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Productions of Metalinguistic Awareness by Young Children with SLI and Typical Language

A thesis

presented to

the faculty of the Department of Audiology and Speech-Language Pathology

East Tennessee State University

In partial fulfillment

of the requirements for the degree

Master of Science in Communicative Disorders

by

Lucy Estes Long

May 2015

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Dr. Brenda Louw

Mrs. Teresa Boggs

Keywords: metalinguistic productions, specific language impairment, age-matched, language-matched

ABSTRACT

Productions of Metalinguistic Awareness by Young Children with SLI and Typical Language

by

Lucy Estes Long

This study seeks to: (1) determine if differences exist between children with Specific Language Impairment (SLI) compared to age-matched (AM) and language-matched (LM) children with typical language development (TL) in rates and proportions of five types of metalinguistic productions and (2) test theories of metalinguistic production. Forty-five children, 24 with TL and 21 with SLI, paired for age or language level, formed two groups. Previously collected data from two studies of verb learning (Proctor-Williams & Fey, 2007; Proctor-Williams, unpublished) were analyzed for rates and types of metalinguistic productions. Results yielded no within or between group significant differences in the rates types. There were differences in proportional use of types of metalinguistic utterances in the LM group. This study showed that children as young as 3;0 produce metalinguistic utterances. Further, it disproved the Piagetian-Based Metalinguistic Development Theory. Interesting trends suggest direction for future research.

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CHAPTER 1

INTRODUCTION

Metalinguistic ability is “the ability to reflect upon and manipulate the structural features of spoken language, treating language itself as an object of thought, as opposed to simply using the language system to comprehend and produce sentences” (Tunmer & Herriman, 1984; as cited in Edwards & Kirkpatrick, 1999, p. 313). A child may employ the rules and structures of language; however, that same child may not have the developmental metalinguistic skills to evaluate those rules as a thought separate from their implementation in a sentence. There are multiple perspectives about the developmental track of metalinguistic skills and numerous methodological approaches for determining their presence or level of sophistication. Yet little data exists regarding metalinguistic development in children below the age of 6 years, children with specific language impairment (SLI), or the overt, spontaneous metalinguistic productions of children of any age. The primary purpose of the present study is to investigate the overt metalinguistic productions of young children with SLI as compared to those with typical language development (TL). As a secondary purpose, this study seeks to examine these productions in light of the primary theories of metalinguistic development.

Metalinguistic awareness requires attention in research as it is integral to both language and literacy development. Children apply metalinguistic skills to facilitate their learning in the language domains of phonology, semantics, morphology, syntax, and pragmatics. Pawtowska, Robinson and Seddoh (2014) and Varghese and Venkatesh, (2012) describe metalinguistic skill use in each of these language domains. *Phonological* metalinguistic skills include: recognition of the phonemes that comprise a particular language; how sounds combine to form words; segmentation of a word into its sounds and syllables; and distinguishing a word within a sentence

or phrase. For example, a task may involve hearing phonemes, such as /k/ /ʌ/ /p/ as separate sounds and identifying the word (/kʌp/ or “cup”) that those phonemes produce when blended. *Semantic* metalinguistic skills include categorization and determination of the appropriateness of lexical meaning such as recognition that “I *sat* the tree” or “I drank the *chair*” are not sensible sentences in English. *Morphologic* metalinguistic skills include determination of appropriate morpheme use, typically of specificity, number, and tense. For example, if the child received a picture of a child with toys, he or she may be required to pass judgment on a sentence such as, “The boy has four toy,” and determine that “toy” is missing the plural –s. A morphological task may also require sentence completion such as, “Yesterday he played. Today he . . .” to prompt the child to process the necessity of morphological markers in context. *Syntactic* metalinguistic skills manifest in judgments of sentence type, word order in sentences, and subject-verb agreement. Syntactic metalinguistic tasks typically require participants to apply syntactic knowledge to determine the appropriateness of another’s syntax. For example, participants are asked to listen to phrases, judge correctness, and perhaps identify or even correct errors of any syntactic variety, such as, “The girl have two dolls.” *Pragmatic* metalinguistic skills allow one to determine if a message is said out of context, is inadequate, or does not maintain contextual relevance with the rest of a conversation. For example, pragmatic skills were investigated by Scholl and Ryan (1980) who asked participants to determine if a statement likely belonged to a pictured mother or her daughter (Pawtowska et al., 2014; Varghese & Venkatesh, 2012).

Children not only employ metalinguistic skills in verbal language, but also in literacy development. Lightsey and Frye (2004) describe the components of metalinguistic development as they relate to literacy, claiming that a balanced literacy curriculum must incorporate the domains of phonological, semantic, syntactic and pragmatic awareness. Children must first

acquire phonological awareness to conceptualize the letters' representation of sounds. As that knowledge increases, children then learn to integrate the sounds to form words, and connect the printed letter to the lexical representation. After determining the words represented by the letters, children then combine the words into sentences through syntactic awareness to establish the appropriate word order. Through pragmatic metalinguistic skill, children learn the varied purposes for which we use written language (Lightsey & Frye, 2004). An understanding of the development of metalinguistic awareness is necessary to understand how metalinguistic skills contribute to both oral and written language development.

Metalinguistic awareness is typically evaluated from one of two broad perspectives: implicit observations or explicit, overt productions. The implicit observations made by adults as children complete tasks, such as grammaticality judgment of spoken sentences, are based upon the adult's perception of the child's skills. For example, in the literature, many studies employ judgment tasks in which the children are presented with sentences containing linguistic errors that the participants then judge as correct or incorrect (Edwards & Kirkpatrick, 1999; Redmond & Rice, 2001; Scholl & Ryan, 1980). The types of errors presented in these tasks vary across studies but most commonly include phonologic, semantic, and morphosyntactic errors. In these judgment tasks, the researchers instruct the participants to identify errors through verbal means or by pressing a button that signals error identification. Additionally, some studies incorporate a task that requires children to correct the perceived errors (Cairns, Schlisselberg, Waltzman, & McDaniel, 2006; Kamhi & Koenig, 1985; Liles, Shulman, & Bartlett, 1977). Although these tasks are useful to evaluate the metalinguistic skills of older children, the tasks are too complex for young children, therefore limiting the information gained (Chaney, 1992). Furthermore, relying solely on adult observation means limiting information to that which can be seen only

through the observer's lens rather than through that of the child's actual skills. The adult's interpretation of the child's external task completion may not accurately represent the child's internal skills, either because of task complexity or observer bias.

Metalinguistic awareness may also be investigated through the overt productions children make that demonstrate the ability to process language as a separate object of thought. Clark (1978) contends that the overt, spontaneous productions that children make may be used as evidence of metalinguistic knowledge in children as young as two years old. She suggests that children's use of spontaneous corrections following incorrect pronunciation, word choice, or order supplies evidence of metalinguistic awareness. Additional evidence arises from children's questions or judgments about the correct phonetic, semantic, syntactic, morphologic, or pragmatic forms of words. Children may also question the language of others, or ask about language in general. A child may also comment on the speech of others or his or her own speech, or play with language through rhyming, alliterations, puns, or segmentation of words or syllables.

Through observing the ways that children naturally and conversationally demonstrate their metalinguistic abilities, researchers are capable of better understanding children's functional application of skills and the sequence of their development. However, only three research studies were found that investigate metalinguistic skills based on spontaneous child productions. One utilized recasts as feedback to which the child responded with metalinguistic remarks (Chouinard & Clark, 2003); the other two studies utilized adults' requests for clarification to cue participants to locate and correct their errors (Levy, 1999; Levy, Tennebaum & Ornoy, 2003). Although the research is limited to these three studies, each study concluded that children as young as two to three years old produced metalinguistic utterances. Despite the

dearth of research in this area, both implicit and explicit methodologies provide researchers with valuable insights into children's metalinguistic awareness skills.

Researchers have analyzed metalinguistic awareness skills through implicit and explicit methodologies in three broad populations: (1) children with TL; (2) children with language impairment (LI) or SLI; and (3) individuals acquiring a second language. The first two populations are the focus of the current research. The following sections will review the literature of metalinguistic skills in children with TL and those with LI. Then the participants of the present study and methods are described in detail. Next, the results from this study are presented, including statistical analysis and interpretation of the data. Finally, a discussion of the implications of the results concludes this thesis.

CHAPTER 2

LITERATURE REVIEW

This literature review relies on studies that examine independently the populations and tasks used historically and in the present project. There were no studies discovered that specifically examined metalinguistic awareness in the same way as the current study. Some studies included only children with typical language, while others compared children with SLI to TL peers matched by age, language, or two groups of both AM and LM peers. Most studies focused on implicit metalinguistic tasks either judgment tasks or correction tasks, while others use protocols that elicited explicit spontaneous metalinguistic productions. Because so few studies included preschool aged children, those involving early elementary participants were also included. Thus, the following literature review provides a broad view of what little is known about metalinguistic skills of young children with SLI and those with TL.

Metalinguistic Skills of Children with TL

Explicit Tasks Involving Spontaneous Productions

Children with TL have been studied to gain perspective about normal development of metalinguistic skills based on their spontaneous responses during interactions with adults. Chouinard and Clark (2003) sought to determine if adults actually do reformulate child utterances and if so, whether children responded to these reformulations. In their longitudinal study of five children (three English-speaking, two French-speaking), aged two years to four years, they found that adults reformulate child utterances, but do so more frequently following erroneous than correct utterances and more frequently for younger than older children. Results indicated that children demonstrate attention to adult reformulations, using metalinguistic skills that contrast their own production with the production of the adult as the language expert.

Chouinard and Clark detected overt child productions following adult reformulations that repeated the phrase with the correction, acknowledged it, repeated new information, and explicitly rejected it. Although the children's use of overt metalinguistic productions following a reformulation ranged from 25% to 100%, a trend was identified that illustrated/showed that these five participants exhibited greater overt attention to adult reformulations with age.

Levy (1999) investigated children's overt responses to adult's specific requests for clarification (e.g., "Where did he go?") as well as neutral requests for clarification (e.g., "What?") to determine children's ability to identify their own errors and to make the necessary corrections. Participants included eight children, ages 2;2 to 3;7 (months; years), who were typically developing and spoke Hebrew as their only language. The children interacted in naturalistic conversations with an examiner, who responded differentially to spontaneous child errors. They collected data about the nature of linguistic error (syntactic, morphological, and semantic) that required repair. Across error types, all children demonstrated a greater proficiency for locating errors than spontaneously correcting the errors once identified. Errors of morphology, though not of syntax or semantics, significantly decreased as children's age and MLU increased. This study also found that adults requested more clarification for errors of morphology than semantics or syntax. Levy concluded that children are capable of metalinguistic awareness and monitoring language at the young ages represented in their participants, even in the absence of conscious awareness of this skill.

Interestingly, these two studies are the only ones that document use of explicit metalinguistic skills in children as young as two years old. In fact, other researchers have proposed that metalinguistic skills do not develop until middle childhood, around 7 or 8 years old (Scholl & Ryan, 1980). These studies contradict that supposition. Both Chouinard and Clark

(2003) and Levy (1999) discovered explicit methodologies that provide these young children with opportunities to demonstrate metalinguistic skills appropriate for their development. This is critical to the present study because it supports the inclusion of young children in studies investigating metalinguistic awareness.

Tasks Involving Judgments and Corrections

While some researchers have used explicit naturalistic interactions in their studies, more often others have utilized implicit, structured grammaticality judgment tasks. Scholl and Ryan (1980) included eight boys and eight girls with TL from each of kindergarten, first, and second grade (aged 6;0 and 8;1) in a study investigating metalinguistic development. They utilized an integrated task requiring pragmatic judgment of likely speaker and syntactic judgment with and without feedback. The children listened to experimenter-read sentences and were given a picture of a woman (the mother) and a two-year-old girl (the daughter) and asked to determine if the sentences belonged to the mother or daughter. For those receiving feedback, the examiner corrected them immediately following incorrect responses, “No, the mother did not say that, the daughter did,” or provided affirmative comments following correct responses. Additionally, the participants made correctness judgments about syntax. Six classes of grammatical forms were investigated in negative and question sentence structures. The syntactic structures included correct order (“The dogs did not chase the cat”), reversed order (“Not the dogs chased the cat”), and telegraphic forms (“Dogs not chased cat”). Scholl and Ryan analyzed the between subject variables of school grade and treatment (presence or absence of feedback) and a within-subject variable of sentence form to determine if children would use feedback to make more correct judgments on subsequent items. The authors found no significant differences between the groups that did or did not receive feedback on the judgment or correction tasks, but a significant

difference was found between the different school grade groups. The second grade children were significantly more accurate in judgments of sentence form than the kindergarteners. The children in fourth grade had significantly higher accuracy than the second-graders, except in the reversed negation and question syntactic form.

Cairns et al. (2006) conducted a study of grammaticality judgment and correction in which they presented 20 sentences to 77 four-, five-, and six-year-old children with TL. Ten of these sentences were grammatically well-formed and 10 were ill-formed, and children heard them in an interview format. Participants determined if the sentences were said “the right way” or “the wrong way” and were asked correct the incorrect sentences. Cairns et al. found a significant difference in grammaticality judgment accuracy between the four- and five-year-olds; the six-year-olds performed significantly better than both four- and five-year-olds. In sentence correction tasks, the five-year-olds did not perform significantly different than the four-year-olds, but the difference between the six-year-olds and both other ages was significant. Cairns et al. concluded that metalinguistic awareness skills improved with age.

Edwards and Kirkpatrick (1999) conducted a study in which 90 children with TL and 10 adult controls listened to a short story containing 20 nonsense lexical items that performed a grammatical or semantic role. Items performing a grammatical role included structure words, such as prepositions, conjunctions, morphological markers. Items with a semantic role were content words, such as adverbs, nouns, and verbs. Initially, Edwards and Kirkpatrick included children younger than four years of age, but later determined their cognitive development was not at a level to both attend to a story and simultaneously make judgments about the language used. The children that remained in the study ranged from 4;0 to 12;11.

Edwards and Kirkpatrick (1999) included some lexical items that were phonotactically legal (meaning they followed the phonological rules of the language) and some that were illegal. Participants pressed a button when they perceived an illegal lexical item, and both correct responses as well as response time were measured. Results were analyzed across age groups by total correct responses as well as within phonology and syntax errors. For each analysis, two observations were made: the average number of correct responses increased and reaction times decreased as age increased. There was a significant increase in accuracy and decrease in response time between the 7-year-old age group and the 8-year-old group. The adult control participants performed better than the children of all ages. Edwards and Kirkpatrick concluded that these results indicate that the developmental progression begins at least as young as 4 years old and continues to develop after the oldest age in the study, 12 years, 11 months. Both identification skill and speed of response improve with age.

Kemper and Vernooy (1993) conducted a study utilizing open-ended interviews to investigate ways in which children exhibit metalinguistic skill. Participants included 23 first-graders (11 boys, 12 girls) with TL, ranging in age from 6;8 to 7;11. The participants listened to two recordings, each 10 seconds in length; one recording was a child with TL and the other was a child with a communicative disorder. The researchers asked participants four questions regarding their perceptions of strong and weak communicative skill of peers in their class, and the children's teacher was interviewed with similar questions about communicative and social skills to gain further insight. In analyzing responses, Kemper and Vernooy found that 83% of participants attributed being a "good talker" to pragmatic criteria, while 17% based their perception upon linguistic production. When asked how a person talks that "can't talk so good," 70% based their answers on linguistic criteria, compared to 30% using pragmatic criteria. Of the

“best talkers” that children identified during the interview, four of the five were also determined as the most popular students by their peers. When researchers interviewed the teacher, three of the five students who were the highest academically successful were chosen as the best communicators. Kemper and Vernooy propose two explanations that children either base their judgments of a “good talker” on popularity and academic achievement, or children who are “good talkers” happen to be popular and academically successful. Kemper and Vernooy concluded that although they consider cognition as a factor to metalinguistic skill, social interaction may have equal importance.

In a study investigating young children’s metalinguistic skills, Chaney (1992) recruited 43 three-year-old children with TL. Chaney investigated the participants’ metalinguistic skills through administration of fourteen tasks to test metalinguistic ability, five measuring phonological awareness, five tasks of word awareness, and two tasks to measure print awareness. The children also participated in two tasks of structural awareness, one morphological task to complete sentences and judge and correct use of plurals and one syntactical task to judge and correct imperative sentences. The morphological task involved two phases. In Phase A, the children received a model of the correct morphological use before they heard a puppet’s incorrect production, which they were tasked to judge. Phase B removed the model and required the participants to listen to and then judge the puppet’s production. The mean percent correct scores of participants from Phase A were remarkably high (identification: 87%; production: 70%), resulting in a ceiling effect with the provision of an adult model. However, in Phase B with participants’ scores declined markedly (identification: 69%; production: 18%).

In Chaney’s (1992) study, a significant correlation was found between metalinguistic awareness skills of phonological, semantic, and syntactic awareness. Additionally, these skills

correlated with overall linguistic skill. Significant correlations also existed between overall metalinguistic skill and literacy knowledge, especially regarding phonological skills. Although some researchers suggest that metalinguistic awareness does not develop until age six at the earliest, Chaney concluded that metalinguistic awareness for phonological, semantic, syntactical, and morphological skills are emerging at three years of age and all awareness skills improved with language development. This is only the case however, if the task is accessible.

These studies of metalinguistic development in children with TL reveal several patterns. First, Cairns et al. (2006), Levy (1999), and Edwards and Kirkpatrick (1999) suggest that metalinguistic skills improve with age and literacy skills, although it is unclear from their studies whether this improvement is based upon language development as opposed to cognitive development. Second, Kemper and Vernooy (1993) conclude that social interaction and pragmatic considerations may play an integral role in metalinguistic awareness development. From these conclusions, it appears that some aspect of maturity, as well as possible social-pragmatic factors contribute to metalinguistic awareness. Third, Chaney's (1992) results suggest that the task used to measure metalinguistic skills makes a difference in the participants' success. A child's metalinguistic skills may not be accessed with certain tasks, such as judgment or correction, leading some researchers to conclude that the skill is absent in younger participants. However, modifications that simplify or scaffold the task, such as provision of a model or elicitation of spontaneous metalinguistic productions can provide these young children with an appropriate opportunity to exhibit metalinguistic awareness.

Few studies have investigated metalinguistic development in young children with typical language skills, and those that have included this population yield conflicting conclusions. Edwards and Kirkpatrick (1993) determined that children under the age of four could not

participate in their metalinguistic tasks. This may have been due to a variety of factors, such as the level of language used in the narrative task, or that the task exceeded the dual processing skills of young children (i.e., attending to a story while simultaneously making linguistic judgments). In contrast, Chaney (1992) determined that children as young as three years old exhibit emerging metalinguistic awareness across a variety of tasks. While these studies provide an initial understanding of typical metalinguistic awareness development, a great need for further research in this area remains.

Tasks Involving New Language Learning

Finestack (2014) conducted a study in which 66 participants were divided into three age groups of 4-, 5-, and 6-year-olds. The purpose of Finestack's study was to determine if children with TL have adequate metalinguistic skills to utilize explicit, deductive instruction to learn and produce a novel morphological form. She compared this instructional procedure to a more usual inductive, implicit teaching procedure. Additionally, if a difference was found, Finestack sought to investigate the relationships among success in learning the novel morphological form, language ability and nonverbal problem solving. The participants were randomly assigned to deductive or inductive instruction group. Three contexts including teaching, generalization, and maintenance probes were used to teach the morphological form. The data from these probes was analyzed to determine the number of "pattern-users" who correctly used the morphological form consistently (seven or more times in at least one session) and "nonusers," who did not demonstrate consistent correct use.

Finestack (2014) found that at all ages, there were a significantly greater number of pattern-users in the explicit, deductive instruction group than in the implicit, inductive instruction group. Nevertheless there were some age group differences. For the 4 year-olds, an advantage

was found for the deductive learners only on the generalization probe. For the 5-year olds, the advantage was found across all three probes. The age 6 group showed no significant differences between deductive and inductive learning, but the author also explains that the group data may have reached a ceiling. Finestack suggests that if deductive learning is a reflection of metalinguistic skills, children exhibit a developmental progression of accessing metalinguistic skills. With age, children utilized metalinguistic skills with greater accuracy to apply explicit instruction to their language knowledge.

The available literature for children with TL provides a beginning understanding of the metalinguistic skill and development that one could expect from a TD population. However, other studies have also investigated metalinguistic perspectives for children with language deficits.

Metalinguistic Skills of Children with Language Impairment

Children with LI/SLI and Age-Matched (AM) TL Peers

Children with SLI or other related language impairments (LI) have rarely been the subject of research in metalinguistic awareness. Kamhi and Koenig (1985) investigated the relationship between metalinguistic skill and linguistic performance in a study including 10 children with TL and 10 with LI, ranging in age from 4;0 to 7;2. Participants had differing expressive language skills and were matched by nonverbal intelligence and receptive language scores, resulting in slightly older participants in the LI group. The examiners presented 28 sentences of varying syntax balanced into seven sentences of each of the following categories: (1) correct, (2) syntactic error, (3) semantic error, and (4) phonologic error. Participants identified and corrected incorrect sentences. Kamhi and Koenig found that children performed similarly on identification and correction tasks for semantic and phonologic errors. However, the

children with LI performed significantly poorer than children with TL in identifying and correcting sentences with syntactic errors. The authors concluded that children with LI required greater time to acquire certain language skills and access these skills once acquired.

Liles et al. (1977) conducted a study with 30 boys in which the 15 children with a LI were age-matched to peers with TL. Both the LI and TL groups were divided into three AM groups of five, six, and seven years of age. The authors stated the purpose of the study was to determine if children with LI and children with TL differed in grammaticality judgment ability and if so, were differences determined by error type. The participants listened to 63 sentences, randomly distributed between three error types: (1) syntactic agreement (syntactically wrong with preserved meaning), (2) lexical (semantically wrong as a result of word error), and (3) word order (changes in syntax resulted in a syntactically and semantically incorrect sentences). Nine sentences with no errors were also presented. Participants identified whether each sentence presented was correct or incorrect, and if a sentence was incorrect, the child was requested to correct it.

Results from Liles et al. (1977) indicated differences between the children with LI and those with TL in errors of syntax agreement and syntactic order, while there was not a significant difference between groups in sentences with lexical errors. The TL group exhibited no within-group differences, while the LI group differed between sentence types, identifying the presence of an error in lexical and syntactic order in sentences with greater accuracy than those with errors of syntactic agreement. Additionally, the LI group's performance differed between the two tasks; they identified errors with higher accuracy than they correctly repaired errors. The authors concluded that children with LI had metalinguistic awareness, but to a lesser extent than age-matched peers with TL.

These two studies comparing children with LI and those with TL were consistent in that children with LI performed similarly to those with TL in semantic judgment tasks. Kamhi and Koenig (1985) found that children with SLI performed similarly to their AM peers in phonologic and semantic tasks, and Liles et al. (1977) found a similar pattern for lexical error correction. However, children with LI consistently performed more poorly in syntactic judgment tasks. Children with SLI generally have particular deficits in morphologic and syntactic skills (Leonard, Camarata, Pawtowska, Brown, & Camarata, 2008). The results of these studies provide valuable insight into the metalinguistic skills of children with LI, although they did not provide information regarding overt, spontaneous child utterances or children younger than 4 years of age.

Children with SLI and Language-Matched (LM) TL Peers

In a rare study of young children's spontaneous productions, Levy et al. (2003) conducted a study involving four children aged 3;5 to 6;10 with congenital neurological deficits and a control group comprised of eight children with typical language and development aged 2;2 to 2;6. Two participants had congenital hydrocephalus, one had Soto's syndrome, and one had Fragile X syndrome, and all four had intelligible speech and language sufficient for basic communication. The participants with LI had Mean Length of Utterances (MLU) that ranged from 2.15 to 2.88, relatively close to the MLU of the children with TL, which ranged from 2.2 to 2.8. Additionally, the researchers determined that the children's linguistic profiles regarding morphosyntax were comparable. The examiner participated in natural play with the child in his/her home, and was blind to the purpose of the investigation, which was adult requests for clarification. They investigated the child's response to specific and neutral requests for clarification following syntactic, morphological, and semantic errors. The children with

intellectual impairments attempted to repair utterances following both neutral and specific requests for clarification. The study did not employ statistical analysis to compare responses to the requests for clarification or correction of errors between the two groups of children. Levy et al. claimed that children are not required to achieve error-free completion of the linguistic task in order to effectively monitor their own speech productions using metalinguistic skills. Therefore, the authors concluded that the foundational procedures of metalinguistic skills are available at all stages of development.

Children with SLI and AM-TL and LM-TL Peers

Some studies of metalinguistic awareness in children with SLI compared those children to both age-matched (AM) and language-matched (LM) groups with TL. Smith-Lock (1995) conducted a study with 17 children with SLI and 32 children with language impairment divided into an AM group and LM group. The participants, ages 5 to 7 years old, completed a variety of metalinguistic tasks including sentence completion with real and nonsense words, comprehension of inflected non-words, response to morphological errors, and deliberately creating grammatical violations. Smith-Lock found that overall, the SLI group performed more poorly than the AM group. Furthermore, the SLI and LM groups were not significantly different. According to the author, this finding suggests that metalinguistic awareness is more closely tied to language development than cognitive or chronological development.

In a longitudinal study involving 21 children with SLI, Rice, Wexler and Redmond (1999) compared metalinguistic awareness through grammaticality judgments across two years in five data collection sessions. The purpose of their study was to evaluate theories explaining the grammatical deficits exhibited by children with SLI. The SLI group was compared to both LM and AM groups of children with TL in correctness of grammatical judgments presented

through robot toy characters. In comparing the SLI and AM groups, the authors found that metalinguistic awareness skills were statistically lower for the SLI group. However, by age 7 years, children with SLI achieved a level of metalinguistic skill that was too high to assert that these children lacked metalinguistic awareness, although it is slightly delayed compared to their TL peers. The SLI and LM groups did not differ significantly, which the authors attributed to the dependency of metalinguistic skill on overall language ability.

Rice et al. (1999) concluded that the judgments that children made paralleled their productions; that is, children were likely to accept errors they were likely to commit and reject errors they were unlikely to produce. This has relevance for metalinguistic awareness and skill in young children or those with SLI, who have not mastered certain aspects of language. Therefore, researchers must be mindful in task selection to avoid presenting participants with tasks they are not linguistically capable of successfully completing. Rice et al. concluded that in metalinguistic tasks involving grammaticality judgments, the performance of children with SLI depended upon the grammatical structure involved in the task.

Redmond and Rice (2001) conducted a study investigating irregular verb production in which 57 children participated, 19 of whom had SLI. Participants ranged in age from 5;7 to 8;8, and children with SLI ranged from 7;9-8;6. Redmond and Rice incorporated judgment and production tasks in which action figures introduced as “moonguys” presented sentences, and the children passed grammaticality judgments on the sentences. To evaluate production, examiners elicited each of the five irregular past tense verbs twice, once in simple sentences requiring the tensed form and once in complex sentences requiring the infinitival form. Their results indicated significant group differences in which the AM group performed better than LM peers, and the children with SLI performed the poorest. Redmond and Rice concluded that children with SLI

are more likely to incorrectly produce and accept incorrect forms of infinitival forms in finite positions.

These studies provide insight into the relationship between age and language skills and children with SLI. Both studies supported the conclusion that children with SLI performed more poorly than AM peers, which aligns with findings for children with SLI and their AM-TL peers with TL reported previously. The studies of only AM comparison found that children with SLI performed poorer than AM peers, emphasizing lower SLI group performance in tasks of syntax and morphology. However, as the studies comparing SLI and AM groups did not compare AM and LM, it is difficult to determine if the AM peers did not perform better because with age they acquired greater language skill. In the studies comparing SLI-LM pairs, both Smith-Lock (1995) and Rice et al. (1999) found that children with SLI performed similarly to younger LM peers. Bialystok (1986) suggests that two components of metalinguistic skill, analysis of linguistic knowledge and attentional procedures, heavily influence response to task difficulty; consequently, tasks that require greater levels of mastery of these components will be more difficult, especially for younger children. Therefore, younger children must participate in metalinguistic tasks that are appropriate for their abilities, such as the model provided in Chaney's (1992) study.

Theoretical Perspectives

The secondary purpose of this present investigation is to test contrasting theoretical predictions comparing the data of participants with SLI to that of AM and LM children with TL. Kemper and Vernooy (1993) described four foundational theories of the development of metalinguistic skills. These include a theory of language interaction, an information processing model, a reading perspective, and Van Kleeck's (1982) Piagetian-based theory. Additionally,

Bialystok's (1986) theory of language knowledge and cognitive control provides a fifth theoretical perspective to metalinguistic skill development. The reading development theory is excluded from further discussion in the present investigation because it cannot be tested as data about participants' reading skills was not collected.

Although few studies explicitly identify their theoretical foundations, the theory to which metalinguistic researchers likely subscribe is inferred based upon their stated hypotheses and methods of their studies. First, a discussion of the premises of each theory and the literature that supports them are presented, followed by hypotheses about the relative metalinguistic performances of each participant group. In testing these hypotheses, it was hoped one theory would be clearly supported, a perspective currently unavailable in the literature.

Language Development Based Metalinguistic Theory

The Language Development Theory, proposed by Clark (1978) and other psycholinguists (e.g., Clark & Anderson, 1979; Marshall & Morton, 1978, as cited by Kemper & Vernooy, 1993), suggests that metalinguistic awareness develops in conjunction with language acquisition. Kamhi and Koenig (1985) investigated this relationship through a grammaticality judgment task with 10 children with SLI and 10 children with TL who had comparable cognitive and receptive language skills. Because the children with TL significantly out-performed the children with SLI in identifying and correcting syntactic errors, the authors concluded that children with SLI exhibit delays in acquiring certain language skills as well as accessing those language skills metalinguistically after acquisition. In Chaney's (1992) study of 43 TD 3-year-old children, tests of metalinguistic ability including phonological, word, and structural awareness and two measures of literacy knowledge also supported the language-based theory of metalinguistic

development. Chaney concluded that a correlation exists between awareness skills and overall linguistic ability and between linguistic ability and literacy knowledge.

Finestack (2014) conducted a study to investigate 4-, 5-, and 6-year-old children's ability to learn a new morphological form. In all groups, users of the new morphological pattern had stronger language skills than nonusers. This study revealed no differences in cognitive abilities between the pattern-users than nonusers. Finestack concluded that language seems to have the greatest impact on the metalinguistic skills required to explicitly a new learn morphological form, though the most successful learners exhibited strong language and nonverbal cognitive abilities. Additionally, the author asserted that language is the primary influence for metalinguistic awareness.

Following the theory that metalinguistic awareness develops along with language skills, it was hypothesized that when participants are age-matched, the children with SLI will perform more poorly than children with TL. Children with SLI exhibit less mature language skills than peers of the same age. If language and metalinguistic development are interrelated, the poorer language skills of the children with SLI would also result in poorer metalinguistic skills. When subjects with SLI and those with TL are language-matched, however, they should show similar metalinguistic skills. If both children with SLI and TL perform equally, this theory will be supported. Because language skill impacts metalinguistic skill according to the language theory, equivalent language skills ensures equal metalinguistic skill.

Information Processing Based Metalinguistic Theory

Flavell (1977, 1981), Foss and Hakes (1978), Tunmer and Fletcher (1981), and LaBerge and Samuels (1974), proposed that metalinguistic awareness develops separately from language (as cited by Kemper & Vernooy, 1993). Instead, they suggest that information processing

capacities that arise in middle childhood relate to metalinguistic awareness. Leonard (2000) describes SLI as a limitation in general processing capacity that may be due to any combination of deficits in energy, processing speed or memory space (regarding the capacity to hold items in memory). Leonard and colleagues (Leonard, 1989, 1992b; Leonard, McGregor, & Allen, 1992; Leonard, Eyer, Bedore, & Grela, 1977, as cited by Leonard, 2000) suggest a “surface hypothesis” that emphasizes both general information processing and that features of English grammatical morphology jointly contribute to SLI. This theory is based upon the unique features of the English language that make morphology and grammar inconsistent and, when paired with a deficit in processing, result in SLI for some children.

The theory stating that metalinguistic awareness develops with information processing would be supported if the age-matched TL group performs better than the TL language-matched group. This comparison in performance would be consistent with findings described by Redmond and Rice (1999), in which the AM group performed better than the LM group, who performed better than the SLI group. The children with SLI would show the poorest performances. If information processing is a determinant of metalinguistic skill, greater processing would result in greater performance. If results supported this theory, it would in turn support the theoretical viewpoint that SLI reflects a deficit in information processing.

Piagetian-Based Metalinguistic Development Theory

Van Kleeck (1982) integrated Piagetian cognitive development within a psycholinguistic theory of metalinguistic awareness. The underlying principle is that the development of metalinguistic awareness reflects the development of general cognitive reasoning. Van Kleeck proposed two stages comprise metalinguistic development. The first stage corresponds to Piaget’s pre-operational stage before age six; the second stage corresponds to concrete operations

stage between ages seven and eleven. During the first metalinguistic developmental stage, children use language purposefully and use depends upon conveying a meaningful message understood by others to meet a want or need. Therefore, children's language awareness focuses on error correction to ensure listeners understand their messages. In this period semantic and pragmatic metalinguistic awareness develops. In Piaget's concrete operational stage, children cognitively manipulate multiple situations and perspectives across time and place. This perspective suggests that in this stage grammaticality judgments become possible because the children are capable of implementing syntactical, morphological and phonological awareness without semantic knowledge or confusion interference.

Van Kleeck's (1982) proposed theory was supported by findings published by Cairns et al. (2006). This study included 77 four-, five-, and six-year olds presented with 10 well-formed sentences and 10 ill-formed sentences. The study determined that both grammatical judgment and correction abilities improved with age. Edwards and Kirkpatrick (1999) also supported the Piagetian Theory. In their study, researchers presented 90 children (ages four years to twelve years, eleven months) with a short story including phonotactically legal and illegal lexical items. The participants improved in both accuracy of responses and reaction times with age, demonstrating a developmental trend in acquiring metalinguistic skills.

The Piagetian-based perspective would be supported if the SLI and age-matched TL group perform equally in metalinguistic productions and the SLI group outperforms the language-matched TL group. This hypothesis relies upon the knowledge that cognition develops with age in the Piagetian view, so two groups of children matched by age should have the same cognitive level, which would be greater than that of the younger LM group. Therefore, if

cognition determines metalinguistic skill, the age-matched TL and the SLI group should perform similarly and the language-matched TL group should perform more poorly.

Bialystok's Language Knowledge and Cognitive Control Theory

Bialystok (1986) describes metalinguistic skill as one that requires two components: analyzing language in a structured manner and attentional processes to select and process such analyses. Different metalinguistic tasks may require different levels of one or both skill components, and as children develop, their mastery of both analysis and attention improve. Bialystok explains, “. . . a rather subtle manipulation in a standard task that changes the dependency on a particular underlying skill component can reveal differences among groups that are otherwise obscured by performance on more integrative tasks” (p. 509). This is especially true for children with SLI because, as Leonard (2000) suggests, analyzing and processing meaning to input is a weakness for these children although they have less difficulty with attention to the task and perception of the presence or absence of morphology. Chaney (1992) exemplifies this concept in the two phases of the structural tasks by including a model in one phase and notably declining success with the removal of this model. These findings suggest that metalinguistic tasks must meet requirements for both skill components for the child's developmental abilities in order to reliably demonstrate his or her skill level. This theory of metalinguistic skill proposes the contribution of language and cognition are important for success. Therefore, this theory would suggest the AM TL group would perform the best, followed by the SLI group, with the LM TL group performing most poorly. While the Nonverbal Intelligence Quotients (NVIQ) of children with SLI is usually in the typical range, their scores are often significantly lower than children with TL (Fey, Catts, Proctor-Williams, Tomblin, &

Zhang, 2004; Fey, Long, & Finestack, 2003; Johnston, 1994; Proctor-Williams & Fey, 2007; Stark & Tallal, 1981, as cited by Proctor-Williams & Fey, 2007).

Table 1 summarizes the hypotheses corresponding to each of the theories. Performance will be determined through the data describing the rate of metalinguistic utterances. Therefore, participants’ performance will be deemed as “better” by obtaining a higher average rate of metalinguistic productions. As displayed in Table1, the Language Development Theory will be supported if children with SLI perform similarly to the LM TL group and the AM TL group has a highest rate of metalinguistic productions. The Information Processing model will be supported if the AM TL group produces the highest rate of metalinguistic productions, followed by the LM TL group, with the children with SLI producing the lowest rate. If the children with SLI produce an equal rate of metalinguistic productions as AM TL group and the LM TL group produce a lower rate than the other two groups, the Piagetian perspective will be supported. Bialystok’s Theory will be supported if the AM TL group produces the highest rate of metalinguistic productions, the SLI group produces a lower rate than the AM TL group, and the LM TL group produces the lowest rate of metalinguistic productions.

Table 1
Orthogonal Predictions

Theory	SLI	TL- AM	TL- LM
Language Development Theory	=	+	=
Cognition: Information Processing	-	++	+
Cognition: Piagetian	=	=	-
Bialystok’s Theory	+	++	-

Note. Within each row, = indicates similar performance, and ++, +, and – indicate strongest, stronger, and weaker performance, respectively

Rationale for the Present Study

Because metalinguistic skills impact reading, older school-age children are frequent participants in metalinguistic research, while younger children have been excluded from many studies. This is especially true for phonological and morphological skills using judgment and correction tasks (Chouinard & Clark, 2003; Kemper & Vernooy, 1993; Scholl & Ryan, 1980; Varghese & Venkatesh, 2012). Additionally, previous studies of metalinguistic ability have primarily included children with TL (Allen, 1982; Chaney, 1992; Clark, 1978; Edwards & Kirkpatrick, 1999; Levy, 1999). Little data is available that provides insight into the metalinguistic abilities of two populations: young children and children with SLI. The studies by Clark (1978), Chouinard and Clark (2003), and Levy (1999) were the only three found in the literature that examined children's overt, spontaneous metalinguistic utterances. This dearth of information supports the necessity of the present study to explore the frequency and types of overt productions that young children use. By gaining understanding of these productions, important foundations are laid in this underdeveloped area of metalinguistic research that have previously been neglected.

Little evidence exists on the metalinguistic abilities of young children and the current study may provide useful developmental and theoretical information for this population. By determining when young children exhibit emerging metalinguistic abilities and the nature of those skills, a more comprehensive perspective of metalinguistic development will be provided. Additionally, the children in the present study include children with SLI and those with TL and includes language- and age-matched groups. Therefore, the study may provide insight into the interaction of language, cognition and metalinguistic skills and contributes to the theoretical debate.

It is important to understand the metalinguistic abilities of children with SLI. This is a population with a high incidence of reading problems and learning to read relies heavily on metalinguistic skills (Catts, Kamhi & Adolf, 2012). If young children with SLI are found to have a decreased metalinguistic ability, it may be an additional risk factor that contributes to their language and literacy deficits. However, if children with SLI have intact metalinguistic abilities, this could be identified as a strength that could be utilized to improve language and literacy.

Research Questions and Hypotheses

The present study seeks to answer four research questions:

1. Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the AM group? Although currently literature only compares SLI and TL groups through age-matching in grammatically judgment tasks, all studies comparing SLI and AM TL groups found that children with TL performed better in metalinguistic tasks than children with SLI (Kamhi & Koenig, 1985; Liles et al., 1977; Redmond & Rice, 2001; Rice, Wexler, & Redmond, 1999; Smith-Lock, 1995). Therefore, it is expected that this trend will continue in comparison of explicit metalinguistic production. It is hypothesized that the children with SLI group will produce a lower rate of metalinguistic productions than the AM TL group.
2. Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the LM group? The literature presents conflicting results in comparing children with SLI and TL through LM groups. Levy (2003) did not employ statistical analysis to determine differences between children with neurological deficits and the TL control group. Smith-Lock (1995) and Rice et al. (1999) found no significant differences between LM children with TL and SLI, although Redmond and Rice (2001) found that

children with SLI performed significantly poorer than LM peers with TL in grammaticality judgment tasks. Furthermore, no studies compared overt metalinguistic utterances of children with SLI and TL. Based on this scant evidence, the working hypothesis is that the children with SLI in the LM group will produce a lower rate of metalinguistic productions than the LM TL group. It is expected that the language deficits of the children with SLI will lead to a decreased rate of metalinguistic utterances compared to the TL group.

3. Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the AM group? Children with SLI demonstrated poorer performance than AM TL peers in previous studies of grammaticality judgments (Kamhi & Koenig, 1985; Liles et al., 1977; Redmond & Rice, 2001; Rice et al., 1999; Smith-Lock, 1995). Therefore, it is expected that the SLI group's overt metalinguistic production types will be less developed than those of children with TL in the AM group. It is hypothesized that children with SLI in the AM group will produce less advanced types of metalinguistic productions than the TL group (e.g., more self-corrections and rehearsals and fewer requests for clarification).
4. Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the LM group? Based on the limited data from previous studies of metalinguistic skill of children with SLI compared to LM TL peers, the trend of decreased metalinguistic performance for children with SLI is expected to continue in comparison of proportion of types of metalinguistic utterances. Although Smith-Lock (1995) and Rice et al. (1999) determined no significant differences between children with SLI and TL in LM groups, Redmond and Rice (2001) found an opposing finding that children with SLI performed significantly poorer than LM TL peers. However, each of these studies compared

performance on metalinguistic judgment tasks, with no studies found to compare SLI and LM TL performance in overt metalinguistic productions. The hypothesis for question four is that children with SLI will produce less advanced types of metalinguistic productions than the LM TL group.

5. Does a relationship exist between the rate of metalinguistic productions and language and cognitive development? As no one has previously tested this hypothesis, there are no predictions for outcomes of this research question.

CHAPTER 3

METHODS

Participants

Demographic Characteristics

Participants included 43 children, 23 with TL and 20 with SLI, drawn from two studies on the effects of dosage of recasts on learning irregular past tense verbs (Proctor-Williams, unpublished; Proctor-Williams & Fey, 2007). As part of the original studies, all parents completed demographic questionnaire and signed an Informed Consent Document that included child assent. Participants were divided into three groups: children with SLI, AM children with TL and morphosyntactically LM children with TL. In the SLI and AM groups, the ages ranged from 4;1 to 7;1. In the AM group, because the pairs were matched for age, it was expected that there would not be a significant difference in age, but there would be a significant difference in language skills because the children with SLI by definition have lower language skills than same-age peers. In the LM group, the age range of children with SLI was 4;8-8;9, while the ages of the children with TL ranged from 3;0 to 6;8. For this group, it was expected that there would not be a significant difference in language skills. However, because the children with SLI acquire language skills at a slower rate than TL peers, it was expected that there would be a significant difference in age. The children with SLI were older than the TL children.

The participants came from Kansas City, northeast Tennessee, and southwest Virginia, and English was the first language of all participants. Mean socioeconomic status (SES) of participants with TL was high to high-middle class based on the procedure of Eilers et al. (1993), which takes into consideration parental education level, employment, and family stability. To compare the SES of the children with SLI and TL, a Mann-Whitney U test was utilized. The SLI

and TL participants in the AM group differed significantly in SES ($Z= 2.495, p= 0.013$), with the children with TL having the higher SES. The SLI and TL participants in the LM group did not differ significantly in SES ($Z= 1.639, p= 0.101$). Of the 24 children with TL, 20 of the 24 participants were Caucasian/White, two were children of mixed Caucasian/White and African-American descent, and two chose “other” on their demographic questionnaire. All 21 children with SLI in the present study were Caucasian/White. The participants were also matched for gender. The AM group consisted of 8 pairs of boys and 3 pairs of girls, while the LM group was comprised of 9 pairs of boys and 7 pairs of girls. The demographic information for the SLI and AM and LM pairs is summarized in Tables 2 and 3, respectively.

Participant Characteristics

As part of the original studies from which the data was drawn, evaluation of participants’ language, cognition, and hearing skills was completed to establish their profiles. All participants passed a hearing screening in both ears at 25 dB at 1000, 2000, and 4000 Hz, and had no neuromuscular disabilities, overt social-emotional disorders, or visual impairments not corrected with glasses. All participants had a nonverbal intelligence quotient (NVIQ) score ≥ 83 as measured by the *Test of Nonverbal Intelligence, Second or Third Edition* (TONI; Brown, Sherbenou, & Johnsen, 1990, 1997) or *Primary Test of Nonverbal Intelligence* (PTONI; Ehrler & McGhee, 2008).

Table 2

Demographic Information for AM Pairs

SLI					TL				
#	Age	Sex	SES	Race	#	Age	Sex	SES	Race
111A	4;1	M	2	W	111B	4;1	M	2	W
112A	4;4	M	3	W	112B	4;4	M	2	W
114A	4;8	M	2	W	114B	4;8	M	1	W
115A	5;0	M	2	W	115B	5;0	M	2	W
116A	5;0	F	5	W	116B	4;9	F	4	M
117A	5;6	M	3	W	117B	5;2	M	1	O
118A	5;7	M	3	W	118B	5;4	M	2	W
119A	5;7	M	3	W	119B	5;7	M	1	W
120A	6;1	F	3	W	120B	5;9	F	1	W
121A	6;10	F	5	W	121B	6;9	F	1	W
122A	7;1	M	1	W	122B	6;8	M	1	W
<i>M</i>	5;5		2.9		5;6				
					10.27				
<i>SD</i>	11.47 mo				mo				

Table 3

Demographic Information for LM Pairs

SLI					TL				
#	Age	Sex	SES	Race	#	Age	Sex	SES	Race
211A	5;6	M	3	W	211B	4;1	M	2	W
212A	5;7	M	3	W	212B	3;10	M	4	W
214A	7;9	F	4	W	214B	3; 0	F	2	W
215A	6;1	F	3	W	215B	3;9	F	2	W
216A	5;7	M	3	W	216B	3;5	M	3	W
217A	7;3	F	1	W	217B	3;7	F	2	W
218A	8;9	F	2	W	218B	5;3	F	3	O
219A	7;7	M	2	W	219B	4;5	M	2	W
220A	7;2	M	2	W	220B	5; 0	M	2	W
221A	5; 0	M	2	W	221B	3;11	M	2	W
222A	7;3	M	1	W	222B	5; 0	M	1	W
223A	7;1	M	1	W	223B	6;8	M	1	W
224A	8;3	F	3	W	224B	5;7	F	1	W
225A	8;1	F	2	W	225B	4;6	F	1	M
226A	8;4	F	2	W	226B	4;2	F	2	W
227A	4;8	M	2	W	227B	3;10	M	1	W
<i>M</i>	6;10					4;4			
<i>SD</i>	15.46 mo					11.18 mo			

Note. SES: 1= High, 2= Middle-High, 3=Middle, 4=Middle-Low, 5=Low; Race: W= White, M= Mixed Caucasian and African-American; O=Other

Language characteristics. To determine language status, all children received a standardized comprehensive language assessment. The children participating in the earlier study conducted by Proctor-Williams and Fey (2007) received the *Test of Language Development-Primary-3* (TOLD-P:3; Newcomer & Hammill, 1997), while children in the second study conducted by Proctor-Williams (unpublished) received the *Clinical Evaluation of Language Fundamentals: Preschool-2* (CELF:P-2; Semel, Wiig, & Secord, 2004). To provide additional description of language status, all children received the *Rice/Wexler Test of Grammatical Impairment (TEGI; Rice & Wexler, 2001)*.

Justification for using CELF:P-2 and TOLD-P:3. The CELF:P-2 and TOLD-P:3 are both standardized language assessments designed for young children. The TOLD-P:3 is for children ages 4;0-8;11 and the CELF:P-2 is for children ages 3;0-6;11. The CELF:P-2 includes 8 subtests (Sentence Structure, Word Structure, Expressive Vocabulary, Concepts and Following Directions, Concepts & Following Directions, Basic Concepts, Recalling Sentences, and Word Classes). These subtests then provide index scores for core language, receptive and expressive language, language content and language structure. The TOLD-P:3 has five core subtests (Picture Vocabulary, Oral Vocabulary, Grammatical Understanding, Sentence Imitation, and Grammatical Completion) and three supplemental subtests (Word Discrimination, Phonemic Analysis, and Word Articulation). The standard scores of the five core subtests comprise the overall language score (Language Quotient). The two assessments provide similar subtests of sentence imitation/repetition, vocabulary, and composite language scores. Important to sensitivity and specificity for children with SLI, both assessments test morphology and syntax through sentence and word structure, and grammatical understanding and completion.

Both assessments take approximately the same amount of time to administer, according to the published manuals (TOLD-P:3= 30-60 minutes; CELF:P-2= 30-45 minutes). Additionally, both are normed and individually administered. The tests are approximately equal in the frequency of clinical use, as found in a study by Betz, Eickhoff, and Sullivan (2013). Betz et al. surveyed a total of 364 school SLPs asking them to rank the frequency of use for 55 standardized language assessments. On the scale developed by the authors, both tests had an average frequency of use falling between ratings of 2 and 3, indicating sometimes and rarely used, respectively. Both the CELF:P-2 and TOLD-P:3 were in the ten most frequently used tests, which is especially impressive given the younger ages they are designed for and that both have another version designed for older use (the CELF-4 and TOLD-I:4). This study indicates that many school SLPs use these tests similarly and demonstrates the clinical perspective of their similarities. Therefore, although the two assessments differ, they have many comparable elements as well, which supports the inclusion of participants regardless of assessment administered.

To provide additional description of language status, all children received the *Rice/Wexler Test of Grammatical Impairment (TEGI; Rice & Wexler, 2001)*, and *Dollaghan's Nonword Repetition Task (NWR task; Dollaghan & Campbell, 1998)*. The assessments were administered in two or three assessment sessions depending on the child's attention and engagement.

Identification of SLI and TL

The children with SLI were identified through inclusionary and exclusionary criteria. Inclusionary criteria included below average scores on TOLD-P:3 or CELF-P: 2 and/or poor performances on tasks characteristic of SLI including sentence imitation, nonword repetition,

and tense and agreement-based morphology. Exclusionary criteria included English as a first language and an IQ score ≥ 84 on the PTONI or TONI-2 or 3. To qualify as SLI, participants demonstrated language skills greater than 1.14 standard deviations below the mean ($SS < 85$) on at least one composite standard score on a standardized language assessment of the TOLD-P:3 (Composite Quotient, Semantic Composite Quotient, or Syntactic Composite Quotient) or the CELF:P-2 (Core Language, Receptive Language, Expressive Language, Language Content, or Language Structure). Tomblin, Records, and Zhang (1996) found that this criterion of ≥ 1.14 SDs below the mean on the TOLD-P:3 was a reasonable threshold to determine presence of SLI in kindergarten children (as cited in Proctor-Williams & Fey, 2007), and therefore is an appropriate criterion for use with the TOLD-P:3 and CELF:P-2 in the present study. To qualify as TL, participants had to receive a standard score > 85 on the overall language scores of the TOLD-P:3 or CELF:P-2. Table 4 displays the standardized assessment information for the AM group, and Table 5 displays the same information for the LM group. Consistent with characteristics commonly seen in children with SLI, 15/20 (75%) participants with SLI scored a scaled score of ≤ 7 on sentence repetition tasks. Eleven of 20 (55%) participants in the SLI group qualified as language impaired by NWR task criteria for total scores. On the TEGI, 12/19 (68%) participants did not meet passing criteria. The TEGI was unavailable for the first two participants (one with TL, one with SLI). These two participants received Leonard's third person singular and past tense probe (personal communication with Proctor-Williams, unpublished). In contrast, 16/23 (70%) children in the TL group qualified as typical on the NWR task. Twenty-two of the 23 (96%) children with TL were classified as having typical language on the TEGI. Tables 4 and 5 display qualifying scores from the TOLD-P:3 and CELF:P-2 for AM and LM pairs, respectively.

Table 4

Qualifying TOLD-P:3 and CELF:P-2 Scores for SLI and AM-TL Pairs

SLI				TL			
#	Composite SS	Syntax	Semantics	#	Composite SS	Syntax	Semantics
111A	90	84	21	111B	90	90	100
112A	88	84	91	112B	112	104	116
114A	77	79	81	114B	98	100	108
115A	83	82	83	115B	107	98	115
116A	77	88	81	116B	114	112	102
117A	86	79	79	117B	109	111	106
118A	81	77	71	118B	108	113	102
119A	83	79	79	119B	109	111	106
120A	71	77	73	120B	124	128	117
121A	84	71	93	121B	102	116	128
122A	83	87	81	122B	113	113	111

SLI and AM and LM TL Group Assignment

Once the children were identified as SLI or TL, 24 children with TL were matched to the children with SLI to form an AM paired group and a LM paired group. As all children with TL were eligible to serve as an age and/or language match, 13 participants were included in both the SLI-LM and SLI-AM paired groups, though matched to different children (eight with SLI and five with TL). The descriptive information for the AM and LM groups is summarized in Tables 6 and 7, respectively.

Table 5

Qualifying TOLD-P:3 and CELF:P-2 Scores for SLI and LM-TL Pairs

SLI				TL			
#	Composite SS	Syntax	Semantics	#	Composite SS	Syntax	Semantics
211A	86	79	79	211B	90	90	100
212A	81	77	71	212B	112	106	105
214A	75	70	83	214B	98	102	95
215A	71	67	75	215B	106	102	110
216A	83	73	77	216B	125	116	120
217A	84	85	85	217B	108	112	98
218A	78	83	76	218B	113	115	109
219A	80	83	81	219B	112	104	116
220A	80	68	96	220B	107	98	115
221A	83	82	83	221B	114	114	118
222A	82	89	76	222B	99	96	102
223A	83	87	81	223B	113	113	111
224A	84	87	83	224B	118	115	119
225A	75	72	81	225B	94	102	98
226A	76	83	72	226B	106	108	114
227A	77	79	81	227B	94	98	103

AM Group. In the SLI-AM paired group, 11 children with SLI were matched to 11 children with TL on gender and age, within a 5 month range. The SLI and AM groups did not differ significantly in age ($t= 3.7925, p= 0.708$). As planned, the children with TL and SLI differed significantly in their language skills as measured by the overall percent correct use of morphology on the TEGI ($t= -3.262, p= 0.0036$). The mean standard score of the children with SLI was lower than that of the children with TL (see table 5). They also differed significantly in nonverbal intelligence (NVIQ) performances ($t= -3.120, p= 0.005$). Standard Score comparison was used to control for item number differences between the PTONI and TONI-2 and 3. The mean NVIQ of the children with SLI was lower than that of the children with TL, but still within the average range for their ages. The pattern of lower NVIQ for children with SLI found in these participants is consistent with previous studies comparing children with TL and SLI (Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; Fey, Long, & Finestack, 2003; Johnston, 1994; Stark & Tallal, 1981, as cited by Proctor-Williams & Fey, 2007). Thus, the children with SLI have weaker cognitive skills than the AM children with TL, but can be considered developmentally equivalent in the broader sense as they are in the average range for their age. Table 7 displays the scores for each AM pair.

LM Group. To establish the LM paired group, 16 children with SLI were matched with 16 children with TL based on gender and language level using TEGI composite tense marking accuracy. The TEGI was selected for language matching as it directly tapped the grammatical weakness of the children with SLI and was used in both studies. Matched pairs fell within a 10 percent point difference on the TEGI (see Table 7). As planned, the SLI and LM group did not differ significantly in their language skills ($t= -0.019; p= 0.985$). Their ages differed significantly ($t= 5.98; p< 0.0001$), with the SLI group older than the LM group. This difference

in age is typically observed when comparing the ages of children with SLI and language-matched groups with TL due to the language delays of the children with SLI. The participants also differed significantly in their nonverbal intelligence as measured by standard scores on the TONI-2 or -3 or PTONI ($t = -2.98$; $p = 0.005$). The children with SLI had lower NVIQ scores than the LM children with TL (see Table 7). This does not mean that the children in these groups were developmentally equivalent in their cognitive skills. It would be expected that the children with SLI would be more advanced in their cognition because of their older age along with typical cognitive performances. To test this, the Wilcoxon test using raw scores for six matched pairs who took the same test revealed a significant difference ($Z = 3.059$; $p = 0.002$). Children with SLI had a significantly higher raw score ($M = 26.17$; $SD = 5.79$) than children with TL ($M = 19.17$; $SD = 6.18$). Tables 6 and 7 display the characteristics of the two groups.

Sub-groups. In order to investigate the proportion of the types of metalinguistic productions, sub-groups were created for both the SLI-AM and SLI-LM paired groups. The SLI-AM paired group was developed by dividing the children with SLI and TL into the age groups of 4, 5, and 6 years old.

The SLI-LM group was divided by SLI and TL into language levels of Low, Medium, and High based on their TEGI scores. The language levels were adapted from the guidelines for setting priorities among intervention goals suggested by Fey (1986). He recommended that forms and functions used up to 50% of the time are skills that should be targeted in treatment because of the low success the child demonstrates using that form or function. Forms and functions used 50-90% of the time are lower priorities for treatment because the skill is emerging and used correctly the majority of the time. Commonly, 90% accuracy is required for demonstration of mastery (Paul & Norbury, 2012). Using these guidelines, participants were sorted and those who

achieved less than 60% were at a low language level, those in the 60-89% range were medium-level language users, and those that scored 90% and higher indicated mastery, or high language level. This resulted in groups of four children with SLI and TL in the “low” group, 7 children with SLI and 8 children with TL in the “medium” group, and 5 children with SLI and 4 children with TL in the “high” group.

Procedure

Two studies investigating the effects of recast density on acquisition of novel irregular past tense verb forms provided the participant samples used for data of this study (Proctor-Williams & Fey, 2007; Proctor-Williams, unpublished). Participants first attended between one and six training sessions, depending on how quickly the child met preset criteria to demonstrate the child had learned the meanings of four (Proctor-Williams, unpublished) or six (Proctor-Williams & Fey, 2007) nonsense verbs. Then all participants attended five experimental sessions. The experimental sessions provided the data for the current study. During the experimental sessions, it was observed that the protocol happened to elicit a higher number of spontaneous, overt metalinguistic productions than typically seen in adult-child interactions.

Table 6

Scores for SLI and AM-TL Pairs

SLI						TL					
#	SI/ SR	TEGI	NWR	NVIQ		#	SI/ SR	TEGI	NWR	NVIQ	
				RS	SS					RS	SS
111A	6	36.5	70.8	22	107	111B	10	25.3	57.3	29	121
112A	7	62.7	63.5	22	104	112B	10	83.0	83.3	12	83
114A	6	45.3	70.8	22	100	114B	12	86.5	84.4	29	114
115A	8	91.5	85.4	28*	109	115B	8	89.5	53.1	12*	111
116A	9	33.4	70.8	22	91	116B	10	91.6	94.8	28	113
117A	4	32.3	71.9	26*	92	117B	11	79.5	78.0	11*	114
118A	4	53.1	68.8	25*	89	118B	9	81.9	75.0	5*	96
119A	4	73.0	44.8	27*	94	119B	11	85.0	76.0	5*	97
120A	6	57.4	86.5	29*	88	120B	14	100.0	85.4	10*	112
121A	2	19.2	57.3	33*	83	121B	15	100.0	85.4	13*	107
122A	8	97.22	87.5	9	84	122B	10	98.9	86.5	11	102
<i>M</i>		54.69			94.63			83.74			106.4
<i>SD</i>		24.91			24.91			20.73			10.9

*Note. SI/SR= sentence imitation/recall task; TEGI= composite % score; NWR=% score for total NWR task; * indicates scores were from different versions of the TONI (one participant received TONI-2 while the other received TONI-3)*

Table 7
Scores for SLI and LM-TL Pairs

SLI						TL					
#	SI/ SR	TEGI	NWR	NVIQ		#	SI/ SR	TEGI	NWR	NVIQ	
				RS	SS					RS	SS
211A	4	32.3	71.9	26	92	211B	10	25.3	57.3	29	121
212A	4	53.1	68.8	25	89	212B	10	53.2	67.7	18	103
214A	4	67.6	33.3	10*	88	214B	11	67.6	79.2	13*	99
215A	6	57.4	86.5	29	88	215B	11	54.8	75.0	24	115
216A	4	73.0	44.8	27	94	216B	9	79.7	86.5	13	97
217A	4	88.6	65.6	12*	97	217B	11	88.0	80.2	21*	112
218A	5	93.9	69.8	15	93	218B	11	94.0	89.6	3	88
219A	5	84.3	86.5	14*	97	219B	10	83.0	83.3	12*	83
220A	2	90.9	68.8	10	92	220B	8	89.5	56.0	12	111
221A	8	91.5	85.4	28	109	221B	13	93.8	91.7	17	101
222A	8	98.3	78.0	14	103	222B	11	98.5	75.0	3	89
223A	8	97.2	87.5	9	84	223B	10	98.9	86.5	11	102
224A	7	86.7	74.0	18	107	224B	11	86.7	66.7	8	103
225A	3	87.5	77.1	10*	85	225B	12	86.2	91.7	25*	106
226A	8	87.8	70.8	11*	89	226B	13	89.5	88.5	26*	114
227A	6	45.3	70.8	22	100	227B	11	48.5	84.4	14	95
<i>M</i>		77.2			94.2			77.3			102.4
<i>SD</i>		20.2			7.5			21.3			10.6

*Note. SI/SR= sentence imitation/recall task; TEGI= composite % score; NWR=% score for total NWR task; * indicates scores were from different versions of the TONI (one participant received TONI-2 while the other received TONI-3)*

The two studies (Proctor-Williams & Fey, 2007; Proctor-Williams, unpublished) were identical in the following ways. The sessions utilized a hybrid treatment approach, wherein the child leads the play, toy set selection, and conversation, while the experimenter controls verbal input to the child, opportunities for child productions, and length of time and toy sets available. Experimental sessions utilized a minimum of three toy sets with each verb to establish multiple contexts for use and to maintain child engagement.

In the earlier study by Proctor-Williams and Fey (2007), the experimenter and child engaged in a 5-minute play activity for each of the six novel irregular verbs (i.e., *kig-kug*, *twink-twank*, *plo-plew*, *ling-lang*, *dake-doke*, and *jare-jore*). Three verbs received a low-density recast rate (0.2 recasts per minute), and three verbs received a high-density recast (0.5 recasts per minute). In contrast, the later study by Proctor-Williams (unpublished) the experimenter and child engaged in 10-minute play activities for each of four of the original verbs (*kig-kug*, *ling-lang*, *dake-doke*, and *jare-jore*), removing the verbs with the highest and lowest accuracy of production rates for participants in the first study. Each child participated in two experiments, the first involved 5 sessions to investigate the effects of rate. The second investigated the effect of distribution of recasts upon the participant's irregular past tense acquisition. The children heard the same total number of recasts and models but they were distributed across 1, 2 or 5 sessions.

To accommodate the variability between studies in the numbers and length of sessions, a rate per minute metric was used to examine the frequency of total metalinguistic comments and questions and target verbs across the studies. Only data for the four verbs used in common (i.e., *dake*, *jare*, *kig* and *twink*) were examined.

Materials

All sessions but one in the original studies were digitally audio-recorded using a Sony Net MD Walkman MZ-N707 recorder and two Azden WM-Pro wireless transmitters with lapel microphones that were routed through a two-channel Azden WR-22 wireless receiver. The other session was recorded using a high-quality two-channel Marantz PMD 430 stereo cassette recorder and two Telex FMR-50 wireless transmitters with lapel microphones and routed through their receiver. The experimenter and the participant each wore a microphone, with the transmitters carried around their waists in small hip packs.

Experimental sessions utilized a minimum of three toy sets with each verb to establish multiple contexts for verb use and to maintain child engagement. The sets included toys that activated in unusual ways that were associated with the meanings of the nonsense verbs.

Coding

Clark's (1978) framework provided the basis for coding the types of metalinguistic utterances and hypothesized developmental order. Trained SLP master's level graduate students transcribed three utterances before and after each identified child metalinguistic utterance to provide context for coding decisions. First, all metalinguistic comments and questions were identified in each participant's transcript. Next, a *post hoc* review of these utterances led to a group consensus decision made by Proctor-Williams and three graduate research assistants of five metalinguistic types including: clarification, challenge, self-correction/revision, self-statement, and rehearsal. The transcripts were then coded for each child's use of the five metalinguistic productions.

1. Requests for clarification included direct and indirect questions about verb meaning or form, such as "What does *dake* mean?" The indirect requests for clarification were marked with

rising intonation as judged during the initial transcription, such as in response to recasts, models, or experimenter questions (e.g., E: “What did you do?”; C: “Kigged it?”). For reliability, all child utterances with rising intonation that imitated (e.g., E: “I jore it”; C: “Jore it?”) or contrasted (e.g., E: “I jore it”; C: “Jare it?”) were coded as request for clarification.

2. Challenges were defined as statements, questions, or directives about what the experimenter said or should say, such as “Stop saying *kug* it!” Tone of voice contributed to this coding decision.
3. Self-corrections or revisions occurred when the child produced a statement indicating awareness that a revision was required. For example, “I *jare, jore* it,” exemplifies a revision. This category included revisions both from correct to incorrect as well as incorrect to correct.
4. Self-statements included statements or questions about the child’s own productions, for example, “I laugh when I said *doke* it on your neck except I said *daked* it on your neck.”
5. Rehearsal occurred when the child rehearsed or made statements about the verb’s meaning or form, such as, “*Jare, jore, jare, jore.*”

Research Design

The current study design is a retrospective quasi-experimental design study. Approval from the Institutional Review Board (IRB) was granted through inclusion in Dr. Proctor-William’s IRB approval.

Data Analysis and Statistical Methods

The present study seeks to answer five research questions. The first two address the rates of overt metalinguistic productions:

1. Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the AM group?

2. Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the LM group?

The next two questions focus on the types of metalinguistic productions:

3. Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the AM group?
4. Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the LM group?

The final research question addresses the theoretical foundation of metalinguistic development:

5. Does a relationship exist between the rate of metalinguistic productions and language and cognitive development?

The statistical design began with a comparison of participants to ensure group assignment and participant matching. The researcher used t-tests for independent samples to test the SLI, AM TL and LM TL groups for differences in age, TEGI composite scores, and NVIQ standard and raw scores. The researcher also used Mann-Whitney U Tests to test the SLI-AM and SLI-LM groups for differences in SES. A Wilcoxon test was used to compare the raw scores of 6 SLI-LM pairs who took the same version of the TONI. These results were reported previously.

Two primary approaches for data analysis were conducted in this research design. The first analysis approach was used to broadly answer the first two research questions regarding rate per minute of metalinguistic production. For the both the SLI-AM and SLI-LM groups, a matched-pairs comparison of rate per minute of metalinguistic utterance was completed through Wilcoxon signed-rank tests.

The second analysis approach, analysis of variance (ANOVA), was used to more finely compare factors that might have contributed to findings of rate. These included cognition and

language levels. As well, ANOVAs were used to examine the proportion of the five types of metalinguistic utterances for the SLI and AM and LM TL groups. This was completed through multiple mixed model two-way ANOVAs with groups as independent variables and the proportions of each type of metalinguistic utterances as dependent variables.

The final research question investigated theoretical perspectives of the impact of language and cognition on metalinguistic skill. To evaluate this relationship, descriptive analyses of the SLI and AM TL as well as SLI and LM TL groups was conducted based on rate per minute of metalinguistic productions.

Reliability and Validity

For inter-rater reliability in the present study, 20% of the language samples (56 of 278) were randomly selected and independently coded by trained graduate students. In the case of a disagreement, a third party reviewed utterances in dispute and made a decision regarding the correct code for that utterance. The coding was found to be reliable, with agreement on 93% of codes. This study has strong ecological validity because the data was collected from spontaneous productions of children during an unrelated task, without manipulating the interaction to elicit such productions. Therefore, the data is representative of what children would likely produce outside of a research experiment, especially when provided with a recast from an adult.

CHAPTER 4

RESULTS

This study first sought to determine if a difference existed between metalinguistic productions of children with SLI and children with TL when AM and LM, as measured by rate and proportion of types of metalinguistic productions. To further investigate metalinguistic skills, the data was used to test theories of development.

Comparison of Rate of Metalinguistic Productions

The first two research questions investigated differences in the rates of metalinguistic productions. For both the SLI-AM and SLI-LM paired groups this was tested using a Wilcoxon Pairs Test, then investigated further through ANOVAs for a more fine-grained analysis of the influence of age and language skills.

Rates of Metalinguistic Productions: SLI-AM Paired Group

The first research question asks: Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the AM group? This was initially tested using a Wilcoxon Pairs Test. The two groups did not differ in their rates of metalinguistic productions ($Z= 0.622, p= 0.534$).

Because of concerns about whether the broad age range in the SLI-AM paired group might have masked differences, a more fine-grained ANOVA was used. The ANOVA design was a two-way, Group (SLI vs TL) X Age (4 vs 5 vs 6 year old) as independent variables and rate of metalinguistic productions as the dependent variable. The ANOVA revealed no statistically reliable main effect for Group ($F= 0.10, p= 0.756$) or Age ($F= 1.57, p= 0.238$), nor was there a significant interaction of Group and Age ($F= 0.27, p= 0.767$). Overall, these results indicate that when language was significantly lower in the SLI group and cognition was similar

between the groups, no statistically reliable differences in rates of metalinguistic productions were found. This was also the case when taking age into account. Nevertheless, Figure 1, which depicts the rate means and standard deviations, suggests an upward trend within each group with age in rate of metalinguistic productions.

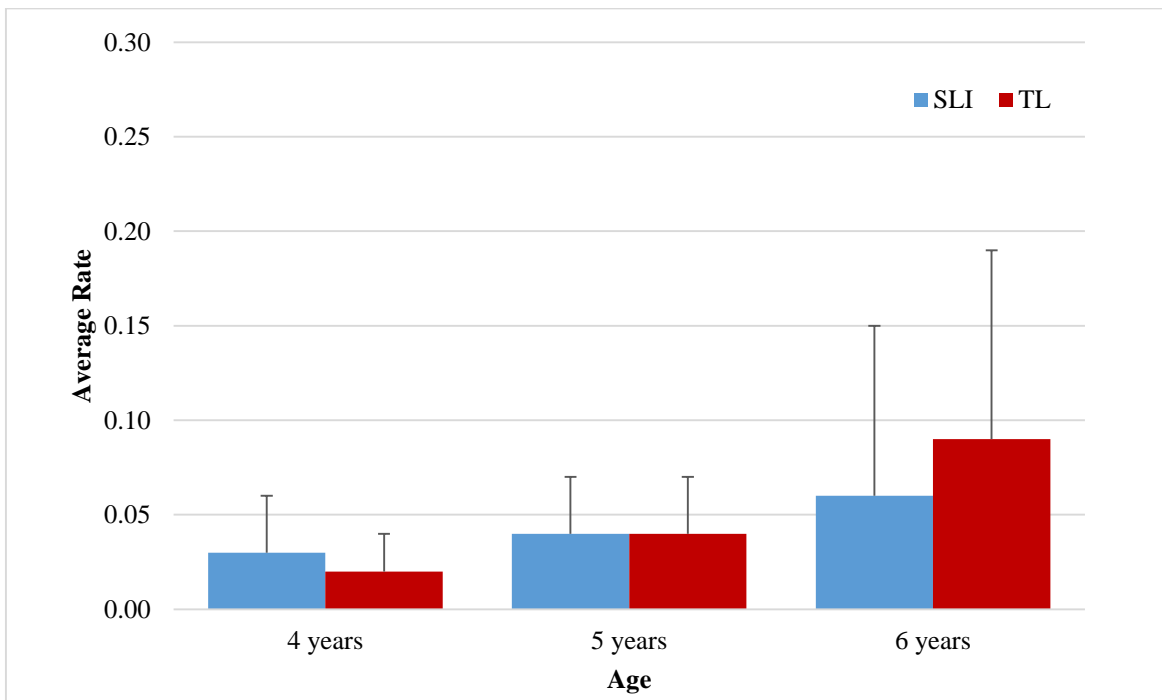


Figure 1. SLI and AM-TL Rates for 4-, 5-, and 6-year olds

Rate of Metalinguistic Productions: SLI- LM Paired Group

Also investigating rate of metalinguistic utterances, the second research question asks: Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the LM group? This was initially tested by matching participants by performance on the TEGI, then analyzing rate of metalinguistic production using a Wilcoxon Pairs Test. The two groups did not differ in their rates of metalinguistic productions ($Z= 0.517$; $p= 0.605$).

Because of concerns that language skill levels in the SLI-LM paired groups might have masked differences, a more fine-grained ANOVA was used. The ANOVA design was a two-way, Group (SLI vs TL) X Language Level (low vs medium vs high) as independent variables

and rate of metalinguistic productions as the dependent. The ANOVA revealed no statistically reliable main effect for Group ($F= 0.001, p= 0.977$) or Language Level ($F= 2.30, p= 0.120$), nor was there a significant interaction of Group and Language Level ($F= 0.170, p= 0.845$). Overall, these results indicate that when cognition was significantly lower in the TL group and language levels are similar between the groups, no statistically reliable differences in rates of metalinguistic productions were found. Nevertheless, Figure 2, which depicts the rate means and standard deviations, suggests an upward trend within each group with language levels in rate of metalinguistic productions.

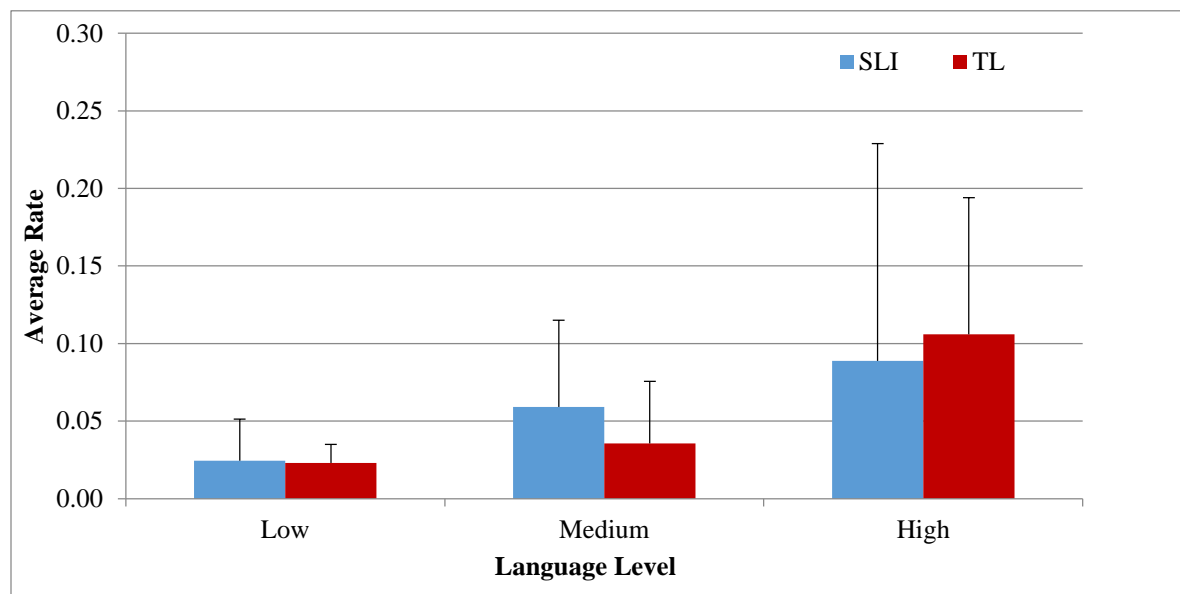


Figure 2. SLI and LM-TL rates for low, medium, and high language levels

Comparison of Proportion of Types of Metalinguistic Productions

The third and fourth research questions both relate to the proportions of the five types of metalinguistic productions outlined by Clark (1978). To investigate these questions, ANOVAs were used with both the SLI-AM and SLI-LM groups to compare the proportion of types of metalinguistic production.

Proportion of Type of Metalinguistic Productions: SLI-AM Paired Group

The third research question asks: Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the AM group? A mixed model 2-way ANOVA with the independent variables of Group (SLI vs TL) as a between group factor and Type (Self-correction/Revision vs Rehearsal vs Self-statement vs Challenge vs Clarification) as a within group factor was utilized. The proportion of metalinguistic types was used as the dependent measure following arcsine transformation to normalize the distribution. This analysis did not reveal a significant main effect for Group ($F= 0.308, p= 0.585$) or Type ($F= 1.850, p= 0.128$) or an interaction between Group and Type ($F= 0.158, p= 0.959$). Overall, these results indicate that when language was significantly lower in the SLI group and cognition was similar between the groups, no statistically reliable differences in proportions of the metalinguistic types were found. Figure 3 represents the means and standard deviations of the proportions of the types of metalinguistic productions for children with SLI and TL in the AM group.

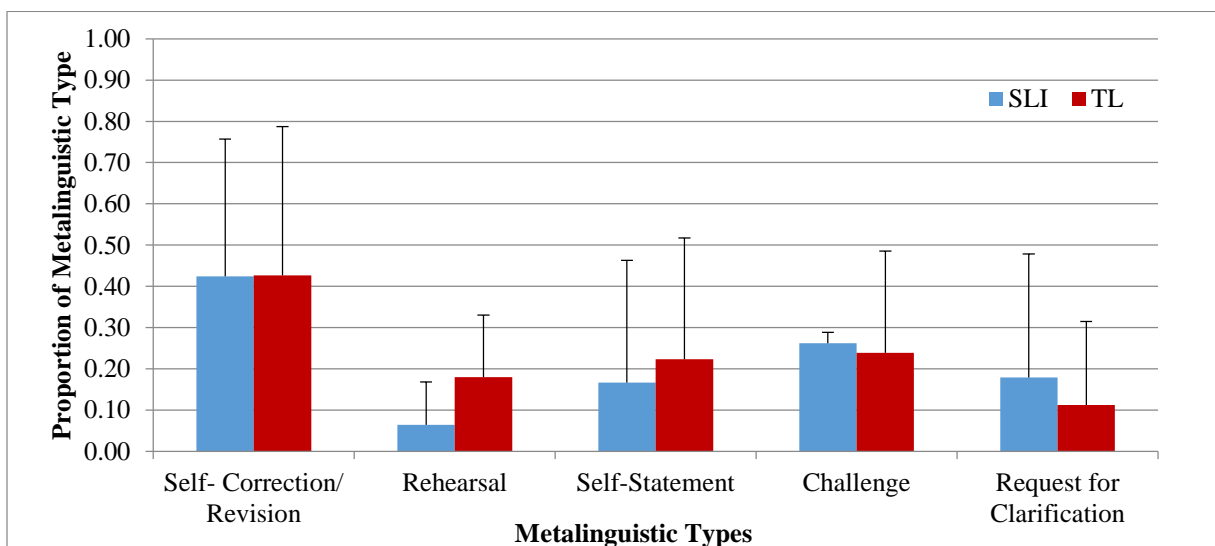


Figure 3. SLI and AM-TL proportion of types of metalinguistic productions

Proportion of Type of Metalinguistic Productions: SLI-LM Paired Group

The fourth research question asks: Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the LM group? This study utilized a mixed-model ANOVA with the independent variable of Group (SLI vs TL) as a between group factor and Type (Self-correction/Revision vs Rehearsal vs Self-statement vs Challenge vs Clarification) as a within group factor. The proportion of metalinguistic types was used as the dependent measure following arcsine transformation to normalize the distribution. This analysis did not reveal a significant main effect for Group ($F= 0.83, p= 0.371$) or an interaction between Group and Type ($F= 0.53, p= 0.714$). However, the analysis revealed a significant effect for Type ($F= 9.64, p< 0.0001$). Through planned comparison, there was a significant difference between the proportions of types of metalinguistic productions used in the LM group (see Table 8). Overall, these results indicate that when cognition is significantly lower for the LM-TL and language is similar between the groups, no statistically reliable difference in proportions of metalinguistic types were found between LM-SLI and LM-TL groups.

The ANOVA revealed significantly more frequent productions of self-corrections—revisions and challenges than self-statements, rehearsals, and requests for clarification. Figure 4 displays the means and standard deviations of the proportions of each type of metalinguistic production for the children with SLI and TL, as well as combined means and standard deviations of both SLI and TL groups in the LM group. The combined mean is displayed because the significant differences in proportions of types of metalinguistic productions were not due to any differences between children with SLI and TL. Rather, the effect found was based solely on the dependent variable of Type without regard for SLI/TL distinction of participants.

Table 8.

Proportion of Type of Metalinguistic Production for All LM Group Participants

Type of Metalinguistic			Type of Metalinguistic	<i>p</i>
<u>Production 1</u>	<u>Relationship</u>		<u>Production 2</u>	<u>value</u>
Self-Correction/Revision	>		Self-Statement	0.0001
Challenge	>		Self-Statement	0.002
Self-Correction/Revision	>		Rehearsal	0.0002
Challenge	>		Rehearsal	0.001
Self-Correction/Revision	>		Request for Clarification	0.002
Challenge	>		Request for Clarification	0.022

Note. Relationship reflects that the Types of Metalinguistic Production 1 were produced with greater frequency than the those listed in Type of Metalinguistic Production 2

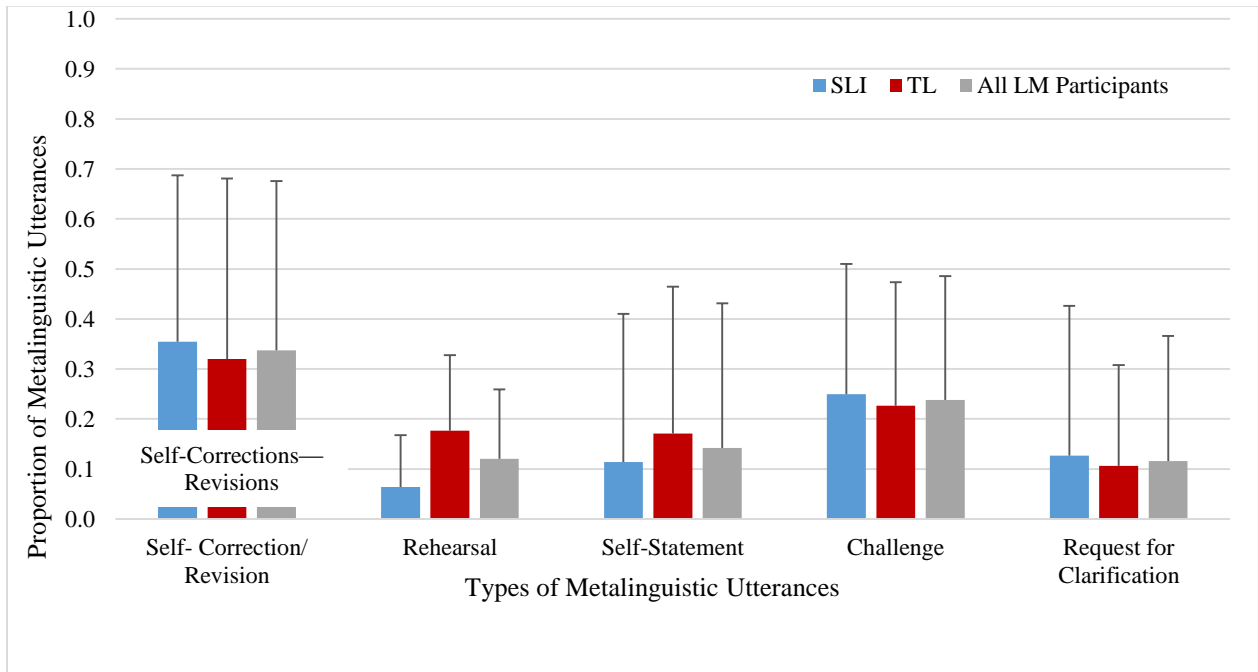


Figure 4. SLI and LM-TL proportion of types of metalinguistic productions

Theoretical Perspectives

The fifth and final research question asks: Does a relationship exist between the rate of metalinguistic productions and language and cognitive development? This question is answered using the data from rate comparisons and applying that data to the orthogonal predictions derived from theoretical perspectives. Table 9 displays the original orthogonal predictions and adds the relationships found in the present study.

Table 9

Orthogonal Predictions- Results

Theory	SLI	TL AM	TL LM
Language Development Theory	=	+	=
Cognition: Information Processing	-	++	+
Cognition: Piagetian	=	=	-
Bialystok's Theory	+	++	-
Results from Present Study	=	=	=

Note. Within each row, = indicates similar performance, and ++, +, and - indicate strongest, stronger, and weaker performance, respectively

Table 9 depicts that the results found in this study do not directly support any of the theoretical perspectives previously described. There was no significant difference in rate between children with SLI and TL whether AM or LM.

CHAPTER 5

DISCUSSION

The purpose of this study is to investigate the spontaneous, overt metalinguistic productions of children with SLI and matched AM-TL and LM-TL pairs. This was accomplished through comparison of the rate of metalinguistic productions as well as by comparing the proportion of the five types of metalinguistic productions described by Clark (1978). Based on the statistical analyses, the results will be discussed for rate and proportion of type of metalinguistic production for the AM and LM groups.

Comparisons of Rate of Metalinguistic Productions

Rates of Metalinguistic Productions: SLI-AM Paired Group

The first research question asks: Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the AM group? The participants in this group were matched within a 5 month age range, with similar cognitive levels and varying language levels in each pair. Because cognition was similar between groups, any differences in this group must be attributed to the impact of language on rate of metalinguistic production. Although no statistically significant differences were found, the data does suggest two trends worth discussing.

First, there is a consistent increase in rate of metalinguistic production within each group as age and cognitive levels increase, as demonstrated in Figure 1. Thus, age and cognition appear to contribute to rates of metalinguistic productions. While the slightly lower performance of the 6-year-old children with SLI compared to their TL peers could possibly be attributed to their slightly weaker (though typical) cognitive skills, this is unlikely given the patterns at 4 and 5 years. The 4-year-old children with TL produced a numerically lower rate of metalinguistic

utterances than the 4-year-old children with SLI. However, this shifts, and the 5-year-olds produced the same average rate, regardless of SLI or TL distinction.

A second, alternative explanation is that language skills may also contribute to rates of metalinguistic production. In the SLI-TL AM group, language was free to vary. The data represented in Figure 1 suggests a difference in the trajectory of change in rates between the groups. The SLI group appears to have a more gradual increase in rate of metalinguistic productions than the AM-TL group. At a young age, the children with SLI slightly out-perform children with TL. However, as age increases, the AM-TL group surpasses the rate of metalinguistic productions of the SLI group. This trend may indicate that at younger ages, children with SLI can think and talk about language at a level comparable to children with TL. However, with increasing age, the children with SLI begin to lag behind their same-age peers in metalinguistic productions. Thus, language level begins to play a role with increasing age even as cognitive performance maintains pace.

This finding of poorer performance for the SLI group is supported by other studies finding that children with SLI performed more poorly than their AM TL peers at a single point in time (Kamhi & Koenig, 1985; Liles et al., 1977; Redmond & Rice, 2001; Rice et al., 1999; Smith-Lock, 1995). No studies have compared children with SLI to AM peers by differences within or between groups longitudinally, such as comparing a 4-year-old group to a 5-year-old group. Additionally, no studies as far as could be determined, compared children's explicit, overt metalinguistic productions, but rather focused on tasks involving judgment and implicit observation. The data from this study uniquely contributes to research in these regards.

Rates of Metalinguistic Productions: SLI-LM Paired Group

The second research question asks: Does the rate of metalinguistic productions of children with SLI differ from those of the children with TL in the LM group? The LM group was comprised of pairs that had equal language performance on a morphological task. However, cognition varied, and the SLI group had stronger cognitive skills than the younger LM-TL group. Therefore, any differences between the SLI and LM-TL group can be attributed to the impact of cognition on rate of metalinguistic productions.

Again, there was no statistically significant difference in rate of metalinguistic production of children with SLI and those with TL in the LM group. The data, however, also suggested a noteworthy trend of overall increasing rate within both the SLI and TL groups. The stronger their language was, the more metalinguistic utterances they produced. Comparison of the average metalinguistic rates between SLI and TL did not reveal any discernable trends. The two groups produced metalinguistic utterances at almost equal rates at the lowest language level. The SLI group produced a slightly higher rate in the medium language group, and the TL group produced a slightly higher rate in the highest language group. Recalling that the cognitive levels of the children with SLI were stronger than those of their LM TL peers, it appears that cognition did not heavily influence the rates.

Available literature also provides inconsistent results about the metalinguistic performances of children with SLI compared to their LM peers. Smith-Lock (1995) and Rice et al. (1999) found that children with SLI were not significantly different in their performances on metalinguistic tasks than the LM-TL group. In contrast, Redmond and Rice (2001) found that their AM-TL group performed better than the LM-TL group, and the SLI group had an even poorer performance than the LM-TL group. However, as with the AM group, these studies

investigated judgment or implicit observation metalinguistic performance, whereas the current study uniquely investigated the overt metalinguistic utterances of participants. Additionally, the previous literature did not compare children at different language levels.

The present study found that SLI-LM and LM-TL groups do not differ significantly in rates of metalinguistic productions. However, a general trend within both the SLI and TL groups was found in that rate of metalinguistic production appears to increase with language level. This supports the assumption that rate of metalinguistic production may be particularly sensitive to language skills.

Comparison of Proportion of Type of Metalinguistic Productions

The third and fourth research questions ask: Does the proportion of types of metalinguistic productions of children with SLI differ from those of children with TL in the AM group or from those of children with TL in the LM group? These questions were investigated by comparing the proportion of each of the five types of metalinguistic productions proposed by Clark (1978).

The statistical analyses of SLI-AM and SLI-LM proportion of type of metalinguistic production revealed no significant main effect for Group (SLI vs TL) or interactions of Group and Type (Self-correction/Revision vs Rehearsal vs Self-statement vs Challenge vs Clarification). However, the data supports some significant main effects for Type and some trends that require further discussion.

Examination of the types of metalinguistic productions of the SLI-AM and SLI-LM groups revealed similar outcomes. In the LM group these reached the level of a statistically reliable difference, without regard for classification as SLI or TL (see Table 8). This indicates that the participants used certain metalinguistic utterances more than others. The LM group

produced more self-corrections—revisions and challenges than self-statements, rehearsals, and requests for clarification. The five types of metalinguistic productions demonstrate metalinguistic awareness in varying ways, and potentially contribute to language learning, as discussed in the following sections.

Self-Statements

Self-statements were those reflecting upon the child's own productions or statements about the nature of the verb, such as Participant 122B/223B (TL-AM and TL-LM) stating, "Why did I call it jore or jare?" This statement indicates that the child is aware of the difference in his production of present and past tense, and his reflection upon his productions. Numerically, children with SLI produced fewer self-statements than the AM-TL or LM-TL group. Self-statements play a significant role in the learning process. Fahy (2014) describes self-talk as a tool reliant upon adequate language that reflects executive functioning skills. Self-talk provides a means for children to develop symbolic language and use privatized, internalized language to plan, make decisions, solve problems and select appropriate strategies for learning (Fahy, 2014; Kamann & Wong, 1993). Recent research has supported findings that preschool aged children with SLI have decreased executive function abilities when compared to TL peers (Genenbacher, 2013; Kuusisto, 2010; Trainor, 2012; Wittke, Spaulding, & Schechtman, 2013, as cited by Fahy, 2014). As self-talk is central to many executive functions, such as planning and problem-solving, Fahy suggests an interaction of weaker executive function and decreased self-talk in children with SLI. Although executive functioning of the participants with SLI was not examined, their nonverbal intelligence scores were weaker than their TL peers. Fahy's proposed relationship between self-statements, language, and executive function may explain the numerically fewer self-statements in children with SLI than AM-TL and LM-TL.

Requests for Clarification

Children with SLI and the children in the LM-TL and AM-TL groups produced a numerically lower proportion of requests for clarification than all other types, except rehearsals. It is important to note that simple, general statements such as, “Huh?” or “What?” did not qualify as requests for clarification in this study. Rather, the statement was required to indicate attention to the verb form, such as, “What does *plew* mean?” Thus, productions had to be more specific, complex metalinguistic productions to receive the code of request for clarification. Thus, in this study only later-developing metalinguistic production were included in the analyses. Increased complexity required for requests for clarification may have contributed to their lower proportion of productions. Finestack (2014) found that direct instruction is beneficial for learning morphological forms. A child’s production of a request for clarification provides the adult with an opportunity to provide explicit instruction about language. Therefore, requests for clarification can facilitate new language learning, dependent upon the adult’s response.

Rehearsals

Rehearsal is a strategy often employed to aid information recall and memory. Participant 219A (LM-SLI) demonstrated rehearsal through the statement, “Dake the ball, doke the ball, dake the ball.” Gill, Klecan-Aker, Roberts, and Fredenburg (2003) investigated the effects of traditional therapy, rehearsal strategy training (RST) and rehearsal plus visualization training (RVST) in following directions with 30 children with SLI in first through fifth grades. Gill et al. found that both RST and RVST improved performance more than traditional treatment approaches for children with SLI. In the present study, children were much younger than the participants in the study conducted by Gill et al., and therefore they may be even less likely to spontaneously employ a rehearsal strategy. Consistent with this research, the present study also

found a trend for AM-SLI and LM-SLI groups to produce numerically fewer rehearsals than TL peers. Alt and Spaulding (2011) also conducted a study investigating spontaneous voiced rehearsal in lexical learning with 7-8 year olds, 20 with SLI and 20 with TL. Alt and Spaulding found no significant differences between use of voiced rehearsal between children with SLI and TL, but found the children with TL to be more effective in their use of the strategy as it resulted in more accurate responses.

Children with SLI may have difficulty with the acquisition of language skills at least in part because they lack the specific metalinguistic skills that facilitate its development (Gill et al., 2003). The Alt and Spaulding (2011) finding suggests, however, that even when children with SLI utilize rehearsal as a metalinguistic and metacognitive task, they do not use the information as efficiently and require more explicit instruction than children with TL.

Challenges

Challenges were identified as those metalinguistic productions that questioned, directed, or commented upon the experimenter's production, such as, "Boy, your words are mixed up," "Who teach you how to say it wrong?" or, "It's not doke. It's dake." (Participant 224B, LM-TL). The LM group comparison revealed that participants with SLI and TL produced a significantly greater proportion of challenges than self-statements, rehearsals, or requests for clarification and the same trend can be seen in the AM group.

Because the children with SLI produce similar proportions of challenges as their TL peers, the data from this study supports the theory proposed by Leonard (1989) that children with SLI perceive the presence of morphological markers as well as their TL peers. However, children with SLI have limited processing resources to determine the grammatical function of a morphological form and appropriately apply the meaning of that form in their own language

(Leonard, 1989; Leonard, Bortolini, Caselli, McGregor, & Sabbadini, 1992). By challenging the adult's recast, the child indicates that they detect a difference in the adult forms compared to their own productions. It seems that children with SLI in this study fit Leonard's profile, with adequate perception of language differences between their production and that of the adult. However, as evidenced by the identification of SLI, they have difficulty processing the perceived differences and applying them to improve their own language skills.

Self-Corrections—Revisions

Self-corrections and revisions were proportionally the most frequently produced metalinguistic utterance by all groups and reached statistically reliable superiority over several other types of metalinguistic productions for children in the SLI-LM group. Self-corrections—revisions were statements such as the following made by participant 219A (SLI-LM): “I Jared the —jore the propellers.” These metalinguistic productions included both changing verb use from incorrect to correct (self-correction) and from correct to incorrect (revisions). This type of metalinguistic production demonstrates the awareness of errors and the need to change the verbal output to a more appropriate form.

The high proportion of this metalinguistic production reflects the high frequency of self-corrections and revisions used at all ages across the lifespan during spoken language. Rispoli, Hadley, and Holt (2008) describe the process of monitoring verbal output that leads to revision in adults as hypothesized by Levelt (1983, 1989; as cited by Rispoli et al., 2008). The process is comprised of two sources for monitoring, including the overtly produced language and the internal representation of speech. Although children and adults make revisions to speech, the revisions do not indicate failure in mastery of speech mechanism (competency), but rather indicates an occasional breakdown in production. Therefore, a self-correction or revision of

speech may represent a failure in production with intact linguistic competency, just as adults who are fully competent in language also make errors of production that require corrections. Furthermore, children are exposed to this metalinguistic type regularly and in a variety of contexts (e.g., parents, teachers, other children, etc.). Thus, young children's use of revisions and self-corrections may not be a reliable indication of metalinguistic development as it is so pervasive throughout the lifespan. Self-corrections and revisions were coded as the same type of metalinguistic production. However, as discussed previously, self-corrections change verbal output from an incorrect to a correct production while revisions serve the opposite function, changing correct output to incorrect productions. A finer analysis differentiating these as two distinct types may have revealed differences between the SLI and TL groups, as well as providing insight about how they processed language information.

The proportion of types of metalinguistic productions provides insight into an area of study previously unexplored. Generally, children with SLI produced similar proportions of metalinguistic productions. However, children with SLI may require additional support to utilize their metalinguistic skills as strategies to learn language, such as in using self-statements, requests for clarification, and rehearsals.

Theoretical Perspectives

The fifth research question asked: Does a relationship exist between the rate of metalinguistic productions and language and cognitive development? Based upon the suppositions of each theory, the results of this study did not align with any one perspective, as demonstrated in Table 9. However, the Piagetian-based metalinguistic theory is disproved through the results of this study.

Children as young as 3; 0 (LM-TL) demonstrated metalinguistic skill through grammatical awareness, which Piagetian-based theorists of metalinguistic development argue is a skill unattainable until ages 7-11 years during the concrete operational stage. As just one example of many obtained in the present study, Participant 214B (LM-TL; age: 3;0) demonstrated metalinguistic awareness when the child said, “You twink them, you twank it.” This self-correction demonstrates that the child specifically analyzed the grammatical form as an object of thought, reflecting upon language production. The child compared the initial production to that of the experimenter’s, passing a grammatical judgment that it contained an error to be corrected. This represents similar examples seen in the present study from the youngest (3;0 years) through the oldest (8;9 years) participant of consistent use of metalinguistic productions demonstrating the capability to pass grammatical judgments, directly opposing the Piagetian-based metalinguistic development theory.

The comparisons of rate were not affected by SLI or TL groups, nor was there a significant difference between the different age and language groups. In both the AM and LM comparisons, there were some trends that language skill may have contributed more variability than cognitive skills in the rate outcomes. However, the overall analyses indicate that language and cognition appear to have overlapping effects upon rate of metalinguistic production. Through initial statistical analysis, this interaction aligns with Bialystok’s theory that both language analysis and cognitive processes are required for metalinguistic development.

Clinical Implications

No statistically significant differences were found between children with SLI and TL in their rates or types of metalinguistic productions. This lack of differences could be due to two possible causes: either there truly is not a significant difference between children with SLI and

TL or there were methodological issues that prevented a demonstration of a significant difference. If indeed there is no significant difference between children with SLI and TL in metalinguistic productions, then children with SLI have a relative strength in their metalinguistic skills in comparison to other language domains. This is important because children with SLI, just as with any population with language deficits, require as much support as possible in their areas of relative strength to bridge their deficits in intervention. Clinicians could therefore take advantage of metalinguistic awareness of children with SLI to increase effectiveness of treatment in learning new morphological and syntactical targets.

For children with SLI, clinicians may need to attend to increasing use of metalinguistic types that aid language learning (i.e., rehearsals, request for clarification, and self-statements). Finestack (2014) found that TD children could learn implicitly, but demonstrated greater gains with explicit learning, especially at young ages. Although the study did not include individuals with SLI, based on the lower language levels and slightly lower cognitive scores combined, one could conclude that children with SLI may also benefit from explicit language instruction. Through explicitly teaching children with SLI to implement metalinguistic strategies, these children may find a method to compensate for their language deficits, as Finestack (2014) suggested for children with TL.

Limitations of This Study

If there was a difference in metalinguistic productions between SLI and TL groups, it was not detected in the current design. This study was limited by the nature of data collection and methods. The study was conceptualized after recognizing the relatively high frequency of metalinguistic utterances during the experimental sessions of Proctor-Williams and Fey's (2007) study. Therefore, the sessions were not constructed to specifically elicit metalinguistic

productions. However, because the utterances were spontaneously produced, the data for this study may be a truly representative sample of natural metalinguistic utterances. Furthermore, the discovery of recasts as an especially useful vehicle to indirectly elicit overt, spontaneous metalinguistic productions provides a methodology for future research.

The relatively small number of participants also limited this study. Statistical analyses may have been impacted by the small sample and overlap, especially once participants were grouped by SLI/TL in the AM and LM groups. For example, the AM group only had 11 pairs, which limited the possibility of statistical analyses by not allowing for a chi-squared test, and the means and standard deviations could have been more easily impacted variation than if the sample had been larger. Additionally, the numbers of participants were even smaller when they were divided into subgroups based on age and language level. This reduced the power available in analyses that were conducted and prevented a potentially important analysis of interactions between children with SLI and TL at multiple ages and language levels.

Finally, the participants in this study were a sample of convenience, pulled from a previous study investigating an entirely different research question. Therefore, the sample was not specifically recruited for the purposes of the present study, which limits this study.

Suggestions for Future Research

Metalinguistic skills and their development in young children is a subject under-represented in research in typical populations as well as those with disorders. Studies of implicit observation of metalinguistic skills are limited in the literature, and studies of explicit metalinguistic productions are even rarer. Therefore, metalinguistic skill as a topic requires greater attention in the literature. Although the present study revealed that recasts provide an especially useful method to elicit metalinguistic productions, the study was still not originally

designed for this purpose. Therefore, future research should seek to replicate this study with the specific purpose of investigating metalinguistic productions and recruit participants for that purpose.

Additional research is also needed to determine the effects of recasts across domains. The present study utilized morphological recasts for irregular past tense verbs, but the effects of morphological recasts for other morphological forms are unknown. The effect of recasts on metalinguistic productions in the language domains of phonology, semantics, syntactic, and pragmatics also remains uninvestigated as far as could be determined.

Another suggestion for future research is to investigate how children with SLI and TL use the information that they receive from communication partners in response to their metalinguistic questions and comments to change their language as do children with TL. Understanding the effects of adult responses to child metalinguistic productions would provide insight into an aspect of the complex process of learning language. For example, if children utilize adult responses to requests for clarification or challenges to gain a more complete understanding of language usage, then these metalinguistic productions may warrant greater attention by adults as children acquire new language components. Additionally, since children with SLI exhibit similar rates and proportions of types of metalinguistic productions as their AM-TL and LM-TL peers, it would be beneficial to better understand possible implications of these similarities and whether children with SLI and TL utilize the adult responses similarly.

One strength of the current study was the inclusion of both LM and AM TL groups in comparison to the SLI groups. However, future studies should improve upon this through independent groups without participants in both AM and LM groups. This would allow a between-group comparison of the AM and LM TL groups, providing important information for

the theoretical perspectives. As well, this design contributes to disambiguating the influence of age, cognition level, and language level, though research is needed for a greater understanding of each of these three factors of metalinguistic development. Further research is needed to investigate the changes that occur with age. One aspect to consider is how development progresses across a greater age range. Incorporating children with SLI, research should investigate whether the trend observed in the AM group (i.e. that children with SLI lag behind children with TL in terms of metalinguistic production) would continue with increasing age. Future research is needed that more specifically identifies the cognitive strengths and weaknesses of participants and purposefully matches or varies them. The impact of different cognitive domains, such as attention, memory, or executive function should be investigated to determine if and how those cognitive components may affect metalinguistic skills. Language should also be investigated in greater detail in future studies by more specifically matching participants by language characteristics across domains.

Defining the types of metalinguistic productions that should be included in these studies is a critical component to future studies. Further research is required to determine whether to include self-corrections and revisions, as in this study it seemed as though revising utterances is so pervasive across the life span that it may not be a developmentally distinguishing type of metalinguistic production. Alternatively, self-corrections and revisions could be included, but coded separately. This would provide insight into whether there are differences in processing language input between children with SLI and those with TL. Studies should also seek to establish the most appropriate types of metalinguistic productions to include in future studies to add to or modify the current list provided by Clark (1978). For example, in this study, we included both statements about the verb and statement about the child's utterances as "Self-

Statements,” and this paper discussed the differing complexity of vague “Huh?” and “What?” as compared to “Why you say that?” as requests for clarifications. The different complexities of requests for clarification and self-corrections and revisions may be better suited as separate distinctions as future studies seek to determine developmental progression of metalinguistic productions.

Conclusions

This study provides evidence that children as young as three years old have metalinguistic skills. This contradicts studies suggesting metalinguistic skills are absent before development of formal literacy skills (e.g., Cairns et al., 2006; Edwards & Kirkpatrick, 1999; Levy, 1999; Scholl & Ryan, 1980). This study provides a unique perspective to children’s development of metalinguistic skills in several ways. Through investigating overt productions of children, this study sheds light on a type of metalinguistic skill that is significantly lacking in the literature. Although several studies have investigated the implicit metalinguistic skills of children, few provide insight into the explicit metalinguistic productions that children make. Additionally, through comparing children with SLI and TL both in AM and LM groups, this study provided information previously nonexistent regarding metalinguistic productions. This study revealed a successful methodology for future researchers to investigate the overt metalinguistic productions children use through recasts. Although the trends and findings of this study provide only an initial indication of the metalinguistic utterances that children produce, the information gained establishes a foundation upon which future research can build.

REFERENCES

- Allan, K. K. (1982). The development of young children's metalinguistic understanding of the word. *Journal of Educational Research, 76*(2), 89–93.
- Alt, M., & Spaulding, T. (2011). The effect of time on word learning: An examination of decay of the memory trace and vocal rehearsal in children with and without specific language impairment. *Journal of Communication Disorders, 44*, 640-654.
- Betz, S. K., Eickhoff, J. R., & Sullivan, S. F. (2013). Factors influencing the selection of standardized tests for the diagnosis of specific language impairment. *Language, Speech, and Hearing Services in Schools, 44*(2), 133-146.
- Bialystok, E. (1986). Factors in the growth of linguistic awareness. *Child Development, 57*, 498-510.
- Brown, L., Sherbenou, R., & Johnsen, S. (1990). *Test of Nonverbal Intelligence (2nd ed.)*. Austin, TX: Pro-Ed.
- Brown, L., Sherbenou, R., & Johnsen, S. (1997). *Test of Nonverbal Intelligence (3rd ed.)*. Austin, TX: Pro-Ed.
- Cairns, L., & Tager-Flusberg, H. (1982). Metalinguistic awareness and language development. *Journal of Experimental Child Psychology, 34*, 449–468.
- Cairns, H. S., Schlisselberg, G., Waltzman, D., & McDaniel, D. (2006). Development of metalinguistic skill: Judging the grammaticality of sentences. *Communication Disorders Quarterly, 27*(4), 213-220.
- Catts, H. W., & Kamhi, A. G., & Adlof, S. M. (2012). Defining reading disabilities and classifying subgroups of poor readers. In A. G. Kamhi & H. W. Catts (Eds.) *Language and Reading Disabilities, Third Edition* (pp.45-76). Boston: Allyn & Bacon.

- Chaney, C. (1992). Language development, metalinguistic skills, and print awareness in 3-year-old children. *Applied Psycholinguistics*, *13*, 485-514.
- Chouinard, M., & Clark, E. (2003). Adult reformations of child errors as negative evidence. *Journal of Child Language*, *30*, 637-669.
- Clark, E. (1978). Awareness of language: Some evidence from what children say and do. In A. Sinclair, R. J. Jarvella, & W. M. J. Levelt (Eds.), *The Child's Conception of Language* (pp.17-43). New York: Springer-Verlag.
- Dollaghan, C., & Campbell, T. F. (1998). Nonword repetition and child language development. *Journal of Speech, Language, and Hearing Research*, *41*, 1136-1146.
- Edwards, H. T., & Kirkpatrick, A. G. (1999). Metalinguistic awareness in children: A developmental progression. *Journal of Psycholinguistic Research*, *28*(4), 313–329.
Retrieved February 21, 2014, from <http://www.ncbi.nlm.nih.gov/pubmed/10380659>
- Ehrler, D. J., & McGhee, R. L. (2008). *Primary Test of Nonverbal Intelligence*. Austin, TX: Pro-Ed.
- Eilers, R. E., Oller, D. K., Levine, S., Basinger, D., Lynch, M. P., & Urbano, R. (1993). The role of prematurity and socioeconomic status in the onset of canonical babbling in infants. *Infant Behavior and Development*, *16*, 297-315.
- Fahy, J. K. (2014). Language and executive functions: Self-talk for self-regulation. *Perspectives on Language Learning and Education*, *21*(2), 61-71.
- Fey, M. E., (1986). *Language intervention with young children*. Boston: Allyn and Bacon.
- Finestack, L. H. (2014). Language learning of children with typical development using a deductive metalinguistic procedure. *Journal of Speech, Language, and Hearing Research*, *57*, 509-523.

- Gill, C.B., Klecan-Aker, J., Roberts, T., & Fredenburg, K.A. (2003). Following directions: Rehearsal and visualization strategies for children with specific language impairment. *Child Language and Teaching Therapy, 19*(1), 85-101.
- Kamhi, A. G., & Koenig, L. A. (1985). Metalinguistic awareness in normal and language-disordered children. *Language, Speech, Hearing Services in Schools, 16*, 199–210.
- Kamann, M. P., & Wong, B. Y. L. (1993). Inducing adaptive coping self-statements in children with learning disabilities through self-instruction training. *Journal of Learning Disabilities, 26*(9), 630-638.
- Kemper, R. L., & Vernooy, A. R. (1993). Metalinguistic awareness in first graders: A qualitative perspective. *Journal of Psycholinguistic Research, 22*(1), 41–57.
- Leonard, L. B. (1989). Language learnability and specific language impairment in children. *Applied Psycholinguistics, 10*, 179-202.
- Leonard, L. B. (2000). *Children with specific language impairment*. Cambridge: The MIT Press.
- Leonard, L. B., Bortolini, U., Caselli, M. C., McGregor, K. K., & Sabbadini, L. (1992). Morphological deficits in children with specific language impairment: The status of features in the underlying grammar. *Language Acquisition, 2*, 151–179.
- Leonard, L. B., Camarata, S. M., Pawtowska, M., Brown, B., & Camarata, M. N. (2008). The acquisition of tense and agreement morphemes by children with specific language impairment during intervention: Phase 3. *Journal of Speech, Language, Hearing Research, 51*, 120-125.
- Levy, Y. (1999). Early metalinguistic competence: speech monitoring and repair behavior. *Developmental Psychology, 35*(3), 822–34.

- Levy, Y., Tennebaum, A., & Ornoy, A. (2003). Repair behavior in children with intellectual impairments: Evidence for metalinguistic competence. *Journal of Speech, Language and Hearing Research, 46*, 368-381.
- Lightsey, G. E., & Frye, B. J. (2004). Teaching metalinguistic skills to enhance early reading instruction. *Reading Horizons, 45* (1), 27-37.
- Liles, B. Z., Shulman, M. D., & Bartlett, S. (1977). Judgments of grammaticality by normal and language-disordered children. *The Journal of Speech and Hearing Disorders, 42*(2), 199–209.
- Newcomer, P. L., & Hammill, D. D. (1997). *Test of Language Development—Primary, Third Edition*. Austin, TX: Pro-Ed.
- Paul, R., & Norbury, C. (2011). *Language disorders from infancy through adolescence: Listening, speaking, reading, writing, and communicating* (4th ed.). St. Louis, MO: Elsevier.
- Pawtowska, M., Robinson, S., & Seddoh, A. (2014). Detection of lexical and morphological anomalies by children with and without language impairment. *Journal of Speech, Language, and Hearing Research, 57*(1), 236-247.
- Proctor-Williams, K. (Unpublished). Usability, use, and necessity of recasts.
- Proctor-Williams, K (Unpublished). Effects of rate and distribution on irregular past tense acquisition.
- Proctor-Williams, K., & Fey, M. E. (2007). Recast density and acquisition of novel irregular past tense verbs. *Journal of Speech, Language, and Hearing Research, 50*, 1029-1047.
- Redmond, S. M., & Rice, M. L. (2001). Detection of Irregular Verb Violations by Children With and Without SLI. *Journal of Speech, Language, and Hearing Research, 44*, 655–669.

- Rice, M. L., & Wexler, K. (2001). *Test of Early Grammatical Impairment*. San Antonio, TX: The Psychological Corporation.
- Rice, M. L., Wexler, K., & Redmond, S. M. (1999). Grammaticality judgments of an extended optional infinitive grammar: Evidence from English-speaking children with specific language impairment. *Journal of Speech, Language, and Hearing Research*, *42*, 943–961.
- Rispoli, M., Hadley, P. A., & Holt, J. K. (2008). Stalls and revisions: A developmental perspective on sentence production. *Journal of Speech, Language, and Hearing Research*, *51*(4), 953-966.
- Scholl, D. M., & Ryan, E. B. (1980). Development of metalinguistic performance in the early school years. *Language and Speech*, *23*(2), 199–212.
- Semel, E., Wiig, E. H., & Secord, W. A. (2004). *Clinical Evaluation of Language Fundamentals- Preschool, Second Edition*. San Antonio, TX: Pearson.
- Smith-Lock, K. (1995). Morphological usage and awareness in children with and without specific language impairment. *Annals of Dyslexia*, *45*, 163-185.
- Van Kleeck, A. (1982). The emergence of Linguistic Awareness: A cognitive framework. *Merrill-Palmer Quarterly*, *28*(2), 237–266.
- Varghese, R. A., & Venkatesh, L. (2012). Grammaticality judgment in English among typically developing primary school children: A preliminary investigation. *All India Institute of Speech and Hearing*, *31*, 109–119.

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