Research Article

Toward Understanding the Lexical–Morphological Networks of Children With Specific Language Impairment: Analysis of Responses on a Morphological Production Task

Hannah Krimm,^a Krystal L. Werfel,^b and C. Melanie Schuele^a

Purpose: The purpose of this study was to characterize the lexical–morphological networks of children with specific language impairment (SLI) compared to children with typical language by analyzing responses on a morphological derived form production task.

Method: School-age children with SLI ($n = 32$) and peers with typical language ($n = 40$) completed an oral cloze derived form production task (Carlisle, 2000). On this task, children were expected to complete verbally presented sentences with a derived form of a provided morphological stem. Responses were coded as correct or incorrect following Carlisle's (2000) stated correct responses. Incorrect responses were coded as scorable or unscorable, and then scorable responses were coded as pseudowords

or real words. Real words were further coded according to whether they were repetitions of the given stem.

Results: There was a statistically significant between-group difference for mean correct responses ($d = 1.43$). The scorable incorrect responses of children with SLI included a lower mean proportion of pseudowords than did the incorrect responses of children with typical language ($d = 0.76$).

Conclusion: Because children with SLI produced a lower proportion of pseudowords as scorable incorrect responses than peers with typical language, we conclude that they have less developed lexical–morphological networks and, thus, less derivational morphology knowledge than peers with typical language.

Derivational morphology knowledge is argued to influence many aspects of language production, language comprehension, and literacy acquisition including vocabulary, decoding, reading comprehension, and spelling (Goodwin & Ahn, 2010; Nagy, Carlisle, & Goodwin, 2014). Derivational morphology knowledge is most commonly measured with morphological derived form production tasks (Wolter & Gibson, 2015). Although children with specific language impairment (SLI) perform more poorly than peers with typical language (TL) on

these tasks (Marshall & van der Lely, 2007; Werfel, 2012), interpretation of poor performance as evidence of a deficit in derivational morphology knowledge may be inaccurate. The purpose of this study was to characterize the lexical–morphological networks of children with SLI compared to children with TL to better understand the derivational morphology knowledge of children with SLI.

Interpreting findings in studies of derivational morphology knowledge is fraught with problems, not the least of which is researchers' inconsistent use of terminology for constructs of interest. Some authors use morphological *awareness* and morphological *knowledge* interchangeably (e.g., Carlisle & Goodwin, 2013). Others draw a distinction between awareness and knowledge, suggesting that awareness implies conscious or explicit manipulation of morphemes, whereas knowledge implies unconscious or implicit morpheme use (Apel, 2014; Carlisle, 1995; Wagner, Muse, & Tannenbaum, 2007). We use the term

^aDepartment of Hearing and Speech Sciences, Vanderbilt University Medical Center, Nashville, TN

^bDepartment of Communication Sciences and Disorders, University of South Carolina, Columbia

Correspondence to Hannah Krimm: Hannah.krimm@vanderbilt.edu

Editor-in-Chief: Sean Redmond

Editor: Lisa Archibald

Received July 25, 2018

Revision received January 4, 2019

Accepted August 6, 2019

https://doi.org/10.1044/2019_JSLHR-L-18-0302

Disclosure: The authors have declared that no competing interests existed at the time of publication.

derivational morphology knowledge throughout this article because we focus on derivational, not inflectional morphology, and we contend that current measurement strategies prevent conclusions about consciousness.

Also limiting conclusions about derivational morphology knowledge is the assumption that producing multimorphemic words requires manipulating the constituent morphemes. The Test of Morphological Structure (TMS; Carlisle, 2000), which is commonly used to measure derivational morphology knowledge (e.g., Apel, Diehm, & Apel, 2013; Apel, Wilson-Fowler, Brimo, & Perrin, 2012; Berninger, Abbott, Nagy, & Carlisle, 2010; Wolter, Wood, & D'zatko, 2009), rests on this assumption (Goodwin, Petscher, Carlisle, & Mitchell, 2017). The TMS task¹ is a morphological derived form production task that follows a cloze procedure. The examiner verbally presents a morphological stem and an incomplete sentence (e.g., *farm. My uncle is a...*), and it is expected that the child will complete the sentence with a derived form related to the given stem (e.g., *farmer*). Importantly, this task can be completed using the lexical-semantic network without accessing the lexical-morphological network to apply derivational morphology knowledge.

Multimorphemic words are stored as single nodes in the lexical-semantic network and as interconnected nodes that represent individual morphemes in the lexical-morphological network (Caramazza, Laudanna, & Romani, 1988; Feldman, Rueckl, DiLiberto, Pastizzo, & Vellutino, 2002). Morphological derived form production tasks, then, like other linguistic production tasks, likely can be completed in one of two ways: (a) by directly accessing a single node in the lexical-semantic network or (b) by assembling the constituent morphemes from the lexical-morphological network (see Ehri, 2000). The former approach reflects lexical-semantic organization whereas the latter approach reflects derivational morphology knowledge. Figure 1 illustrates these two approaches to completing a morphological derived form production task.

When a child completes a morphological derived form production task using the lexical-semantic network, the morphological stem given by the examiner serves as a prime for the target response. For example, when the examiner provides *adventure* as the given stem for the item *Adventure. The trip sounded (adventurous)* on Carlisle's (2000) TMS, the *adventure* node is activated in the child's lexical-semantic network. Spreading activation from the *adventure* node stimulates the *adventurous* node and other semantically related nodes (e.g., *adventurer*, *fun*). If the child recognizes—consciously or not—that (a) the grammatical completion of the sentence requires an adjective and (b) the task requires the response to be morphologically linked to *adventure*, she/he responds with *adventurous* rather than *adventurer* or *fun*.

When a child completes a morphological derived form production task using the lexical-morphological

Figure 1. Hypothesized process for derived form production.

network, she/he concatenates constituent morphemes to generate a response. Using the example above, the child recognizes that grammatical completion of the sentence requires an adjective, accesses several adjective-forming suffixes (e.g., *-y*, *-ous*, *-able*, *-ful*) from the lexical-morphological network, and ultimately selects one to produce an adjectival derived form for *adventure*. Selecting the conventional suffix *-ous* results in the correct derived form response *adventurous*. Selecting a nonconventional suffix, such as *-y*, results in production of a pseudoword response such as *adventurey*. Pseudoword responses reflect derivational morphology knowledge because they require conscious or unconscious manipulation of individual morphemes stored in the lexical-morphological network. A child is highly unlikely to have stored the pseudoword *adventurey*, for example, as a whole word in the lexical-semantic network because it is not available in ambient language input. Rather, when a child produces *adventurey*, we assume she/he “invented” it by accessing the adjective forming *-y* suffix from the lexical-morphological network and concatenating it with the stem *adventure*.

Unlike pseudoword responses, which imply lexical-morphological network access and, thus, derivational morphology knowledge, it is impossible to determine whether correct responses on morphological derived form production tasks are achieved by accessing the lexical-morphological network. Accessing the lexical-semantic network is more efficient than concatenating morphemes from the lexical-morphological network (Caramazza et al., 1988), so correct responses are more likely to indicate semantic organization than derivational morphology knowledge. Because children with SLI are known to have compromised lexical-semantic organization (Sheng & McGregor, 2010), their poor performance on morphological derived form production tasks may reflect their limited vocabulary and/or disorganized lexical-semantic networks rather than limited derivational morphology knowledge.

Drawing conclusions about derivational morphology knowledge requires tasks that can only be completed

¹The TMS also includes a decomposition task, but we do not address that task in this study.

using the lexical–morphological network. Ultimately, a nonword production task, such as Berko’s (1958) Wug Test, designed specifically to tap derivational morphology, would be useful. In the absence of such a task, examining pseudoword responses generated using the TMS may provide insight into derivational morphology knowledge of children with SLI. The purpose of this study was to characterize the lexical–morphological networks of children with SLI compared to those of children with TL by analyzing pseudoword responses on a morphological derived form production task.

Method

The Vanderbilt University Institutional Review Board approved the methods used in this study. The data analyzed for this study were collected as part of a larger study on the relations between linguistic knowledge (e.g., phonological awareness, orthographic knowledge, morphological knowledge) and literacy for children with SLI and children with TL (Werfel, 2012).

Participants

The extant database used for this study included data from all children who participated in Werfel (2012). Participants were 32 children with SLI and 40 children with TL in Grades 2–4 recruited from across middle Tennessee. Table 1 reports participants’ characteristics. All participants scored within normal limits (standard score $\geq 85 \pm 3$ SEM) on the Test of Nonverbal Intelligence–Fourth Edition (Brown, Sherbenou, & Johnsen, 2010), spoke English as their first language per parent report, and passed a bilateral hearing screening prior to testing. There was not a statistically significant between-group difference in distribution of grade level, $X^2(2, N = 59) = 1.11, p = .573$. There was not a statistically significant between-group difference for articulation proficiency. There was an unplanned statistically significant between-group difference for age; children with SLI were older than children with TL.

Procedure

To recruit children with SLI, school speech-language pathologists in area schools sent consent forms home with children on their caseloads with Individuals with Disabilities Education Act eligibility categories of language impairment, speech impairment,² and specific learning disability in reading. Children with speech impairment were recruited because some children with speech impairment have comorbid, unrecognized language impairment (Shriberg, Tomblin, & McSweeney, 1999; Tomblin et al., 1997). Similarly, children with specific learning disability in reading were recruited because approximately 35%–40% of children with language impairment exhibit below average

reading skills in second and fourth grade (Catts, Fey, Tomblin, & Zhang, 2002) and may come to have specific learning disability eligibility on their Individualized Education Program, with or without identification of language impairment. To recruit children with TL, the classroom teachers of participants with SLI attending mainstream schools sent consent forms home with three classmates who they considered to have TL.

Children were assigned to the SLI or TL group based on their Core Language composite score on the Clinical Evaluation of Language Fundamentals–Fourth Edition (CELF-4; Semel, Wiig, & Secord, 2003). Children in the SLI group scored more than 1 *SD* below the mean (i.e., $SS < 85$). Children in the TL group scored within normal limits (i.e., $SS \geq 85$). There was a 5-point spread between the highest CELF-4 Core Language composite score ($SS = 83$) in the SLI group and the lowest CELF-4 Core Language composite score ($SS = 88$) in the TL group. The effect size for mean group difference on the CELF-4 Core Language composite score was large ($d = 3.44$).

Outcome Measure

Participants completed the derivation subtest of the TMS (Carlisle, 2000) as part of a larger speech, language, and literacy assessment battery (see Werfel, 2012). The TMS derivation subtest is a 28-item cloze task completed orally with no printed stimuli. The experimenter says a morphological stem followed by the beginning of a sentence that can be completed with a derived form of the stem. The participant provides a response to complete the sentence. For example:

E Farm. My uncle is a...
C Farmer.

Interested readers can access the complete measure and correct responses in Carlisle (2000).

Scoring

We initially assigned each child response a code of correct or incorrect according to the single correct answer for each item specified by Carlisle (2000). Next, we coded incorrect responses according to whether they were unscorable or scorable.

Unscorable responses (a) did not include the given stem (e.g., *fun* where *adventure* was the given stem), (b) included more than one word (e.g., *major hour* for *majority*), and (c) reflected decomposition (e.g., *advent* from *adventure*). Responses on which the participant declined to answer or stated that she/he did not know were also coded as unscorable. We assume that unscorable responses provide no information about a child’s lexical–morphological network.

Scorable incorrect responses were single words that included the given stem, including stem repetitions. They were coded as (a) real words or (b) pseudowords. We operationalized real words as words that appear in the *Random*

²In Tennessee, speech impairment and language impairment are separate eligibility categories (Tennessee Department of Education, n.d.).

Table 1. Participants' characteristics.

Variables	SLI (<i>n</i> = 32)					TL (<i>n</i> = 40)					<i>t</i>	<i>p</i>	<i>d</i>
	<i>M</i> (<i>SD</i>)		Range			<i>M</i> (<i>SD</i>)		Range					
Age (months)	112.06	(12.44)	88	–	136	104.85	(11.86)	84	–	132	2.50	.02	0.60
CELF-4 SS	71.53	(9.83)	40	–	84	106.30	(10.34)	88	–	124	14.57	< .001	3.44
TONI-4 SS	97.81	(8.13)	83	–	115	104.40	(8.13)	88	–	121	3.42	.001	0.81
Arizona-3 total score	98.61	(2.27)	91.5	–	100	98.78	(2.85)	88	–	100	0.27	.784	0.06

Note. Maximum total Arizona-3 score = 100. SLI = children with specific language impairment; TL = children with typical language; CELF-4 = Clinical Evaluation of Language Fundamentals–Fourth Edition (Semel et al., 2003); SS = standard score; TONI-4 = Test of Nonverbal Intelligence–Fourth Edition (Brown et al., 2010); Arizona-3 = Arizona Articulation Proficiency Scale–Third Revision (Fudula, 2000).

House Webster's Unabridged Dictionary (1997). We assume that pseudowords imply lexical–morphological network access and indicate derivational morphology knowledge. Multimorphemic real words (i.e., real words that were not stem repetitions) were removed from analysis because they provide no information about a child's lexical–morphological network; it is impossible to discern whether a child assembled the real word from constituent morphemes or accessed it as a single lexical node. Real words that were simple repetitions of the given stem (stem repetitions) were included in analysis. Omission of inflectional morphological markers is a hallmark of SLI, particularly in regard to tense marking (Leonard, 2014). Omission of derivational markers may reflect a generalization of this propensity for omission to derivational morphology.

Results

Table 2 displays descriptive statistics for each response type. We used independent-samples *t* tests to analyze the between-group difference for (a) proportion of scorable incorrect responses that were pseudowords and (b) proportion of scorable incorrect responses that were stem repetitions. There was a statistically significant between-group difference in proportion of scorable incorrect responses that were pseudowords and the effect size was large, $t(69.45) = 3.15$, $p = .002$, $d = 0.76$. Children in the SLI group provided a lower proportion of incorrect responses that were pseudowords as compared to children in the TL group. There was not a statistically significant between-group difference in

proportion of scorable incorrect responses that were stem repetitions, $t(60.67) = 2.94$, $p = .005$. However, the effect size was large ($d = 0.70$); numerically, children with SLI produced a higher proportion of stem repetitions than peers with TL.

Discussion

Multiple researchers have argued on the basis of performance on morphological derived form production tasks that children with SLI have compromised derivational morphology knowledge relative to peers with TL. Poor performance on morphological derived form production tasks is expected, however, given that children with SLI have limited semantic knowledge and compromised lexical–semantic organization. The purpose of this study was to characterize lexical–morphological organization of children with SLI compared to children with TL by analyzing responses on a morphological derived form production task.

Children with SLI produced a smaller proportion of incorrect responses that were pseudowords than children with TL. These findings suggest that children with SLI are less likely than peers with TL to access individual derivational morphemes from the lexical–morphological network when producing derived forms and provide a more defensible source of evidence for the conclusion that children with SLI have less morphological knowledge than peers with TL.

Our findings are consistent with anecdotal evidence that children with SLI may use the lexical–morphological network less than peers with TL when completing morphological

Table 2. Descriptive statistics on participants' responses on the Test of Morphological Structure.

Proportion	SLI (<i>n</i> = 32)					TL (<i>n</i> = 40)				
	<i>M</i>	(<i>SD</i>)	Range			<i>M</i>	(<i>SD</i>)	Range		
Proportion of total responses that were correct ^a	.22	(.17)	0.04	–	0.75	.47	(.18)	0.11	–	0.93
Proportion of incorrect responses that were scorable ^b	.90	(.11)	0.67	–	1.00	.90	(.15)	0.50	–	1.00
Proportion of scorable incorrect responses that were:										
Pseudowords ^c	.11	(.16)	0.00	–	0.50	.24	(.18)	0.00	–	0.60
Stem repetitions ^c	.63	(.37)	0.00	–	1.00	.39	(.31)	0.00	–	1.00

Note. SLI = children with specific language impairment; TL = children with typical language.

^aDenominator is the total number of responses the child gave. ^bDenominator is the number of incorrect responses the child gave. ^cDenominator is the number of scorable incorrect responses the child gave.

derived form production tasks. Marshall and van der Lely (2007) described the incorrect responses given by children with SLI as encompassing fewer overgeneralizations (i.e., pseudowords) than children with TL. In other words, children with SLI seemed to use words already established in their lexicon whereas children with TL more readily used the lexical–morphological network to produce pseudoword derived forms. Similarly, our finding that children with SLI produced a smaller proportion of pseudowords than children with TL suggests that children with SLI have limited lexical–morphological networks compared to peers with TL.

It is well established that children with SLI omit tense-marking morphemes in obligatory contexts (Rice & Wexler, 1996). The larger proportion of stem repetition responses produced by children with SLI may extend this finding and reflect a general tendency of children with SLI to omit morphological markers. Importantly, omission of inflectional morphemes is mostly confined to tense-marking morphemes (Oetting & Rice, 1993). Future work could determine whether omission of derivational morphemes is restricted to specific cases of derivational morphology, such as nominalization.

Future Directions

This study provides preliminary evidence that children with SLI may not develop lexical–morphological networks to the same degree as peers with TL. However, a strong theoretical definition of derivational morphology knowledge accompanied by well-defined observable behaviors that demonstrate derivational morphology knowledge is needed before robust conclusions about derivational morphology knowledge in children with SLI can be made.

We propose that derivational morphology knowledge implies a well-developed and well-organized lexical–morphological network. Observable behaviors that indicate derivational morphology knowledge, then, include (a) inventing multimorphemic words, (b) decomposing multimorphemic words into constituent morphemes, (c) deciphering the meaning of unknown multimorphemic words, and (d) readily recognizing meaningful relations between multimorphemic words that share morphemes.

Researchers have assumed that producing morphological derived forms requires inventing of multimorphemic words. We argue that morphological derived form production tasks can be completed using semantic knowledge, and we know of no existing tasks that sufficiently remove the effects of semantic knowledge on morphological derived form production so that derived form production implies derivational morphology knowledge. Analyzing incorrect responses on a commonly used morphological derived form production task was a first step toward removing the effect of semantic knowledge, but our methods have limitations. We did not consider response grammaticality, for example, due to the nature of derivational morphology. Many suffixes serve multiple inflectional and derivational roles: *-ing* creates present progressive verbs (e.g., she is *running*), gerunds (e.g., I like *running*), and

adjectives (e.g., *running* water); *-ed* forms past participles (e.g., *jumped*) and adjectives (e.g., *talented*); *-er* creates agentive nouns (e.g., *farmer*), comparative adjectives (e.g., *bigger*), and frequentative verbs (e.g., *shimmer*). We cannot determine whether responses that include these and other opaque suffixes reflect a lack of derivational morphology knowledge or a lack of syntactic proficiency.

We propose that a lexical decision task, which implicitly assesses the ability to decompose multimorphemic words, may be a more theoretically sound, practical, and valid means of assessing derivational morphology knowledge. Caramazza et al. (1988) used a lexical decision task to investigate representation of inflectional morphemes in adults' lexical–morphological networks that could be adapted to investigate representation of derivational morphemes. They presented participants with pseudowords that were and were not morphologically decomposable. Participants took longer to decide that morphologically decomposable pseudowords were not real words. They also made more errors when judging morphologically decomposable pseudowords than when judging nondecomposable pseudowords. The authors concluded that deciding whether or not morphologically decomposable words were real words took longer because doing so requires searching the lexical–semantic network for a single node that represents the word and searching the lexical–morphological network for nodes for the constituent morphemes. In contrast, making a decision about morphologically nondecomposable words requires searching only the lexical–semantic network. This type of a within-subject task intrinsically controls for individual differences in semantic and syntactic knowledge; thus, it could more clearly illustrate the quality of a child's lexical–morphological network and, by extension, his or her derivational morphology knowledge. The task could be adapted to include derived pseudowords to characterize derivational morphology knowledge.

Acknowledgments

This work was supported by Preparation of Leadership Personnel grants (H325D080075 and H325D140087, awarded to PI: Schuele) from the U.S. Department of Education, the 2012 Jeanne S. Chall Research Fellowship (awarded to PI: Werfel) from the International Reading Association, and Vanderbilt CTSA Grant UL1 RR024975 from National Center for Research Resources/National Institutes of Health. Study data were managed using REDCap electronic data capture tools hosted at Vanderbilt University (1 UL1 RR024975 from National Center for Research Resources/National Institutes of Health). The content is solely the responsibility of the authors and does not necessarily reflect the views of the U.S. Department of Education, the International Reading Association, or the National Institutes of Health.

References

- Apel, K. (2014). A comprehensive definition of morphological awareness: Implications for assessment. *Topics in Language Disorders*, 34, 197–209. <https://doi.org/10.1097/TLD.000000000000019>
- Apel, K., Diehm, E., & Apel, L. (2013). Using multiple measures of morphological awareness to assess its relation to reading.

- Topics in Language Disorders*, 33, 42–56. <https://doi.org/10.1097/TLD.0b013e318280f57b>
- Apel, K., Wilson-Fowler, E. B., Brimo, D., & Perrin, N. A. (2012). Metalinguistic contributions to reading and spelling in second and third grade students. *Reading and Writing*, 25, 1283–1305. <https://doi.org/10.1007/s11145-011-9317-8>
- Berko, J. (1958). The child's learning of English morphology. *WORD*, 14, 150–177. <https://doi.org/10.1080/00437956.1958.11659661>
- Berninger, V. W., Abbott, R. D., Nagy, W., & Carlisle, J. (2010). Growth in phonological, orthographic, and morphological awareness in grades 1 to 6. *Journal of Psycholinguistic Research*, 39, 141–163. <https://doi.org/10.1007/s10936-009-9130-6>
- Brown, L., Sherbenou, R., & Johnsen, S. (2010). *Test of Nonverbal Intelligence—Fourth Edition (TONI-4)*. Austin, TX: Pro-Ed.
- Caramazza, A., Laudanna, A., & Romani, C. (1988). Lexical access and inflectional morphology. *Cognition*, 28, 297–332. [https://doi.org/10.1016/0010-0277\(88\)90017-0](https://doi.org/10.1016/0010-0277(88)90017-0)
- Carlisle, J. (1995). Morphological awareness and early reading achievement. In L. B. Feldman (Ed.), *Morphological aspects of language processing* (pp. 189–209). Hillsdale, NJ: Erlbaum.
- Carlisle, J. (2000). Awareness of the structure and meaning of morphologically complex words: Impact on reading. *Reading and Writing*, 12, 169–190. <https://doi.org/10.1023/A:1008131926604>
- Carlisle, J., & Goodwin, A. P. (2013). Morphemes matter: How morphological knowledge contributes to reading and writing. In C. A. Stone, E. Silliman, B. J. Ehren, & G. P. Wallach (Eds.), *Handbook of language and literacy* (2nd ed., pp. 265–282). New York, NY: Guilford.
- Catts, H. W., Fey, M. E., Tomblin, J. B., & Zhang, X. (2002). A longitudinal investigation of reading outcomes in children with language impairments. *Journal of Speech, Language, and Hearing Research*, 45, 1142–1157. [https://doi.org/10.1044/1092-4388\(2002/093\)](https://doi.org/10.1044/1092-4388(2002/093))
- Ehri, L. (2000). Learning to read and learning to spell: Two sides of a coin. *Topics in Language Disorders*, 20, 19–36. <https://doi.org/10.1097/00011363-200020030-00005>
- Feldman, L. B., Rueckl, J., DiLiberto, K., Pastizzo, M., & Vellutino, F. R. (2002). Morphological analysis by child readers as revealed by the fragment completion task. *Psychonomic Bulletin and Review*, 9, 529–535. <https://doi.org/10.3758/BF03196309>
- Goodwin, A. P., & Ahn, S. (2010). A meta-analysis of morphological interventions: Effects on literacy achievement of children with literacy difficulties. *Annals of Dyslexia*, 60, 183–208. <https://doi.org/10.1007/s11881-010-0041-x>
- Fudala, J. (2000). Arizona Articulation Proficiency Scale, Third Revision. East Moline, IL: LinguiSystems.
- Goodwin, A. P., Petscher, Y., Carlisle, J. F., & Mitchell, A. M. (2017). Exploring the dimensionality of morphological knowledge for adolescent readers. *Journal of Research in Reading*, 40, 91–117. <https://doi.org/10.1111/1467-9817.12064>
- Leonard, L. (2014). *Children with specific language impairment* (2nd ed.). Cambridge, MA: MIT Press.
- Marshall, C. R., & van der Lely, H. K. (2007). Derivational morphology in children with grammatical-specific language impairment. *Clinical Linguistic & Phonetics*, 21, 71–91. <https://doi.org/10.1080/02699200600594491>
- Nagy, W. E., Carlisle, J. F., & Goodwin, A. P. (2014). Morphological knowledge and literacy acquisition. *Journal of Learning Disabilities*, 47, 3–12. <https://doi.org/10.1177/0022219413509967>
- Oetting, J. B., & Rice, M. L. (1993). Plural acquisition in children with specific language impairment. *Journal of Speech and Hearing Research*, 36, 1236–1248. <https://doi.org/10.1044/jshr.3606.1236>
- Random House Webster's Unabridged Dictionary. (1997). (2nd ed.). New York, NY: Random House.
- Rice, M. L., & Wexler, K. (1996). Toward tense as a clinical marker of specific language impairment in English-speaking children. *Journal of Speech and Hearing Research*, 39, 1239–1257. <https://doi.org/10.1044/jshr.3906.1239>
- Semel, E., Wiig, E., & Secord, W. (2003). *Clinical Evaluation of Language Fundamentals—Fourth Edition (CELF-4)*. San Antonio, TX: The Psychological Corporation.
- Sheng, L., & McGregor, K. K. (2010). Lexical-semantic organization in children with specific language impairment. *Journal of Speech, Language, and Hearing Research*, 53, 146–159. [https://doi.org/10.1044/1092-4388\(2009/08-0160\)](https://doi.org/10.1044/1092-4388(2009/08-0160))
- Shriberg, L. D., Tomblin, J. B., & McSweeney, J. L. (1999). Prevalence of speech delay in 6-year-old children and comorbidity with language impairment. *Journal of Speech, Language, and Hearing Research*, 42, 1461–1481. <https://doi.org/10.1044/jshr.4206.1461>
- Tennessee Department of Education. (n.d.). *Speech or language impairment*. Retrieved from https://www.tn.gov/assets/entities/education/attachments/se_eligibility_speech_lang_imp.pdf
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of specific language impairment in kindergarten children. *Journal of Speech, Language, and Hearing Research*, 40, 1245–1260. <https://doi.org/10.1044/jshr.4006.1245>
- Wagner, R., Muse, A., & Tannenbaum, K. (2007). *Vocabulary acquisition: Implications for reading comprehension*. New York, NY: Guilford.
- Werfel, K. L. (2012). *Contributions of linguistic knowledge to spelling performance in elementary school children with and without language impairment* (Unpublished doctoral dissertation). Vanderbilt University, Nashville, TN.
- Wolter, J. A., & Gibson, F. E. (2015). Morphological awareness assessment to improve language and literacy. *Seminars in Speech and Language*, 36, 31–41. <https://doi.org/10.1055/s-0034-1396444>
- Wolter, J. A., Wood, A., & D'zatko, K. W. (2009). The influence of morphological awareness on the literacy development of first-grade children. *Language, Speech, and Hearing Services in Schools*, 40, 286–298. [https://doi.org/10.1044/0161-1461\(2009/08-0001\)](https://doi.org/10.1044/0161-1461(2009/08-0001))