Overview of MATRS and Its Value

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The Morphological Awareness Test for Reading and Spelling™ (MATRS™) is a reliable, valid, norm-referenced standardized measure of morphological awareness for students in first through sixth grade. Morphological awareness is defined broadly as the ability to consciously consider and manipulate the smallest units of meaning in language, including base words and affixes (i.e., prefixes and suffixes; e.g., Apel & Henbest, 2016; Carlisle, 2000; Larsen & Nippold, 2007; Wolter et al., 2009). MATRS can be administered by speech-language pathologists, school psychologists, learning specialists, researchers, and other practitioners charged to determine whether a student is demonstrating language or literacy difficulties. This tool can be used to identify students with morphological awareness difficulties that may be impacting their reading and spelling skills.

This chapter will discuss several key points about the assessment, including a comprehensive definition of morphological awareness, the significant issues that led to the development of MATRS, and an overview of the assessment tool itself.

WHAT IS MORPHOLOGICAL AWARENESS?

Morphemes are the smallest units of meaning in a language. In the English language, morphemes are simple base words (also known as free morphemes; e.g., *friend*, *hit*, *red*) and prefixes and suffixes (sometimes known as bound morphemes; these are collectively called affixes, e.g., *un-*, *re-*, *-ly*, *-ing*, *-ness*, *-er*). Both base words and affixes are morphemes because they convey specific meanings. Morphological awareness, then, is the ability to consciously consider and manipulate morphemes—base words and affixes.

Affixes can be inflectional or derivational morphemes. **Inflectional morphemes** provide more information about a base word, such as time and quantity, without changing the basic meaning or grammatical class of the base word (e.g., *talked*, *talking*, *talks*, *dogs*, *taller*, *tallest*). For example, in the sentences “He talked,” “He is talking,” and “He talks,” the base word *talk* functions as a verb in all sentences, but the suffixes give information about when the *talking* occurred. The addition of the *-ed* means in the past. The addition of the *-ing* means currently, and the addition of the *-s* means it occurs habitually. All inflectional morphemes are suffixes.

Derivational morphemes are those prefixes and suffixes that change the meaning and/or word class of the base word (*clear*/*unclear*; *paint*/*painter*). With the *clear/unclear* example, adding the prefix *un-* to *clear* resulted in changing its meaning to the opposite of clear. In the case of *paint/painter*, adding the *-er* to the verb *paint* created a noun, *painter*. Morphological awareness, then, includes being conscious of and being able to talk about and manipulate inflectional and derivational morphemes.

When an affix is attached to a base word, sometimes the result is that we can still see and hear the base word in the newly affixed, multi-morphemic word (e.g., the word *curl* is heard and seen in the word *curly*). The relationship between a base word and, in this example, its derived form is considered transparent. However, in other cases when an affix is added to a base word, the result is a multi-morphemic word that does not sound and/or look like the base word. For example, when we see the word *emptiness*, we can hear its base word in it, but we no longer see its base word (i.e., *empty*). When the word *musician* is written, we can see the base word in it, but we no longer hear the base word (i.e., *music*). The addition of the suffix *-ian* changed the pronunciation of *music*; the /k/ sound represented by the letter *c* was changed to the /ʃ/ sound. There also is a change in which syllable has primary stress. Thus, in these two cases, the relationship between the base word and its derived form is considered to involve a **shift in sound or spelling**. With some multi-morphemic words, such as *invasion*, we no longer hear or see the base form of that word, *invade*. In this latter case, the modified base word is considered to be **opaque** because both the sound and spelling have changed.

Some initial research suggests that multi-morphemic words considered to be opaque with their base form are more challenging to think about than words that have a transparent or a single-shift relationship with their base word (e.g., Apel et al., 2023). Items across the MATRS tasks include inflectional and derivational words that vary in their transparency, or degree of shift, with their base words. Figure 1.1 presents a summary of the morpheme types.

Morphological Production Versus Morphological Awareness

It is important to distinguish between the terms morphological production and/or use and morphological awareness. **Morphological production** refers to the use of morphology as it occurs within a communicative context, such as a conversation (Bloom & Lahey, 1978). Morphological production occurs without any conscious attention paid to the morphological structure of the utterance. For example, when a mom says to her 3-year-old child, “Look at those dogs!” she is not thinking about plural *s* or directing her child to think about plural *s* specifically but rather using it (or producing it) within a communicative context. **Morphological awareness**, in contrast, *does* require conscious attention to morphology, such as when a teacher or interventionist teaches a student who is working on a writing project when to use plural *s* versus possessive *s*, as in the following example:

To review from yesterday’s lesson, remember when you are writing and want to indicate that something belongs to someone, use apostrophe *s*, but when you want to indicate that there is more than one of something, use *s* or *es*, depending on the last sound that is in the word.

In this example, the teacher is explicitly teaching the rules of morphology and thus supporting the student’s morphological awareness. The distinction between production and awareness is an important one; it is the awareness of morphology that is critical for successful reading and spelling.

Morphological Awareness Development

Research findings suggest that children as young as kindergarten age begin to show some implicit morphological awareness abilities. The classic study by Berko (1958) showed that 5-year-old children could correctly answer inflectional items on her “wugs” test (e.g., “This is a wug. Now there are two of them. There are two . . . ?”). First-grade children, however, begin to correctly answer more explicit task items on morphological awareness tasks (e.g., Anglin, 1993; Apel, Brimo, et al., 2013; Carlisle & Nomanbhoy, 1993). For example, they are able to complete tasks that require them to think about words related by meaning (e.g., “*humorous: The man has a sense of _____*”; Carlisle, 1995) and recognize printed forms of affixes (Apel, Brimo, et al., 2013).

As children become older, their morphological awareness skills improve. Many studies have examined the morphological awareness skills of children across grade levels, anywhere from kindergarten to sixth grade (e.g., Apel, Brimo, et al., 2013; Kuo & Anderson, 2003; Nunes et al., 1997).

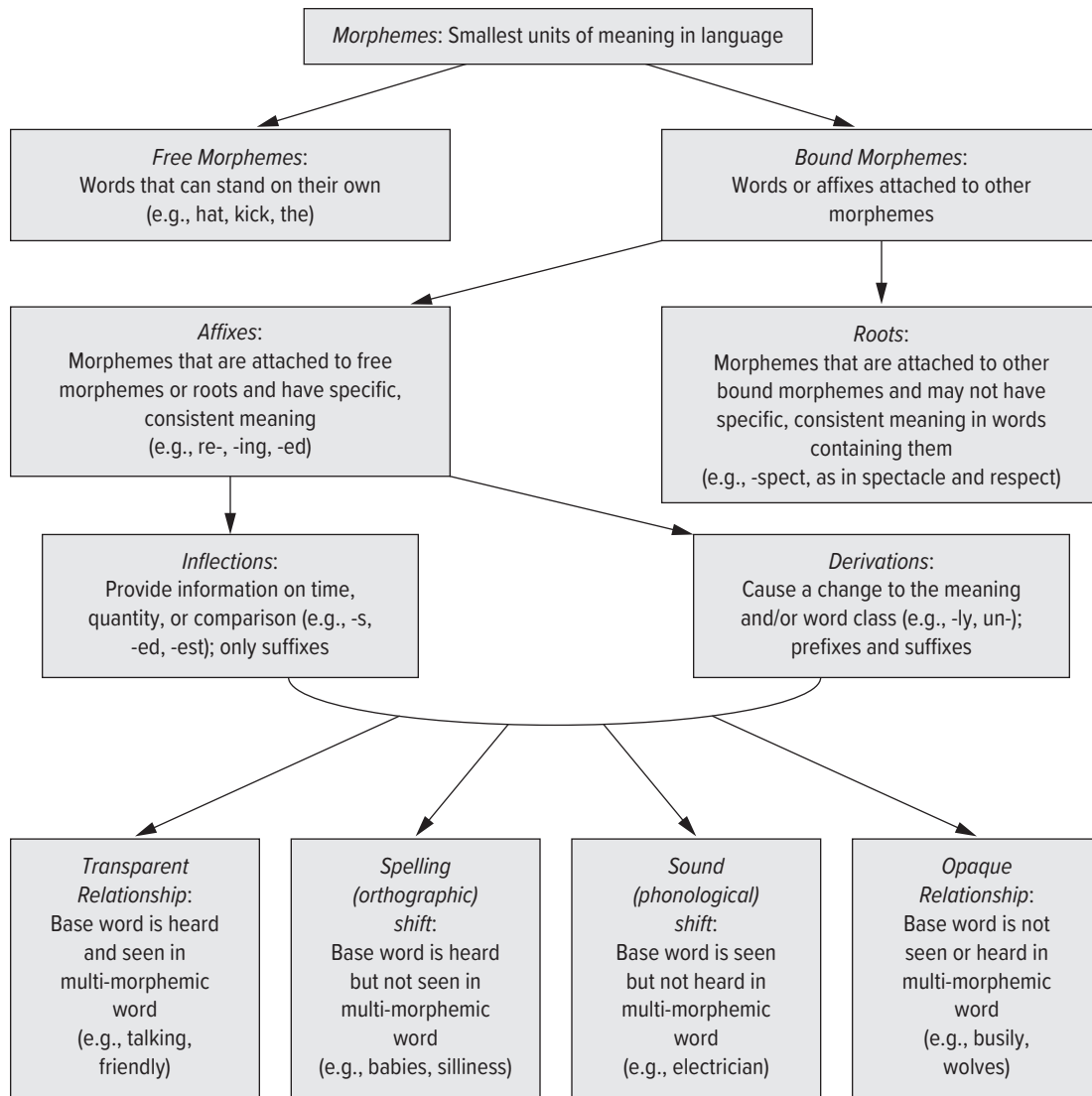


Figure 1.1. Summary of morpheme types.

However, many of those studies have not examined growth in morphological awareness abilities across consecutive grades (e.g., only testing children in second, fourth, and sixth grades). Berninger and colleagues (2010) actually examined morphological awareness skills of children in first through sixth grade using several morphological awareness measures. They found that the most notable growth in morphological awareness occurred during the first 3 years of school but that growth continued to happen across the remaining three grades. In sum, children begin demonstrating their morphological awareness skills in first grade and that development continues at least up through sixth grade. MATRS was constructed to capture this development across the first 6 years of children's school years.

BACKGROUND TO MATRS

Educators, school specialists, and researchers share a common concern: how best to improve the literacy skills of students who are struggling with reading and writing. This concern is a high priority given the considerable number of students who struggle with literacy (e.g., National

Center for Education Statistics, 2022). Furthermore, most state standards for students in elementary and middle school have one or more goals focused on students' morphological awareness (Gabig & Zaretsky, 2013). Examples of these goals include the following:

1. Kindergarten: "Use the most frequently occurring inflections and other affixes (*-ed, -s, -er, un-, -ful, -less*) as a clue to the meaning of an unknown word."
2. Second grade: "Determine the meaning of a new word when a known prefix is added to a known word (e.g., *happy/unhappy, tell/retell*)."
3. Fifth grade: "Use conventional spelling for high-frequency words and other study words and for adding suffixes to base words (e.g., *sitting, smiled, cried, happiness*)."

This focus on targeting morphological awareness to improve literacy skills makes sense intuitively, given that written English is a morphophonemic system; that is, English spelling relies on morphemes as much as it does phonemes to produce written words and convey their meaning (e.g., Moats, 1994; Treiman, 1998).

Across multiple decades, a growing literature base supports the important and strong contributions morphological awareness makes to students' reading and spelling abilities (e.g., Grigorakis & Manolitsis, 2021; James et al., 2021; Larsen & Nippold, 2007; Liu et al., 2024; McCutchen et al., 2008; Metsala et al., 2021; Singson et al., 2000; Sparks & Metsala, 2023; Wolter et al., 2009). Importantly, morphological awareness uniquely predicts literacy 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, et al., 2012; McCutchen et al., 2008; Nagy et al., 2003; Roman et al., 2009; Tighe & Schatschneider, 2016; Walker & Hauerwas, 2006).

How does morphological awareness contribute to reading and spelling? When students encounter an unknown multi-morphemic word when reading, they can use their established awareness of base words and affixes to determine, or problem-solve, the overall meaning of the word. For example, if they see the word *Canadian* and recognize the base portion of the word as *Canada* and know that the *-ian* often means *a person who belongs to*, they can deduce the meaning of the word. In other words, they break words down into their different morphemes, and then by assigning meaning to each of those morphemes, they can likely come up with the meaning of the unknown word.

A similar benefit applies to spelling. For example, when students wish to spell a word they have never spelled before (e.g., *wizardly*), they can use their awareness of the spelling of the base word and the affix *-ly* to correctly write the word. Importantly, words with affixes outnumber base words in students' textbooks by a ratio of 4:1 (Anglin et al., 1993). Thus, strong morphological awareness skills can lead to stronger reading and spelling abilities.

Practitioners will want to know the breadth and depth of their students' morphological awareness skills so that they can increase these abilities in their students with typical literacy skills and develop better instructional plans for students who are struggling with reading and writing. This knowledge gleaned from using MATRS is particularly important given that historically minimal morphological awareness instruction typically occurs in classrooms (Moats, 2009). With well-informed results from MATRS, more prescriptive lessons can be developed to target specific deficits with which students may present. For educators, assessing morphological awareness should be a standard practice as part of their educational methods in deciding how they can best aid their students' development of reading and writing abilities (Apel, 2017).

Results of morphological awareness interventions corroborate the important impact of morphological awareness on literacy skills. Individual investigations (Apel, Brimo, et al., 2013; Apel & Diehm, 2014) and several systematic reviews (Bowers et al., 2010; Brady & Mason, 2023; Goodwin & Ahn, 2010) have demonstrated that morphological awareness interventions have positive clinical effects on measures of reading and spelling. This is particularly true for primary grade students, students with identified weaknesses in literacy abilities, and even students considered to be at risk for future reading difficulties (Bowers et al., 2010; Brady & Mason, 2023; Goodwin & Ahn, 2010).

As mentioned previously, students continue to develop their morphological awareness skills at least through sixth grade (Berninger et al., 2010), so instruction across the first six grades of school can help increase students' morphological awareness and literacy abilities.

The positive effects of morphological awareness on literacy development should provide educators, school specialists, and researchers with some relief to the concern at hand: how to improve the literacy skills of struggling students. However, two critical issues have emerged from the research on assessing students' morphological awareness. First, researchers are inconsistent with the task(s) used to assess students' morphological awareness abilities. These inconsistencies are the result of using different tasks across studies and/or measuring morphological awareness by using only spoken *or* written tasks. These inconsistencies likely have occurred because most researchers lack a coherent and comprehensive definition for morphological awareness. Second, until now, there has been no reliable, valid, norm-referenced measure of morphological awareness. Thus, the tasks used in most research studies have not enabled researchers to compare their participants' performances to a set of grade-level norms.

MATRS was developed to address these two issues. MATRS is aligned with a conceptual model that portrays the breadth of morphological awareness an individual may call on when reading and spelling. It also represents a standardized measure that provides educators, school specialists, and researchers with the ability to determine whether a student's morphological awareness skills are within expectations for their grade. MATRS also provides practitioners with information that can be used to construct and deliver instruction/intervention plans specific to a student's needs.

OVERVIEW OF MATRS

MATRS is a norm-referenced, standardized measure of morphological awareness that consists of eight tasks (see Table 1.1 for a list of those tasks, which are described in Chapter 2). For each target grade, students are administered four tasks. The assessment is individually administered to first- through sixth-grade students to determine whether their morphological awareness skills are within expected limits based on grade level. When those skills are below typical limits, MATRS identifies which aspects of morphological awareness require specific intervention.

Table 1.1. MATRS Tasks

Task Number	Task Name	Who Records Responses
1	Segmenting	Examiner
2	Affix Identification	Student
3	Affix Meaning	Student
4	Suffix Choice	Student
5	Spelling Multi-Morphemic Words	Student
6	Suffix Spelling	Student
7	Spoken Relatives	Examiner
8	Written Relatives	Student

MATRS is based on a conceptual model developed by Apel (2014b). This four-domain model considers morphological awareness to include awareness of the following:

1. Spoken or written forms of morphemes
2. The meaning of affixes and the alterations in meaning and grammatical class they bring to base words (e.g., how *-ed* causes a verb to refer to the past or how *-er* can change a verb to a noun, as in *read* to *reader*)
3. The manner in which written affixes connect to base words, including changes to those base words (e.g., how some suffixes require a consonant to be doubled or dropped when attached to a base word in written form, such as in *hop* changing to *hopping* and *hope* to *hoped*)

4. The relation between base words and their inflected or derived forms (e.g., knowing that a variety of words are related because they share the same base word, such as *act*, *action*, *react*, and *activity*)

At each grade level, each of these domains is measured by a MATRS task. Specifically, MATRS assesses students' awareness of spoken or written forms of morphemes, affix meanings and their potential semantic (meaning) and orthographic (spelling) effects on base words, and the morphological relations between base words and their inflected or derived forms. The conceptual model will be explored further in Chapter 2.

Target Population

In clinical and educational settings, MATRS should be administered to first- through sixth-grade students who are struggling in the areas of reading and spelling. By doing so, normative information on how such students compare with their grade-level peers can be obtained. In other settings, such as research investigations, MATRS might be administered to students outside of those grade ranges as a criterion-referenced measure. Practitioners also could use MATRS with students above sixth grade in a criterion-referenced manner.

During the 3 years of data collection for its development, MATRS was administered to students in public and private schools that were representative of high-, middle-, and low-income neighborhoods based on school-reported percentages of students eligible for free and reduced lunches. Students represented a range of demographics, including race/ethnicity (Apel et al., 2021). Most students (94%) spoke English as the primary language, although some had other primary languages in the home. Students who were currently receiving special education services (e.g., speech, language) were included in data collection across the 3 years. However, students who spent the majority or all of their school days within a special education classroom were not assessed during the development of MATRS. Thus, MATRS can be administered to most student populations, with the caveat that it was not administered to students in full-time special education classrooms. See Table 5.1 for the demographics of the MATRS sample.

Examiners

MATRS can be given by practitioners responsible for assessing students who are struggling in their literacy skills, including speech-language pathologists, school and educational psychologists, learning specialists, and other similar professionals, as well as by researchers. MATRS can be used as part of a comprehensive assessment process for students referred for possible reading and/or writing (spelling) challenges. Just as other foundational skills are assessed to determine potential sources for delayed or disordered literacy skills (e.g., phonological [speech sound] awareness), MATRS should be used to determine whether challenges in reading and spelling may be related to a deficit in morphological awareness skills.

Thus, practitioners may give MATRS as part of their typical battery of measures used when assessing why students are performing below expectations in reading and spelling. Practitioners also may administer MATRS outside of a battery of tests because of indications of poor morphological awareness skills that arise when observing their students' performances during reading or spelling times. For example, it may be that teachers observe students who consistently leave off affixes when they read or spell. They also may detect that certain students are unfamiliar with using component morphemes in multimorphemic words that are not transparent (e.g., not recognizing the base word *strategy* and the plural affix in the word *strategies*) when attempting to read or spell the word. Researchers also can use MATRS to directly measure morphological awareness skills to answer their specific research questions for their investigation.

Although special training is not required to administer MATRS, the individuals who administer it should have a solid understanding of what morphological awareness is and how it contributes to reading and spelling development. Furthermore, they should have a strong

understanding of MATRS: what it assesses, how it is administered, and how students' outcomes on the different tasks may provide a guide to remedying students' morphological awareness deficits. To learn that information, examiners should closely read this manual and review the example case studies that illustrate the assessment to instruction/intervention connection process (see Chapter 4). To learn how to gather and analyze data obtained from the MATRS, examiners should first read the administration instructions for each task (see Chapter 2) and then view the demonstration videos for each task (see the About the Downloads page at the front of this manual for access instructions).

MATRS Assessment Materials

MATRS includes the following components for administration, scoring, and analyzing the assessment:

- **Assessment Manual:** This MATRS Assessment Manual includes all the information you need to understand, interpret, and administer MATRS. Appendices A and B include correct responses for each task—for Versions A and B, respectively. Appendix C includes tables for converting raw scores to standard scores and percentile ranks—for both Version A and Version B. An interactive Excel scoring sheet for these conversion tables is available for download.
- **Examiner Administration Booklet:** The Examiner Administration Booklet contains directions on how to prepare and administer the tasks. Each task is scripted and contains at least two practice items and a set of scored items. Allowable prompts and repetitions are described. The printed booklet included in the MATRS Kit is for Version A. Should you wish to retest the student, a Version B booklet is available online to download and print.
- **Student Response Forms:** Six sets of Student Response Forms are included with the MATRS Kit, one each for Grades 1 to 6. The Student Response Form is a booklet used by students to record their responses on Tasks 2, 3, 4, 5, 6, and 8. The examiner records the student's response for them on Tasks 1 and 7. The printed Student Response Forms included in the MATRS Kit are for Version A. Should you wish to retest the student, a Version B for each grade is available online to print and download.
- **Digital Audio Recording:** A digital audio recording is provided for administration of Task 3, Affix Meaning, to ensure consistent pronunciation of the nonwords. As described in Chapter 2, examiners should download the audio recording before meeting with the student and then play it during the testing session.
- **Demonstration Videos:** Nine demonstration videos are available online to stream. These videos introduce the assessment and show how each of the tasks should be administered.

See the About the Downloads page for instructions to access the B versions of the booklet and forms, the audio recording, videos, Excel scoring sheet, and the MATRS™ Technical Report.

For testing, pencils also need to be supplied for both the examiner and the student, a toy block if administering Task 1, and a device on which to play the audio recording for administering Task 3.

Administration Format and Timing

Chapter 2 of this manual describes how to prepare for and administer each of the MATRS tasks. Administration involves the examiner proceeding through the Examiner Administration Booklet instructions while the student responds on the Student Response Form for most tasks. Corrective feedback is given only for Practice Items, as indicated in the Examiner Administration Booklet instructions. Typically, administration of all tasks at a given grade requires approximately 35–45 minutes. However, all tasks do not need to be administered in one sitting.

Examiners may wish to break up the administration of MATRS by administering some tasks during one sitting and the remaining tasks during a second sitting. All tasks to be administered should be completed within a 2-week time frame.

For school-based professionals interested in assessing students in groups as part of a Level 1 or 2 Multi-Tiered System of Support (MTSS) or Response to Intervention (RTI) process or for researchers interested in assessing multiple students at once for their investigation, the following tasks can be administered as a group: Tasks 2, 3, 4, 5, 6, and 8. See Chapter 2 for guidance on group administration.

Scoring and Interpretation

After the testing session is complete, examiners can use the guidance in this manual to score the student's results. Examiners should reference Appendices A and B to determine the correct response for each task. To determine a student's scores, the examiner should add all correct responses and then convert these raw scores to standard scores and percentile ranks using the conversion charts in Appendix C or the Excel sheet available online.

MATRS relies on percentile ranks to indicate a student's performance on the administered tasks. Percentile ranks allow the examiner to determine whether a student's raw score on a task falls within expectations for same-grade students. Percentile ranks between 16 and 84 represent the average range for performance on that task(s). Any score that falls below the 16th percentile indicates the student is performing below grade-level expectations for that task, and practitioners should consider morphological awareness skill(s) a viable target for improvement (see Chapter 4). Percentile ranks indicate the percentage of students who performed similarly to or below the target student on that particular task. For example, a target student who earns a percentile rank of 16 performed similar to or better than 16% of students at that grade level but lower than 84% of same-grade students who participated in the norming sample. As another example, a target student who earns a percentile rank of 84 performed similar to or better than 84% of same-grade students in the norming sample on that particular task. Of course, any percentile score that falls above the 84th percentile indicates that the child is performing above grade-level expectations for that particular morphological awareness skill.

Practitioners should use the results of their administration of MATRS to determine 1) whether a student's morphological awareness skills are at or below expectations for the student's grade level and 2) instructional/intervention goals for students struggling with morphological awareness (see Chapter 4 for examples).

Progress Monitoring

MATRS has two versions: A and B. The Version A Examiner Administration Booklet and Student Response Forms are included in your printed MATRS Kit. Version B of these components is available online for downloading and printing. Examiners should administer Version A during the first administration of the MATRS. Should a student require morphological awareness instruction/intervention, the examiner can administer Version B at a later date to determine whether growth in a student's morphological awareness skills has occurred. MATRS should not be administered more than once per quarter; for example, if Version A is administered in the fall quarter, Version B could be administered in the winter or spring quarter.

DEVELOPMENT OF MATRS

MATRS was developed via a \$1.3 million grant awarded to Dr. Kenn Apel (first author on MATRS) at the University of South Carolina from the Institute of Educational Sciences, U.S. Department of Education (see grant information on copyright page). Across the 3 years of the grant and 2 additional no-cost extension years, the grant team, including MATRS co-authors Dr. Victoria S. Henbest and Dr. Yaacov Petscher (second and third authors on MATRS, respectively), assessed

just over 5,400 first- through sixth-grade students to develop the optimal task items for MATRS. This work allowed the team to develop reliable and valid items for the eight tasks, with two versions of each of the tasks. Thus, an examiner may use one version to initially diagnose students' morphological awareness skills. If students demonstrate deficits in morphological awareness, the second version may be administered after a period of morphological awareness instruction/intervention to determine any progress or changes in the students' morphological awareness abilities.

Data collected for the development of MATRS have been used to answer other research questions (e.g., Apel & Henbest, 2020; Apel et al., 2023; Henbest et al., 2019). Of note, one such investigation (Apel et al., 2023) demonstrated that students can differ in the patterns of strength and weaknesses of their morphological awareness skills across the different tasks administered. Given that MATRS represents a measure composed of a series of tasks that represent different aspects of morphological awareness, it provides an optimal means to assess morphological awareness abilities and patterns of strengths or weaknesses of those skills in first- through sixth-grade students. Further discussion of MATRS development is available in Chapter 5.