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Performance in Morphological Awareness: Children with Language Learning Disabilities versus Typical Language

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Capstone Approval Page

Capstone Title: Performance in Morphological Awareness: Children with Language Learning Disabilities versus Typical Language

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HONORS THESIS ABSTRACT

Purpose: Currently, assessment methods used to identify strengths or weaknesses in morphological awareness—a skill necessary for academic success—vary widely in style and manner of administration. Only one norm-referenced test includes subtests targeting morphological awareness. The purpose of the present study was to determine the utility of a written probe in the assessment of morphological awareness in third grade children.
Method: Using a convenience sample of 60 third grade students, the present study compared student performance on two morphological awareness tasks: an experimental written spelling probe and an adapted form of a more widely used oral dynamic assessment. Students were classified into two groups: those with typical language (TL) and articulation disorders (AD) versus those with language learning disabilities (LLD) and those who qualified for Response to Intervention (RtI). A mixed method design was utilized to address the performance of the two groups on the different measures on different levels. First, student scores were quantitatively measured to compare overall performance; this was followed by a qualitative analysis of student responses on the written spelling probe, allowing the researchers to identify error patterns among the two groups.
Results: Students with LLD and those in RtI scored significantly lower than their peers on both the oral and written probe. Results indicated a statistically insignificant negative weak correlation between the tasks for students with TL and AD; a statistically significant strong positive correlation was calculated for students with LLD and enrolled in RTI.
Conclusion: Because of the strong positive correlation in performance on the two tasks for students with LLD and those in RtI, assessment in either modality for that population would appear to identify weaknesses in morphology. Error patterns appear similar among both groups but have some implications for our intervention practices for morphological awareness.

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ABSTRACT (100-200 WORDS): Previous studies about morphological awareness (MA) have discovered its important relationship to literacy skills. However, assessment methods used to identify weaknesses in the skill vary widely. Using a sample of 60 third grade students, the present study compared student performance on two MA tasks (an oral probe and an experimental written probe) to determine the utility of the written assessment. Research questions included the following: *Are there performance differences on the tasks between the two groups? Is there a correlation in student performance on the two tasks? Do children with language learning disabilities (LLD) differ from children with typical language (TL) in the prevalence of a certain error on the written probe?* The data indicated that students in the LLD group scored significantly lower than their peers on both tasks. Results indicated an insignificant

negative weak correlation between the tasks for students in the TL group; a significant strong positive correlation was calculated for students in the LLD group. Because of the strong positive correlation for students in the LLD group, it appears that assessment in either modality for that population would identify weaknesses in morphology. Error patterns appear similar among both groups but have some implications for our intervention practices for morphological awareness.

BACKGROUND

Language and Morphology

Language consists of five components: phonology, morphology, syntax, semantics, and pragmatics (Reed, 2012). The focus of this study is morphology, the examination of the smallest meaningful units of language (i.e. morphemes) (Reed, 2012). Morphemes can be classified into one of two groups: free morphemes (i.e. base words) or bound morphemes (i.e. prefixes and suffixes, collectively called affixes) (Reed, 2012). When considering affixes, they can be subdivided even further into either inflectional (i.e. grammatical) or derivational morphemes (Larsen & Nippold, 2007a). Inflectional morphemes are those that, when added to a base word, do not change the meaning of the word or its part of speech. Examples include the plural –s, the present progressive –ing, and the third person singular –s (Larsen & Nippold, 2007a). When the plural –s is attached to a base word such as *cat* to become *cats,* neither the part of speech nor the meaning of the word changes. Rather, it simply becomes the plural form of the original noun, *cat.* In contrast, a derivational morpheme is one that *does* change the meaning of the word and/or the part of speech (Larsen & Nippold, 2007a). For example, the addition of the suffixes –ment, -ance, or the agent marking –er create nouns. When these suffixes are attached, the verb *retire* becomes *retirement*, *perform* becomes *performance*, and *teach* becomes *teacher*.

An awareness of these units of language, an understanding of their meaning and the way they alter the meaning of base words, knowledge of the way they attach to base words and any spelling changes associated with such combinations, and the ability to interpret the relationships between base words and their inflected/derived forms is known as morphological awareness (Apel, 2014). Morphological awareness is critical to the development of English language skills and has been identified as a key predictor of literacy success (Wolter, Wood, & D'zatko, 2009),

including vocabulary proficiency, reading abilities, and spelling skills (Wolter & Pike, 2015). As morphological awareness has warranted increasing attention in the last three decades, it is pertinent that, for both the typical language learner and students with language learning disabilities (LLD), professionals understand the development of morphemic knowledge, its link to literacy skills, assessment measures, and intervention strategies.

The present study compared performance by elementary-aged children on an oral and written assessment of morphological knowledge with the purpose of exploring the utility of an experimental written probe to accurately assess the skill, and if necessary, to inform remediation. Specifically: *Is there a difference in performance on the tasks between children with and without language-learning deficits? Is there a correlation in performance on the oral dynamic assessment task and the written spelling task? Do children with LLD differ from children with typical language in the prevalence of a certain error (i.e. morphemic, phonemic, omission) on the spelling probe?*

Development of Morphemic Knowledge

Children begin to acquire morphological awareness as early as preschool, and their skills continue to develop through elementary school and into high school (Berko, 1958; Berninger, Abbott, Nagy, & Carlisle, 2010; Nagy, Diakidoy, & Anderson, 1991). However, because morphemes can be either inflectional or derivational, there are two trajectories of development.

The earliest learned skills are those of inflectional morphology. Oral mastery of inflectional morphemes typically occurs during the preschool years (Berko, 1958; Nagy, Diakidoy, & Anderson, 1991). In 1958, Jean Berko performed a study with 94 preschool and first grade students, ranging from four to seven years old. Berko gave students an assessment

targeting their production of inflectional morphemes. To control for previous vocabulary knowledge, Berko used nonwords while probing for the addition of real morphemes. For example, the students were shown a picture of three birds. Pointing to the pictures, the following prompt was read aloud by the test administrator: "This is a wug. Now there is another one. There are two of them. There are two ____" (Berko, 1958). The word targeted by Berko was *wugs,* with the plural marker dictated by the child. The results of this study suggested no differences in morphemic knowledge between sex, but significant differences for some of the inflectional items between preschool and first grade students. This indicates that, even at four years old, children have some implicit knowledge of inflectional morphology, and that as they move into elementary school, some of their verbal inflectional morphology skills are being refined. In writing, students demonstrate use of inflectional morphological knowledge in free writing samples as young as kindergarten and first grade (Turnbull, Deacon, & Kay-Raining Bird, 2011). By the end of first grade, all ten students in the Turnbull et al. study were using the plural –s and progressive –ing with 93% and 97% accuracy, respectively, in obligatory contexts. However, other studies have not seen such mastery until later grades. Due to the small number of students in Turnbull, Deacon, & Kay-Raining Bird's study (N=10), their findings cannot be generalized without some reservation. Carlisle (1996) found that the accuracy and use of morphological markers increases significantly in the free writing of second and third graders, suggesting that Grade 2 is a key point in morphological development. Green et al. (2003) examined the accuracy with which third and fourth graders used inflectional morphemes. In the spring of the academic year, on average, third grade students used inflectional morphemes to mark past tense, complex verbs, and plurality with over 87% accuracy in a free writing sample, indicating their mastery of the skill.

The development of derivational morphological knowledge is a process that spans many years (Windsor, 1994). Knowledge of derivational morphology begins to develop in early elementary school and continues to develop even into high school (Anglin, 1993; Larsen & Nippold, 2007a; Nagy, Diakidoy, & Anderson, 1991). In the Green et al. (2003) study, although on average, third grade students used inflectional morphemes with over 80% accuracy, derivational morphemes were used, on average, with only 63% accuracy in the free writing sample. In 1994, Windsor studied both comprehension and production of derivational suffixes in children and adults. Results indicated that 5th through 8th grade students outperformed students in 3rd and 4th grade on both the comprehension and production tasks. Performance by 6th through 8th grade students on the comprehension task was only slightly lower than the adult scores; however, adults significantly outperformed all students on the production tasks. These results indicate that morphological knowledge of derivational suffixes continues to develop even into adulthood.

Influence of Morphological Awareness on Literacy Skills

As morphological awareness develops in children, professionals must be aware of the relationship between morphological awareness and other literacy skills, including vocabulary development, reading comprehension, and spelling abilities (Wolter & Pike, 2015). Apel, Wilson-Fowler, Brimo, and Perrin (2012) studied the relationship of the three metalinguistic measures (i.e. phonological, morphological, and orthographical awareness) and three measures of literacy (i.e. word recognition, reading comprehension, and spelling). Of the three metalinguistic measures, morphological awareness was the only one with a moderate or strong correlation to all three of the literacy tasks. Historically, morphological awareness has been

overlooked as a link to literacy success, but the body of literature on the topic is growing and gaining significant attention (Apel et al., 2012).

According to estimates by Nagy and Anderson (1984), there are approximately 88,500 words included in text in school English. In order to know all 88,500 words by the time students are 18 years old, they would have to learn between 13-14 new words each day from birth. This is not plausible for even the most demanding programs of vocabulary instruction. However, Nagy and Anderson suggest a solution to this dilemma that includes teaching children the skills to extract word meaning from surrounding text or breaking down words into smaller parts (i.e. employing morphological awareness) to aid in self-directed vocabulary learning. For purposes of this present study, we are most interested in the effects of employing morphological awareness on other literacy skills, and in this case specifically, its effect on word learning and vocabulary development. Anglin (1993) found that first, third, and fifth grade students' ability to employ morphological analysis significantly contributed to vocabulary development. In addition, Carlisle (2000) used three morphological awareness tasks and two comprehension tasks (i.e. vocabulary and reading comprehension) to measure the effect of morphological awareness on comprehension in third and fifth grade students. Results indicated that morphological awareness was significantly correlated with students' capacity to define multimorphemic words.

Beyond vocabulary, several studies have considered the effects of morphological awareness on reading comprehension, another key component of literacy (e.g., Apel, Diehm, & Apel, 2013; Apel et al., 2012; Carlisle, 2000; Deacon & Kirby, 2004; Larsen & Nippold, 2007b; Nagy, Berninger, & Abbott, 2006; Wolter & Pike, 2015). Strength of morphological awareness skills is positively related to reading comprehension for students in primary school (e.g., Apel, Diehm, & Apel, 2013; Apel et al., 2012; Carlisle, 2000; Deacon & Kirby, 2004; Wolter & Pike,

2015). Second and third grade students' performances on morphological awareness tasks were significantly related to their reading comprehension (Apel et al., 2012) and Carlisle (2000) found similar results. She not only found a unique significant relationship between the morphological tasks and the reading comprehension task for third grade students, but also for fifth grade students. Comparable outcomes have been found for students in secondary school (Larsen & Nippold, 2007b; Nagy et al., 2006; Nagy, Diakidoy, & Anderson, 1991). Nagy et al. measured the influence of morphological awareness on literacy skills in fourth through ninth grade students (2006). They found that morphological awareness made a significant unique contribution to reading comprehension for students at all the investigated grade levels. Larsen and Nippold's investigation of sixth grade students (2007b) delivered similar results. Lassen and Nippold administered the Dynamic Assessment Task of Morphological Analysis (DATMA) to their students and found that performance on the DATMA was related to measures of the students' reading comprehension. As students make the transition from "learning to read" to "reading to learn" in third grade, it is essential that students have the ability to accurately read and comprehend texts. This evidence suggests the critical role morphological awareness plays in reading comprehension, and thus multiple academic pursuits, as students develop from early elementary age to adolescence.

Most important to the present study is the investigation of the influence of morphological awareness on spelling abilities (e.g., Apel & Lawrence, 2011; Apel et al., 2012; Nagy et al., 2006; Nunes, Bryant, & Bindman, 1997; Rubin, 1988; Treiman & Cassar, 1996). Upon drawing conclusions about the data regarding the relationship between morphological awareness and spelling, we are prompted to consider the implications it has for our view on the development of spelling skills. Several theories of spelling have been suggested, but two of the theories most

applicable to this discussion are included here. The Stage Theory proposes that children learn to spell in stages, in which they employ phonological knowledge first, followed by the use of morphological knowledge (Nunes, Bryant, & Bindman, 1997). The age at which morphological awareness begins to distinctly affect spelling has not been exclusively identified, but depending on the specific model of the theory, can range from third grade (Henderson, 1985) to late elementary and middle school (Schlagal, 2001). On the contrary, the Multilinguistic Model (Masterson & Apel, 2007) of spelling theorizes that metalinguistic skills do not develop singularly or linearly, but rather, that students use multiple metalinguistic skills for spelling from even the earliest stages of literacy development. This theory challenges the assumption that young spellers rely solely on phonetic knowledge.

Research on this topic suggests that, as morphological awareness develops in children with typical language (TL), it plays a unique role in predicting spelling accuracy. Treiman and Cassar (1996) examined spelling patterns in three student populations. The participants in Experiment 1 included first, second, and fourth grade students. A real word probe was administered to students to analyze the spelling errors made for one-morpheme and two-morpheme words that ended with the same phonetic cluster. For example, both *brand* and *tuned* end with the phonetic cluster /nd/. If young students did not use morphological awareness to aid their spelling, Treiman and Cassar hypothesized that spelling errors across one-morpheme and two-morpheme words would be similar. However, Treiman and Cassar found that students were more likely to omit the representation of the first consonant in the cluster for one morpheme words (i.e. /n/, in this example) and more likely to omit the representation of the second consonant in the cluster for the two morpheme words (i.e. /d/, in this example). This finding suggests that even students in first grade, although far from a comprehensive understanding of

morphology, employ some level of morphological awareness in their spellings. In Experiment 2 of their study, Treiman and Cassar worked with kindergarten and first grade students. Using the same word list as Experiment 1, Treiman and Cassar administered the same dictated spelling probe. However, this time the words were partially represented on the answer sheet and students were only required to fill in the missing letters (e.g., bra_*nd*_, tu_*ned*_). The missing letters were those that represented the final phonetic cluster. Although kindergarten students were more likely to omit the first phoneme in the final cluster for both word types, their disregard for the first phoneme over the second phoneme in the cluster was even greater for single-morpheme words. The effect of word type (i.e. one-morpheme or two morpheme) for kindergarten students was short of significance ($p=.56$), but was significant for first grade students ($p < .001$). Again, students in neither grade demonstrated a full understanding of morphological awareness, but their differences in spelling across word type and across grade level suggests their use of morphological awareness even in kindergarten and an increased use in first grade. In the third experiment, Treiman and Cassar aimed to determine if the type of task played a role in student performance. This time, using the same words, Treiman administered a dictated spelling probe to a group of second grade students and sentence formation task to another group of second grade students. Because the sentence formation task demanded that students divide their attention between several aspects of written language, Treiman and Cassar hypothesized that children would revert to a more phonological spelling and produce more errors in the sentence-level group than the word-level group. However, similar patterns of errors were found for the word-level and sentence-level groups, indicating that accessing several metalinguistic skills during spelling for the second graders was not affected by the type of task. As students transition to middle elementary years, Apel et al. (2012) examined whether metalinguistic skills

(phonemic, morphemic, and orthographic awareness), rapid automatized naming, and receptive vocabulary predicted outcomes on word recognition, spelling, and reading comprehension tasks. Performance on four of the tasks could explain 36% of the students' scores on the spelling probe for second and third grade students with TL, but morphological awareness alone was a unique predictor of the scores. Nagy et al. (2006) examined the contribution morphology makes to the development of literacy skills in fourth through ninth grade students. Again, morphological awareness was found to contribute to literacy skills, but most importantly, made a significant and unique contribution to spelling for students in each grade. These results, in conjunction with the results from Treiman and Cassar (1996) and Apel et al. (2012) indicate the influence of morphology on spelling from a very young age, but more notably, the continued influence from kindergarten to early high school. In consideration of these results, we cannot ignore the importance of morphological knowledge in spelling accuracy for students across all levels in our classrooms.

Morphemic Awareness and LLD

As critical as it is to determine the role of morphological awareness for students with TL, professionals in the field of speech-language pathology cannot ignore the importance of understanding the role of morphological awareness in students with LLD. The term LLD acts as an umbrella term for a large and heterogeneous group of students whose language deficits are a substantial component of their learning challenges (Reed, 2008). Language based learning disabilities have been identified as deficits in reading, writing, and/or spelling in the absence of an intellectual disability (American Speech-Language-Hearing Association, n.d.), including conditions such as dyslexia and dysgraphia.

As with students with TL, several researchers have explored morphological knowledge in students with language deficits (e.g., Siegel, 2008; Silliman, Bahr & Peters, 2006; Windsor, Scott & Street, 2000). Silliman et al. (2006) studied spelling patterns in 24 students from 6 to 11 years old. The performances on the Phonological, Orthographic, and Morphological Assessment of Spelling (POMAS) of 8 students with LLD were compared with chronological-age (CA) and spelling-age (SA) matched peers. Looking at the data quantitatively, students with LLD performed significantly lower than CA matched peers, but appeared to perform similarly to SA matched peers. However, when qualitative error differences were considered, students with LLD showed more difficulty in phonological representation of phonemes and representation of inflectional morphemes. These findings suggest that the performance of students with LLD on spelling tasks differs both quantitatively and qualitatively from their peers, and their errors include omission of morphemes.

Carlisle (1987) worked with a population of fourth, sixth, and eighth grade typically developing (TD) students and ninth grade students with reading and writing based learning disabilities. Carlisle administered four tasks: the spelling subtest of the *Wide Range Achievement Test* (Jastak & Jastak, 1978), a test of morphological structure, an experimental spelling test, and a test of suffix addition. Ninth graders with LLD performed below 8th grade TD students on the test of morphological structure and performed similarly to the 4th grade TD students on the experimental spelling measure. These results suggest that students with LD have deficits in both production and spelling of morphologically complex words, but that the challenges in spelling are more notable than those of production. Similarly, students with dyslexia have demonstrated poor morphological awareness and these outcomes were significantly correlated with spelling

and reading outcomes (Siegel, 2008). In generalizing these results, we can expect that students with LLD will exhibit poorer spelling and morphological skills than their TD peers.

Assessment Strategies for Morphological Awareness

Although strong morphological awareness is related to positive language and literacy outcomes and has shown to be a weaker skill in students with LLD than students with TL, we cannot begin to provide instruction for the skill if we have not yet assessed students' levels of ability. One setback to our current practice is the lack of a standardized approach to assessment. Over the years, several different assessment methods of morphological awareness have been used (Apel et. al, 2012), and only one norm-referenced test includes subtests targeting morphological awareness (Apel & Werfel, 2014).

When assessing morphological knowledge, tasks either measure students' syntactic, semantic, or both syntactic and semantic aspects of morphological understanding. To measure the syntactic knowledge of morphemes in isolation, cloze tasks with pseudowords are performed (Berko, 1958; McBride-Chang et al., 2005), requiring students to correctly complete a sentence by using the appropriate grammatical morpheme markers. The use of nonwords acts as a control for vocabulary knowledge and forces students to rely solely on their grammatical understanding of the affixes. Morphological awareness measures that target the semantic aspect rely solely on students' demonstration of their knowledge of the word meaning, but not their grammatical role in a sentence. Examples of these tasks include the *Morphological Relatedness Task* (e.g., "Are moth and mother related?" Nagy et al., 2006) and the *Comes From* task (e.g., "Does the word corner come from corn?" Berninger et al. 2010). To ensure that students have a global understanding of morphemes, researchers suggest the best assessment methods target both the

semantic and syntactic aspects of morphemes (e.g., Carlisle, 1995). Multiple tasks have been developed to target both of these components of language. Examples include Carlisle's administration of the *Test of Morphological Structure* that included a *Decomposition* and *Derivation* task (2000). These tasks force children to consider the semantic relationship between base and derived words, but also consider the grammatical role of the correct morpheme in the sentence.

Dynamic assessment has been used in several studies to identify the morphological awareness of school aged children (e.g., Larsen & Nippold, 2007b; Ram, Marinellie, Benigno, McCarthy, 2013; Wolter & Pike, 2015) and has been identified as a useful assessment tool (Wolter & Pike, 2015). Larsen and Nippold (2007b) developed the Dynamic Assessment Task of Morphological Analysis (DATMA) for use with sixth grade students. The DATMA asks students to define multimorphemic words and offer evidence of their understanding of the individual morphemes. If students cannot provide an acceptable answer, they are prompted by the test administrator until either (1.) the student provides/identifies a satisfactory definition or (2.) the test administrator utilizes all prompts without success. Depending on the amount of scaffolding needed by the student, scores are assigned accordingly. Since the development of the DATMA, other researchers have adopted and adapted it for use with other student populations (e.g., Ram et al., 2013; Wolter & Pike, 2015).

Because there is no standard measure for morphological awareness, Apel, Diehm, and Apel (2013) compared scores on four morphological tasks from 156 students in kindergarten, first, and second grade. The team identified two of the four tasks that differentiated performance across the three grade levels. The first of these tasks was called the "Relatives Task" in which the students were given a base word and asked to use that word (in the correct tense, with all

necessary morphemes attached) to complete a particular sentence. For example, the test administrator dictated the following: "Swim. Today, the girl is _____." In this case, the target word would be *swimming*. The second task that produced distinguishing scores at each grade level was an Affix Identification task. Students were presented with 51 written pseudowords, each of which contained a nonword base and real morpheme. Students were asked to analyze the word structure, look for affixes, and circle any affixes that they identified.

The purpose of Apel, Diehm, and Apel's study (2013) was to compare different outcomes on several different measures of morphological awareness. The Relatives Task and Affix Identification Task both differentiated performance by grade level, and more importantly, the Relatives Task was also associated with reading skills demonstrated by students across all three grades. This finding suggests that, for kindergarten, first, and second grade students, the Relatives Task appears to be a valuable assessment. It should be noted that the Relatives Task is one that measures both semantic and syntactic knowledge of morphemes. As professionals work to develop the most effective means of assessment, we must expand our examination to include the best practice for older students and continue to evaluate students' semantic and syntactic morphological knowledge.

Conclusion

Morphological awareness plays a significant role in literacy outcomes for both students with TL and LLD. In this study, our goal was to understand the quantitative and qualitative performance differences for students with TL and LLD on two tasks of morphological awareness: an oral dynamic probe (modeled after Larsen & Nippold, 2007b) and written spelling probe. We gathered data from 60 elementary-aged students to explore performance outcomes

and determine whether a relationship exists between performances on the two tasks. In consideration of the findings discussed above, we developed two hypotheses. First, because students LLD have demonstrated poorer morphological awareness than their peers, we hypothesized that students with LLD would have poorer performance on both tasks than their TD peers. We hypothesized that there would be a correlation in performance on both tasks for all students because (1.) there is a positive relationship between morphological awareness and spelling skills for both students with TL and LLD and (2.) both tasks were designed to be measures of morphological awareness. If both tasks accurately assessed morphological awareness, then the scores on each task should be reflective of one another.

METHODS

Participants

Participants in the present study included third grade children (N=60). Students were selected as a convenience sample from a Midwest suburban school district in close proximity to the researcher. All children enrolled in the third grade in the school were included; there was no exclusionary criteria. As a whole, the school population is predominantly White (87%), with the remaining population made up of Hispanic (6%), Asian (4%), and Multiracial (4%) students. Eleven percent of the students' families in the district are considered "Low Income."

The speech-language pathologist for the district helped the researchers classify students into one of four groups: those with TL (n=47), those with LLD (n=5), those with articulation disorders (AD; n=5), and those enrolled in response to intervention (RtI; n=3). Students were considered to have TL if they did not qualify for language or learning disabilities services. Students included in the LLD group were receiving services provided under Individual

Education Plans (IEPs) for language-based skills (i.e., reading, writing, speaking, and listening comprehension); students classified in the articulation group were receiving services provided under IEPs for speech production only. RtI group members were students who were not performing at grade level and were receiving additional instruction in language based academic areas skills from staff members.

Measures

Two probes were administered to students to assess their morphological awareness. The dynamic assessment was modeled after the DATMA developed for sixth grade students by Larsen & Nippold (2007b). In the present study, the researchers modified the assessment to make it appropriate for third grade students. Words included on the probe were from "Fundations," a classroom vocabulary program focusing on a "word of the day" that was utilized by the classroom teachers (See Appendix A for the word list).

The second assessment of morphological awareness was a spelling probe developed by the researchers. The probe consisted of 24 multimorphemic words. The items on the probe alternated between real and pseudo words, resulting in 12 real words and 12 pseudo words (See Appendix B for the complete word list.). Target words and affixes were determined using *K12 Reader* Reading Instruction Resources. Real words, with the exception of three items (i.e. reuse, forgot, sharpness), were chosen directly from the *3rd Grade Master Spelling List.* The nonwords were created by pairing a nonword base with a real affix. All but 2 (i.e., for- and –ness) of the affixes used for the nonwords were found on the *K12 Reader 3rd Grade Master Spelling List.* However, the 2 affixes not found on the third grade list were found on the *2nd Grade Master*

Spelling List, so it is reasonable to expect the 3rd grade students in this study to use them correctly (*K12 Reader* Reading Instruction Resources, 2008-2015).

Procedure

The dynamic assessment was administered to the students as a pre- and post-test for a vocabulary unit taught by the speech-language pathologist. Testing was conducted by university faculty and trained speech-language pathology graduate students in a one-to-one format. The post-test was administered in the fall of the students' third grade year. These post-test scores were used as the oral probe scores in the present study.

During the assessment, the university faculty and graduate students asked students to define multimorphemic words. If they were unable to successfully complete the task, the students were given scaffolded prompts to help them come to the correct answer. The scaffolded prompts were as follows:

Prompt 1: "What does _____ mean?"

Prompt 2: "Does the word _____ have any smaller parts? Now can you tell me what the word means?"

Prompt 3: "The smaller parts are ____ and ____. Now can you tell me what the word means?"

Prompt 4: "Listen to this sentence (word in a sentence). Now can you tell me what the word means?"

Prompt 5: "Which of these choices gives the meaning of the word _____? (Present two choices)."

The spelling probe was administered in the spring of the students' third grade year. The probe was administered by the school district's speech-language pathologist at the classroom level. Students were given an answer sheet with 24 blank answer spaces to write down their best spelling of each test item. The speech-language pathologist read each word aloud, followed by a sentence with the target word included, and then repeated the target word. Students were permitted to raise their hand and ask for items to be repeated as needed. Testing required approximately 30 minutes in each classroom and was completed in one session.

Scoring

The test items on the dynamic testing were scored on a scale of 0-5. The scoring system for the dynamic probe was as follows:

-If student was able to spontaneously produce the correct definition (Prompt 1), he/she was awarded 5 points and the clinician moved on to the next word.

-If student identified that the word had smaller parts and provided the correct definition (Prompt 2), he/she was awarded 4 points and the clinician moved on to the next word. If student could identify the smaller parts, but could not produce the correct definition, the clinician continued with the following prompts, and .5 points/identified word part were added to the final score for that word.

-If the student was provided with the smaller parts of the word and was able to produce the correct definition (Prompt 3), he/she was awarded 3 points and the clinician moved on to the next word.

-If the student was able to hear the word in a sentence and the provide the correct definition (Prompt 2), he/she was awarded 2 points and the clinician moved on to the next word.

-If the student was able to choose the correct meaning of the word from the two choices that were presented (Prompt 1), he/she was awarded 1 point.

-If the student was unable to provide the definition during prompting or choose the correct one from the two choices, he/she earned a score of 0 and the clinician continued to the next word.

At the end of the test, scores for each item were added together to get a total raw score for use in obtaining our results. There was a total of 12 items, which resulted in a maximum score of 60.

The test items on the spelling probe were scored with two different scoring systems, but both systems were designed to focus solely on the awareness of the affix. To successfully assess only the awareness of the affix, base word spelling was disregarded in the assessment of scores. Each item received two scores. The first score was based on a quantitative measure of correctness. Affixes that were spelled correctly received a score of 1, whereas incorrectly spelled affixes received a score of 0. Scores across all items for each student were added together to obtain a raw score with a maximum score of 24.

A second score scale was designed to assess qualitative aspects of the students' spelling. Points were assigned to each test item according to the types of errors made in spelling the test item. The four point scoring scale was as follows:

3—Affix is spelled correctly. (e.g., beautiful)

2—Affix is spelled with a workable phonological representation, but is not correct for specific word. (e.g., beautifull)

1—Affix is marked, but it is not a phonologically correct representation.

(e.g., beautifeal)

0—Affix is omitted. (e.g., beauty)

The maximum score possible was 72 total points.

Analysis

A mixed method design (sequential explanatory) was utilized to address the performance of the two groups on the different measures on different levels. In other words, the design allowed researchers to explore student performance by first using quantitative data and then delve deeper into the performance by utilizing qualitative data.

RESULTS

Quantitative Results

In order to begin to answer the first question as to whether there is a difference in performance on the tasks between children with and without language-learning deficits, descriptive statistics were calculated for each ability group. Due to comparable statistical performance (See Table 1), the subgroups were combined into two groups for analysis: Typical Language and Articulation vs. LLD and RtI.

Table 1

Quantitative Mean Raw Scores (Standard Deviation) for Ability

	Student Groups			
	Typical Language (TL; n=47)	Articulation Disorder (AD; n=5)	Language Learning Disability (LLD; n=5)	Response to Intervention (RtI; n=3)
Dynamic Probe (Maximum Possible: 60)	48.98 (3.75)	46.60 (4.45)	34.40 (15.08)	37.00 (2.00)
Spelling Probe (Maximum Possible: 24)	21.57 (2.01)	22.40 (2.61)	17.4 (3.78)	19.00 (2.65)

Using that data, independent t-tests were conducted to determine if and to what extent the difference in performance existed between the two ability groups (TL & AD versus LLD & RtI). As seen in Table 2, results from the independent t-tests indicated statistically significant differences in performance between the two groups. On average, performance on the dynamic probe by students with TL and AD (M= 48.75, SD = 3.84) was greater than performance by students with LLD and those enrolled in RtI (M = 35.38, SD = 11.53). This difference was significant $t(7.24) = 3.26$, $p = .013$ and represented a large effect size (r=.59). For the spelling probe, performance by students with TL and AD (M = 21.69, SD = 2.04) was again greater than students with LLD and those enrolled in RtI (M = 18.00, SD = 3.3). Results from the independent samples t-test indicated that this difference was statistically significant $t(7.85) = 3.08$, $p = .02$ and represented a large effect size (r=.55).

Table 2

Quantitative Mean Raw Scores (SD) for Ability Groups Across Task

	Student Groups	
	Typical Language & Articulation Disorder (TL & AD; n=52)	Language Learning Disabilities & Response to Intervention (LLD & RtI; n=8)
Dynamic Probe (Maximum Possible: 60)	48.75 (3.84)	35.38 (11.53)
Spelling Probe (Maximum Possible: 24)	21.69 (2.04)	18.00 (3.3)

To address the second question as to whether there is a correlation in performance on the oral dynamic assessment task and the written spelling task, a Kendall's Tau analysis was used to explore relationships between performance on the two tasks for students in each ability group. This nonparametric correlation measure was utilized due to the developmental nature of morphology skills, small data set, and possible ceiling effects, which thus, violates the assumptions of normality. Results indicated a statistically insignificant negative weak correlation ($r = -.13$; $p = .11$) between the tasks for students with TL and AD. A statistically significant strong positive correlation ($r = .59$; $p = .02$) was calculated for students with LLD and those enrolled in RtI.

Qualitative Analysis

The final question regarding whether children with LLD differ from children with TL in the prevalence of a certain error (i.e. morphemic, phonemic, omission) on the spelling probe was answered by using the qualitative scoring system described previously. The number of student scores at each level of qualitative scoring (3,2,1, or 0) was calculated, and the researchers determined the mean frequency of each score on the spelling probe for students in each ability group (See Table 3).

Students in both groups demonstrated error patterns in nonwords that were reflected in errors made for real words. Students with LLD and those enrolled in RTI were more likely to make morphological errors or multi-level errors and appeared to rely on phonological information as compared to students with TL and AD. Students in the LLD/RtI group had more difficulty with morphology on nonwords than true words as compared to students with TL and AD. This potentially indicates a better grasp of morphological concepts, beyond accuracy, for the students in the TL and AD group. If this underlying understanding of morphology for students in the TL/AD group is true, it can be considered the reason for those students' abilities to more accurately generalize the morphological patterns to novel targets.

It is also notable that only 2 students in the sample (both of whom were from the TL/AD group) made mistakes of omission, and among those two students, each only made one such error; in other words, of all the 1,440 student spellings on the probe, only 2 of the spelled words had an error of complete omission. All of the other 1,438 spellings by the students had *some* representation of the affix

.

Table 3

Mean Frequencies by Group on Spelling Probe

	Score	TL & AD		LLD & RtI	
		Word Type		Word Type	
		Real	Non	Real	Non
Morphologically Mastered	3	10.90	10.79	9.5	8.5
Phonologically Correct	2	.67	.77	1.375	1.875
Represented with Multi-level Errors	1	.42	.40	1.125	1.625
Affix Omitted	0	0	.04	0	0

DISCUSSION

Similar to students in Carlisle's study (1987), students in the present study with LLD and enrolled in RtI struggled more with morphological awareness tasks than their peers. This confirmed the researcher's hypothesis that students with LLD and in RtI would exhibit poorer performance on both tasks of morphological awareness.

Most important to this study was the correlation between the two tasks. Although Carlisle (1995) suggests the use of assessment tasks that measure both semantic and syntactic understanding of morphemes, the significant positive correlation between the two tasks for students with LLD and those in RtI suggests that assessment in either modality (even the syntactic heavy experimental written probe) appears to have potential for the accurate identification of weaknesses in morphology for this population. However, the unexpected negative weak correlation between performance on the two tasks for students with TL and AD

does not support the use of the spelling probe to identify weaknesses in morphology for the students with TL and AD. It is believed that the negative correlation can be attributed to the design of the spelling probe used in this study and a possible ceiling affect for this group of students; however, this assumption warrants attention and investigation by future researchers.

Unlike the findings of Silliman et al. (2006), the present study did not indicate a pattern of morpheme omission among students with LLD. In fact, the only students in the sample who omitted a morpheme were both in the TL/AD group, challenging the idea that children with LLD are more likely to make errors of omission in spelling morphologically complex words.

Implications of Study on Morphological Intervention

Because it has been estimated that students will likely encounter 88,500 words before age 18 (Nagy and Anderson, 1984), we can expect that they may be asked to decode, define, read, and spell many words with which they may be unfamiliar. This forces clinicians and educators to consider a more global approach to word learning: morphological instruction. In her examination of 111 primary and secondary school age students, Tattersall (2010) identified morphological challenges to be more prevalent than phonological errors in elementary students across all levels of ability (TL and LLD), suggesting that morphological instruction would be beneficial for all elementary students. Although students in our TL and AD group provided evidence of stronger morphological awareness than their peers, the positive correlation between morphological awareness and the development of strong literacy skills forces clinicians to consider providing morphological instruction to all students.

Several meta-analyses on morphological intervention studies have come to similar conclusions: morphological intervention has positive effects for all ages and levels of ability, but

even more importantly, it is most effective for the youngest and least able students (e.g., Bowers, Kirby, & Deacon, 2010; Carlisle, 2010; Goodwin & Ahn, 2010; Reed, 2008). Despite the evidence for the importance of morphological intervention, there is very little literature about the best practices for instruction, and over the years, it has not been regularly included in our classrooms (Bowers, Kirby, & Deacon, 2010; Carlisle, 2010). Intervention strategies vary in the number of hours per week spent in instruction, number of sessions per week, total number of weeks, number of students in the groups receiving instruction, ages and ability levels of participants, and skills targeted during the exercises. Because the rigor of the program can vary so widely, to date it has been difficult to draw concrete conclusions about the best practice. However, the results of the present study revealed that students in the LLD/RtI group had more difficulty with morphology on nonwords than true words as compared to students with TL and AD. This suggests the importance of teaching skills that will help students generalize the knowledge about the morphological awareness that they do possess—especially for those students with language-based learning deficits.

Several studies have provided successful instruction to students in which researchers documented marked increases in morphological awareness and other literacy skills after students completed the intervention program (e.g., Apel, Brimo, Diehm, & Apel, 2013; Bowers & Kirby, 2010). Bowers and Cooke (2012) suggest two means for providing morphological instruction: the orthographic word sum and the word matrix. Bowers and Kirby (2010) provided intervention to fourth and fifth grade students for vocabulary learning with an emphasis on using these two strategies. In comparison to the control group, students in the experimental group demonstrated significant vocabulary improvement for both target words and words in the same morphological family. By the demonstration of students' significant improvement for words in

the same morphological family, researchers are making it evident that such a means of instruction provides students with an understanding of the underlying principles of morphology, thus allowing them to generalize their knowledge of morphemes.

In addition to the success Bowers and Cooke found for the word sum and matrix focused intervention, Bowers et al. (2010) highlighted the importance for future research regarding the "detective" problem solving method of instruction. Bowers et al. (2010) concluded that this interactive and student motivated method proved to be effective and should be considered further as professionals search for the best morphological intervention.

LIMITATIONS AND FUTURE DIRECTION

The small sample size (N=60) and the obtainment of our participants from a convenience sample compromises the ability to generalize the results of this study. Participants did not represent a larger population of diverse ethnic backgrounds, educational opportunities, or socioeconomic status.

Future research should carefully consider probe design to ensure a broader range of item difficulty in order to prevent a ceiling effect. Results of the current study point to the students with TL and AD achieving mean scores on the spelling probe which approached 100% accuracy while demonstrating more difficulty with the oral probe (mean accuracy≈81%), thus most likely resulting in the weak negative correlation between the two tasks. Researchers should consider the use of more advanced derivational morphemes along with later developing grammatical markers.

The format of the probe used in this study should be retained as the use of real words as well as pseudo words can provide the examiner qualitative information on the child's use of

morphological as well as other language skills. Information regarding the child's relative strengths as well as areas of concern will aid therapists and teachers in designing instruction to ensure academic success.

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Appendix A. Word List for the Dynamic Assessment.

1. Thicker
2. Softest
3. Swelled
4. Checked
5. Disrupt
6. Handful
7. Kindness
8. Predict
9. Safety
10. Bravely
11. Forbid
12. Return

Appendix B. Word List and Dictated Sentences for the Spelling Probe

1. Looked; She looked over her paper before handing it in.
2. Deeked; The girl deeked it on the way to school.
3. Showed; The teacher showed a movie on Friday.
4. Bammed; The dog bammed when it was hungry.
5. Louder; The girl talked louder than the boy.
6. Reener; The dog acted reener than the cat.
7. Highest; The trail was the highest in the park.
8. Gebest; The bug was the gebest in the yard.
9. Colorful; The picture was colorful.
10. Bapful; The garden was bapful.
11. Sharpness; The students were surprised by the sharpness of the pencils.
12. Tibness; The children noticed the tibness of the classroom.
13. Empty; The box was empty.
14. Lebty; The kite was lebty.
15. Likely; It was likely that the boy could get a new skateboard for his birthday.
16. Gobely; The party was gobely.
17. Distance; It was a distance to the store.
18. Disfag; The disfag of the papers made us throw them away.
19. Prepare; The mom stopped playing to prepare dinner.
20. Predat; Dad made sure to predat the game.
21. Forgot; He forgot his homework.
22. Fortob; The girl fortob all of presents at the party.
23. Reuse; We always reuse bags at the store.
24. Rebop; The moms rebop many each day.