TEACHER TALK IN GENERAL AND SPECIAL EDUCATION ELEMENTARY CLASSROOMS THAT INCLUDED CHILDREN WITH PROBLEM BEHAVIOR

By

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To my former students

who continue to motivate me

because they deserve so much more.

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CHAPTER 1

TEACHER TALK AND PROBLEM BEHAVIOR

Introduction: It Takes Two to Tango

For all children, the ability to meet the linguistic demands of the classroom is critical to accessing instruction and navigating social interactions successfully. However, for the majority of children with severe problem behavior, that success is likely to be impeded by unidentified language deficits (Hollo, Wehby, & Oliver, in press). A large body of research has focused on the language skills of children with and at risk for emotional and behavioral disorders (EBD). However, it takes two to tango: Because communication is a two-way street, it also is important to examine adults' use of language in the classroom. If, for example, students do not understand idioms such as *it takes two to tango* and *two-way street*, the meaning of the intended message is lost. When they send incomprehensible messages or fail to recognize and repair breakdowns in communication, teachers unintentionally may exacerbate students' existing academic and behavioral difficulties (Harrison, Gunter, Reed, & Lee, 1996). It is possible that negative interactions surrounding miscommunication may contribute to the poor outcomes so often experienced by children with EBD (Bradley, Bartalotta, & Doolittle, 2008). Therefore, the current study examined how teachers encode messages for children with or at risk for EBD in general and special education classrooms.

Researchers have studied children's language skills extensively in relation to both academic and behavioral performance, but far less information is available regarding the

influence of teacher language on student performance. Empirical research to date primarily has focused on the effects of teacher talk on language acquisition and educational achievement in preschool, university, and adult second language classrooms. Few studies have been conducted within K-12 classrooms, and no known descriptive or experimental studies of the form or content of teacher talk have included school-age students with problem behavior. It is possible that features of teacher talk inhibiting student comprehension also may contribute to negative teacher-student interactions, increasing instances of problem behavior in the classroom. As a precursor to assessing relations between teacher talk and child behavior or developing interventions to improve classroom communication, it is important to identify features of teacher talk that may inhibit effective instruction and contribute to classroom conflict.

The purpose of the current observational study was to examine how teachers encode messages for children with or at risk for EBD, describing naturally occurring features of teacher talk that may impede student comprehension. Audiotaped lessons conducted by 28 general and special education teachers in grades K-4 allowed examination of the structure and content of teacher talk. Within- and between-group analyses were conducted to determine whether these features varied by grade level or setting (general or special education self-contained classrooms). First, an overview of the relation between language and behavior is provided, followed by a review of the literature on teacher talk and a rationale for the variables included for analysis. Next, procedures used to extract and analyze the data are described. Results include descriptive statistics and tests of between-group differences in quantity, complexity, content, and clarity of teacher talk in elementary classrooms containing children with or at risk for EBD.

Relations of Language Impairment and Problem Behavior

From a very early age, language and behavioral development are closely intertwined (Im-Bolter & Cohen, 2007). Many preschool-age children occasionally tantrum to express wants and needs (*I'm tired, I want that, pay attention to me*), but typically outgrow that phase when they acquire sufficient verbal skills to communicate with parents, teachers, and peers. Because many school-age children with EBD have functional but weak language skills (Hollo et al., in press), they too may resort to tantrum-like behavior when presented with high-level linguistic demands in the classroom. These demands include understanding complex content, demonstrating knowledge, conversational repair, negotiating meaning, developing social relationships, and resolving interpersonal conflicts. Language dysfunction also disrupts self-talk, or the internal dialogue that is central to developing response inhibition (Gallagher, 1999), emotion regulation (Fujiki, Brinton, & Clarke, 2002; Cohen & Mendez, 2009), emotion understanding, affect labeling, perspective-taking (Astington & Jenkins, 1999; Cutting & Dunn, 1999; Lieberman et al., 2007), and other critical school survival skills.

It is important to emphasize that decades of research have demonstrated the comorbidity of language and behavior problems, but language deficits are commonly overlooked in children whose problem behavior is the more immediate concern. In a recent meta-analysis, Hollo et al. (in press) synthesized 22 research reports in which participants were school-age children with formally identified EBD but no history of language delay, deficit, or impairment (LI) prior to study enrollment. Results indicated that regardless of setting, program type, or reason for evaluation, 80.6% of students scored below a standard score 85 (1 SD below the mean) on comprehensive norm-referenced diagnostic language assessments. Diagnostic assessments

identified 34% of the Hollo et al. sample as mildly impaired, and 47% with moderate to severe deficits that had not been identified formally. The extent to which teachers were aware of students' language difficulties is unknown.

Other studies of students with chronic and severe problem behavior have confirmed that students with or at risk for developing EBD tend to have higher rates of language dysfunction than typical peers (Beitchman, Cohen, Konstantareas, & Tannock, 1996; Benner, Nelson, & Epstein, 2002; Hooper, Roberts, Zeisel, & Poe, 2003). Longitudinal studies have confirmed that co-occurrence can be identified at an early age and is likely to be stable or increase over time (Beitchman et al., 2001; Benasich, Curtiss, & Tallal, 1993; Brownlie et al., 2004; Hooper et al., 2003). The direction of the association is unknown: Low language skills may lead to development of problem behavior, problem behavior may inhibit language development, or a third factor may explain the relationship (Hinshaw, 1992). It is abundantly clear, though, that children with low language skills tend to exhibit problem behavior and vice versa.

Theoretical Foundations of the Role of Teacher Talk in Student Behavior

Problem Behavior as Functional Communication

Communication and problem behavior have been conceptualized as belonging to the same response class. For example, asking for a break and throwing a tantrum are functionally equivalent if either behavior provides escape from a task demand (Ducharme & Schecter, 2011). Students who lack the expressive skills to discuss complex emotional states may resort to physical rather than verbal means of manipulating the environment, employing what has been called a "functional but maladaptive coping strategy" (Hooper et al., 2003; p. 20). Indeed,

problem behavior has long been viewed as functional communication, with a rich body of literature showing the effectiveness of functional communication training (FCT) to decrease behaviors such as property destruction, aggression, and self-injury (Kurtz, Boelter, Jarmolowicz, Chin, & Hagopian, 2011). Participants in FCT studies primarily have been individuals with intellectual or developmental disabilities. Although little direct evidence supports use of FCT with students with high incidence disabilities, identifying the function of problem behavior and teaching a functionally equivalent replacement behavior has been shown to effect positive behavior changes in students with and at risk for EBD (Gage, Lewis, & Stichter, 2012).

Receptive Language and Problem Behavior

Kevan (2003) noted that most studies of FCT have included participants with severe communication deficits or individuals who were nonverbal, and interventions have consisted of teaching functionally equivalent *expressive* behaviors. Kevan also pointed out that although it is rarely addressed in experimental literature, descriptive studies have shown that *receptive* language deficits also are associated with problem behavior. In fact, receptive deficits have been shown to be even more strongly related to problem behavior than expressive deficits (Griffith et al., 1997; Hooper et al., 2003; Lindsay et al., 2007; Menting et al., 2011; Nelson, Benner, & Cheney, 2005; Sigafoos, 2000). For students with receptive deficits, researchers have hypothesized that difficulty understanding language increases the difficulty of task demands and the probability the student will engage in escape and avoidance behaviors (Harrison et al, 1996; Kevan, 2003; Sigafoos, 2000).

Kevan (2003) cited several studies demonstrating that adults tend to overestimate receptive language skills of individuals with intellectual disabilities. As a result, he suggested

that a mismatch between the level of caregivers' expressive output and clients' receptive skill may contribute to occurrences of problem behavior. Harrison et al. (1996) noted the same phenomenon may occur in classrooms for students with EBD. Receptive language deficits have been characterized as more subtle and more difficult for adults to detect than expressive deficits (Cohen, Davine, Horodezky, Lipsett, & Isaacson, 1993). Further, across ten studies including 270 students with EBD, the mean receptive language score was 82.23 (Hollo et al., in press). Students with scores just below average performance levels may comprehend much of the language of the classroom, but have nevertheless have gaps in their understanding that cause difficulty accessing lesson content and following complex instructions. Subsequently, adults may perceive students' failure to comply as intentionally defiant, inattentive, lazy, or rude (Cohen et al., 1993; Donahue, Cole, & Hartas, 1994). This attribution may contribute to negative teacher-student interactions.

Negative and Coercive Interactions

An ecological model (Conroy, Sutherland, Haydon, Stormont, & Harmon, 2009) provides a framework for the presumption that miscommunication in the classroom contributes to increased conflict and decreased instruction. This model recognizes that the principles of applied behavior analysis must be considered within the context of individual reciprocal social transactions as well as the global classroom ecology. Two behavioral researchers (Harrison et al., 1996; Kevan, 2003) have posited that teachers' use of sophisticated, complex, abstract, or vague language may be misunderstood by students with low language skills. The authors specified that this mismatch between teacher talk and student comprehension may become an aversive stimulus, increasing the probability that students will engage in problem behavior to escape or

avoid verbal interactions with teachers. In turn, teachers are likely to terminate or decrease interactions with difficult students to escape or avoid triggering problem behavior.

This cycle of coercive interactions has been called a negative reinforcement trap in which escape from aversive stimuli shapes and maintains both teacher and student behaviors (Harrison et al., 1996). This cycle is a well-documented phenomenon in classrooms for children with and at risk for EBD (Carr, Taylor, & Robinson, 1991; Gunter et al., 1994; Sutherland & Morgan, 2003; Wehby, Symons, & Shores, 1995). These reciprocal transactions are a component of the ecological model in which teachers and children both continually contribute to shaping—and being shaped by—the environment (Sutherland & Oswald, 2005). Because most teacher-student interactions are verbally mediated, it is reasonable that teachers who use explicit and accessible language may be more adept at promoting student compliance and preventing problem behaviors than teachers who speak less clearly.

Teacher Talk and Student Success

In school settings, children with externalizing behaviors that disrupt the environment tend to be identified with emotional and behavioral disorders more often than children with internalizing disorders such as anxiety, depression, or social withdrawal (Kerr & Nelson, 2010). As a result, school-based intervention efforts typically are directed toward classroom and behavior management. Effective instruction often is cited as a key ingredient in classroom management programming (Conroy, Sutherland, Snyder, & Marsh, 2008; Simonsen, Fairbanks, Briesch, Myers, & Sugai, 2008; Wehby, Symons, Canale, & Go, 1998), as active engagement in learning is incompatible with problem behavior. For children with problem behavior and low language skills, however, effective instruction may need to include strategies supporting

classroom communication. One such strategy is monitoring and adapting linguistic input, or teacher talk, to promote access to instruction in academic and social skills. Before interventions can assess the effect of modifying teacher talk, however, it is first important to identify aspects of teacher talk likely to impede effective communication.

Because classroom communication plays a critical role in children's performance in schools (Thatcher, Fletcher, & Decker, 2008), it is plausible that teachers with poor communication skills may be relatively ineffective in helping students reach academic and behavioral goals. There is a rich body of literature describing the language of the classroom, with contributions from education (e.g., Cazden, 2001; Loban, 1963), linguistics (e.g., Sinclair & Coulthard, 1975), speech-language pathology (e.g., Sturm & Nelson, 1997), and second language instruction (e.g., Chaudron, 1988). Studies of adult language, though, are rare in comparison to the vast literature on children's language development and its relationship to academic and behavioral performance. The relative paucity of literature about adult use of language in the classroom is surprising considering teacher talk characterizes 70% or more of instructional time (Bellack, Kliebard, Hyman & Smith, 1966; Cross & Nagle, 1969; Dillon, 1983; Gruenewald & Pollak, 1990). For this reason alone, it is important to understand not only *what* teachers say, but *how* they say it (Carlson, Gruenewald, & Nyberg, 1980).

Identifying Relevant Variables

Scholars have approached the measurement of adult language in a variety of ways, depending on the purpose of the analysis. The outcome variables used in the current study were adopted from several areas of inquiry related to classroom communication. These include

observational studies in which researchers describe teachers' use of a variety of linguistic features in naturalistic settings (Dickinson & Porsche, 2011; Kean, 1967; Masterson, Davies, & Masterson, 2006; Sturm & Nelson, 1997). Another body of research includes investigations of how instructors adapt language use when communicating with students with developmental disabilities (DePaulo & Coleman, 1986; Girolametto, Hoaken, Weitzman, & van Lieshout, 2000; Gremaud & Lambert, 1984) or nonnative speakers of English (Cabrera & Martinez, 2001; Chiang & Dunkel, 1992; Hakansson, 1982; Henzl, 1979; Owen, 1996).

Generally, dependent variables can be categorized under three basic linguistic components: form, content, and use (Bloom & Lahey, 1978). Many researchers have examined features of teacher talk from preschool to post-secondary education; however, only three studies were identified in which researchers quantified the form and content of teacher talk in general education elementary (Kean, 1967; Sturm & Nelson, 1997) and middle school settings (Masterson, Davies, & Masterson, 2006). The form, or structure of language, includes variables such as amount of talk, rate, fluency, and syntactic complexity. Content references linguistic units (words or phrases) used to convey meaning. The use of language references pragmatics, or the function of language in discourse, conversation, instruction, or social contexts.

Across the literature in teacher talk, variables of form and content have included (a) quantity, or the amount of teacher talk per sample, (b) complexity of grammatical structures, (c) content, or the words and phrases used to convey meaning, and (d) clarity, defined as use of linguistic features known to promote listening comprehension. Researchers have defined variables of interest in seemingly endless ways, particularly regarding language functions. For example, Sturm and Nelson (1997) identified 11 communicative functions of teacher talk in elementary school classrooms, and developed 23 codes including supplying or soliciting

information, and acknowledging or evaluating student responses. Masterson, Davies, and Masterson (2006) classified 13 communicative functions by middle school coaches, including confirming understanding, praising, getting attention, responding, and defining.

To date, studies of adult language in relation to students' behavior have centered on language functions rather than content or structure. One line of research in this area has examined commands and compliance (e.g., Atwater & Morris, 1988; Forehand & McMahon, 1981; Richman et al., 2001), A second area of research on functions of teacher talk has included effects of praise statements and reprimands or negative statements on student academic and social behaviors (e.g., Jack, Shores, Denny, Gunter, DeBriere, & DePaepe, 1996; Rathel, Drasgow, & Christle, 2008; Sutherland, Wehby, & Copeland, 2000; Swinson & Knight, 2007). However, despite the strong theoretical link between teacher talk and student behavior, no studies describing the form or content of teacher talk have included students with chronic and severe problem behavior. The current study addresses this gap in the literature by examining variables within the constructs of quantity, complexity, content, and clarity in general and special education classrooms that included students with or at risk for EBD.

Quantity

The amount of teacher talk may be defined in terms of number, length, or proportion of words, utterances, or turns in a given sample. An utterance is a unit of speech that represents a complete thought, which may include a single word or complete sentence (although *sentence* more commonly references written language and *utterance* spoken language, these terms will be used interchangeably). A turn is composed of all consecutive utterances by a single speaker. It is well established that teachers talk far more than students (Sinclair & Coulthard, 1975), yet the

ideal balance of teacher talk remains unknown (Nelson, 1985). Teachers who talk too little may fail to communicate lesson content, but teachers who talk too much may overwhelm students' capacity for listening comprehension and "create nonlisteners, or at best, passive or confused listeners" (Gruenewald & Pollak, 1990, p. 47). Moreover, using language concisely may be an indication of greater mastery of subject matter than verbosity or a tendency to ramble. For example, Carlsen (1993) reported that new teachers tended to speak more often and for longer durations when delivering unfamiliar lesson content than when they had more complete knowledge of the topic, indicating that less teacher talk may reflect greater confidence and understanding. One early study also showed that the ratio of teacher talk to student talk was inversely associated with teacher morale—teachers who talked more reported being less satisfied with teaching (Greenwood & Soar, 1973).

Given samples of equal duration, the number of words per minute (WPM, or rate) is another measure of the quantity of teacher talk (Hutchins, Brannick, Bryant, & Silliman, 2005). That is, in a given period of time, teachers who talk at high rates use more words than those who speak slowly. Researchers have not identified an ideal rate for all speakers and all listeners, but Dhindsa and Anderson (1992) reported that speech faster than 175 words per minute (WPM) increased cognitive load and resulted in decreased free recall of lecture content in typically developing seventh graders. It is also possible that extremely slow speech input would also increase demands on short-term working memory or phonological memory. In a test of this hypothesis, Montgomery (2004, 2005) reported that children with specific language impairment (SLI) benefitted from slow rates of speech (4.4 syllables per second), whereas altering input rate had no effect on sentence comprehension in children with typically developing language skills.

Complexity

Linguistic complexity references spoken or written syntactic or grammatical structures. Many researchers have quantified complexity in terms of clausal constructions, including the number and type of subordinated, coordinated, or embedded clauses (Arndt & Schuele, 2013; Hakansson, 1982; Masterson et al., 2006), clausal density (Nippold, Mansfield, Billow, & Tomblin, 2008), and weighted subordination index (Loban, 1963; Kean, 1967). The number of clauses also determines whether utterances are classified as fragments, simple, compound, or complex (Masterson et al., 2006). Fragments, or utterances containing a word or phrase without a subject and predicate (*Okay; To the store*), are very common in spoken language but rare in written texts. Simple sentences consist of a single clause (subject and verb e.g., *She went home*), even if the subject is understood (e.g., *Go home*) or stated by another speaker (e.g., She did what? *Went home*). Grammatical complexity has been defined in different ways in spoken and written language (Arndt & Schuele, 2013). One way to conceptualize complex sentences is that they contain two or more clauses (e.g., *She went to the store before she went home*).

Complex sentences typically are longer and more difficult to comprehend than simple sentences; therefore, sentence length has been used to characterize complexity (Sturm & Nelson, 1997). For children with SLI, researchers have demonstrated that long simple sentences are more difficult to comprehend than short simple sentences (Montgomery, Magimairaj, & O'Malley, 2008). Even more difficult are sentences containing dependent clauses, particularly if they contain passive or reflexive verbs, multiple steps, negation, or order-of-mention violations (Gill & Henderson, 2003). Even if students have acquired the necessary vocabulary, and even when controlling for sentence length, grammatical complexity has been demonstrated to negatively affect comprehension for children with SLI (Montgomery, Evans, & Gillam, 2009).

Content

The semantic content of teacher talk references the vocabulary words used to convey the meaning of a message. It is possible that a source of mismatch between teacher talk and student comprehension exists at this level, if teachers use words students do not understand. This hypothesis has yet to be tested, but is plausible as students with EBD often have poor semantic skills relative to typically developing peers (e.g., Keefe, Hoge, Shea, & Hoenig, 1992; Rinaldi, 2003; Rogers-Adkinson, 2003). Further, some studies have indicated that receptive vocabulary scores were lower than expressive vocabulary in samples from this population (Cohen, Barwick, Horodezky, Vallance, & Im, 1998, Novak, 1992; Ruhl, Hughes, & Camarata, 1992). This pattern of responding is atypical, as most individuals can understand more words than they can produce.

Quantifying teachers' vocabulary has been approached in various ways. These include measures of lexical diversity, which describe the range of vocabulary in a sample, and lexical density, which indicates the amount of semantic information contained in a sample relative to grammatical indices. Both provide estimates of the ease or difficulty of comprehending a message (Bradac, Desmond, & Murdock, 1977). Researchers also have quantified difficulty of vocabulary words in terms of whether a child is more likely (familiar, common, frequently used words) or less likely (unfamiliar, rare, sophisticated words) to encounter a given word (Dickinson & Porsche, 2011; Horst, 2010).

Researchers also have examined teachers' use of academic words, or those which appear in academic texts across subjects and which are important for students to learn because they facilitate learning in multiple content areas (Bailey, Butler, LaFramenta, & Ong, 2004; Beck, McKeown, & Kucan, 2008). Prior studies have indicated that in early elementary school, teachers typically use concrete vocabulary (*pencil, window*) to reference the immediate context.

In higher grades, teachers' lexical references become more abstract, complex, and context-free (*honesty, freedom*; Lazar, Warr-Leeper, Nicholson, & Johnson, 1989). Concrete references are similar to the language used at home which is *situated* in a particular context; however, comprehension of the *lexicalized* or abstract language of formal instruction requires higher-order language skills (Nelson, 1985). In the second language learning literature, mastery of the formal language of the classroom has been referred to as cognitive academic language proficiency, or CALP, contrasted with basic interpersonal communication skills, or BICS. According to Bailey et al., (2004), students "who are reasonably proficient speakers of everyday (BICS) English" (p. 6) may have some knowledge of complex syntax, idioms, and academic vocabulary but still have language proficiency levels that do not match the linguistic demands of the classroom.

Clarity

Teachers who express themselves clearly use language that is concrete, explicit, unambiguous, and error free. Whether teacher talk is accessible to students depends on the frequency with which teachers use language that is clear (concrete) rather than opaque (abstract or ambiguous). Researchers have used the term opaque to describe words or phrases that are difficult to decipher or easily misunderstood, particularly by speakers with low language proficiency (Ernst-Slavit & Mason, 2011). Researchers have identified several variables that decrease clarity of teacher talk, demonstrating that student achievement is negatively affected by teachers' use of ambiguous, abstract, and disfluent language.

Ambiguity. Opaque language includes ambiguity, in which the meaning of a word or phrase is open to interpretation. Ambiguity or vagueness is another quality of speech that detracts from the meaning the speaker attempts to convey (Snyder, Bushur, Olson, Clark, &

Snyder, 1991). Ambiguity has been described in terms of words or phrases that indicate the speaker lacks confidence or knowledge, as demonstrated by equivocating, approximating, hedging, or bluffing (*pretty much, maybe, probably, anyway*; Hiller, Fisher, & Kress, 1969), decreased specificity of the content (*the thing, some kind of, all that*; Smith, 1980), or ambiguous referents (e.g., a pronoun without its noun referent; Chilcoat, 1987; Masterson et al., 2006).

Figurative language. The definition of opaque language includes figurative language that has multiple or nonliteral meanings. Figurative language is particularly problematic for students with language deficits (Nippold, 1991; Abkarian, Jones, & West, 1992). Students may interpret figurative language literally. For example, if given the instruction *check your paper,* a student may write a check mark on the paper rather than make sure the answers are correct (Lazar et al., 1989). Idioms, expressions, and colloquialisms such as *play it by ear, true blue,* or *cash cow* often are meaningless when taken literally. Phrasal verbs, in which the meaning of the verb changes when paired with a preposition (e.g., *hang on, hang up, hang out, hang in there*) are commonly used in English, and may pose problems for students with low language proficiency. Irony and sarcasm are forms of figurative or nonliteral language in which the meaning of the intended message is the opposite of what is actually stated. Humor in the form of word play (puns) is a demonstration of the confusion that can arise from multiple meanings.

Mental state verbs. Opaque or abstract language includes use of mental state verbs which refer to internal states such as desire (*want, need, appreciate*), cognition (*imagine, judge, know, remember*), emotion (*hope, care, doubt*), and perception (*appear, feel*). Relative to typically developing children, children with SLI have been shown to perform poorly on tasks assessing comprehension and use of mental state verbs (Spanoudis, Natsopolous, & Panayiotou, 2007). Mental state verbs, particularly those representing beliefs (*think, believe, hope*), are relevant to

developing a theory of mind (false belief understanding; perspective-taking) and are among the most difficult words for children to acquire (Papafragou, Cassidy, & Gleitman, 2007).

Disfluency. Even short, simple sentences that include concrete and familiar vocabulary may become incomprehensible if not delivered fluently. Disfluency occurs when speakers become lost in linguistic mazes, or patterns of speech that do not make sense semantically. Mazes include fillers (*um, uh, like*), false starts, hesitations, revisions, or reformulations. Mazes are thought to reflect linguistic uncertainty (Loban, 1963) and may occur when the speaker is "expressing an idea that is abstract, complicated, or not yet fully developed" (Fiestas, Bedore, Pena, & Nagy, 2005, p. 731). Two studies (Smith & Land, 1980; Snyder et al., 1991) have shown that increases in ambiguous terms and mazes during college lectures resulted in significant decreases in students' performance on researcher-developed tests measuring comprehension of lecture content. Studies of school-age children also have investigated ambiguity (Crossan & Olson, 1969; Hiller et al., 1969) and disfluency (Bugental, Lyon, Lin, McGrath, & Bimbela, 1999) and demonstrated that each of these qualities has a negative effect on student achievement.

Errors and abandoned utterances. Grammatical errors such as incorrect subject-verb agreement or tense marking also reflect disfluency and may negatively affect comprehension. Forney and Smith (1979) demonstrated that fourth graders performed better on a researcher-developed measure after listening to grammatically correct lectures in comparison to lectures with errors such as redundant phrases, misplaced clauses, and double negatives. Speakers may even abandon an utterance entirely. Listeners may have difficulty following the train of thought of a speaker who switches topics mid-sentence or fails to complete sentences.

Summary

There is ample evidence of the importance of teacher talk in relation to student academic achievement, as well as known associations between children's linguistic and behavioral development. Still, adults' instructional language has never been studied in classrooms including students with or at risk for EBD. The likelihood that these students have unidentified language deficits increases the importance of using the most clear and explicit language possible to convey information and avoid misunderstandings. Although miscommunication in the classroom may be problematic for all children, negative consequences for students who exhibit problem behavior may be even more severe. Verbally mediated strategies to improve academic or behavioral outcomes are likely to be ineffective and could even have countertherapeutic effects (Javorsky, 1995; Ruhl, Hughes, & Camarata, 1992). When communication fails, problem behavior and interpersonal conflict may increase between teachers and students with EBD.

Dependent variables in the current study were selected based on two primary sources. First, studies of teacher talk and student comprehension across classroom settings were considered. Second, it was important to match potential variables with what is known about language skills in students with EBD. Findings from the meta-analysis by Hollo et al. (in press) revealed that on average, receptive language scores were below average in this population (82.68, 95% CI [77, 88]). Measures of quantity and clarity were selected because it has been suggested that teachers who talk excessively or disfluently may overwhelm the capacity for listening comprehension by students with poor receptive language skills. In addition, Hollo et al. determined that students with EBD tend to score relatively low on tests of semantic skills (84.03 [78, 90]) and even lower on syntactic skills (78.63[70, 88]). Children who produce functional but

limited semantic and syntactic forms may give adults the (perhaps false) impression that they also are capable of understanding sophisticated language (Kevan, 2003); therefore, measures of semantic content and syntactic complexity were included.

The purpose of this preliminary investigation was to provide insight into current practices in classrooms for children with and at risk for emotional and behavioral disorders, establishing base rates of specific verbal behaviors and identifying potential targets for change. The question guiding this study was simple: How do teachers talk to students with or at risk for EBD during large group instruction in general and special education classrooms? To begin to answer this question, descriptive statistics were calculated to establish base rates for early elementary (K-2) and late elementary grades (3-4). Statistical analyses were conducted to determine whether those base rates were stable (a) within individual teachers, regardless of lesson type or content, and (b) between groups of teachers in general and special education settings (GE or SE, early or late elementary classrooms) and those with more or less teaching experience (0-9 or >10 years).

CHAPTER 2

METHOD

Participants and Settings

Teachers who provided samples of instructional talk were part of a two-year, multi-site intervention project, *Reducing Severe Problem Behavior in Schools*. The goal of the study was to promote positive instructional and classroom management techniques for children with and at risk for EBD. Intervention components included evidence-based class-wide strategies to increase academic engaged time and decrease problem behavior. Researchers provided teachers with training and ongoing support to implement a class-wide group contingency to minimize peer attention to problem behavior and encouraged teacher self-monitoring to increase the frequency of praise statements and opportunities to respond embedded in their teaching. Original participants were 55 teachers in self-contained special education classrooms exclusively for students with EBD, and 116 teachers in general education classrooms which included students at high risk for special education placement (defined as children in the lowest 20% of the class for academic achievement and the highest 20% for problem behavior).

All special education (SE) teachers who provided at least three 10-minute language samples consisting of large-group instruction in any subject (commonly language arts, math, or science) were selected for the current study, resulting in a group of 14 SE teachers. Next, general education (GE) teachers with a minimum of three samples were identified. The 14 teachers who matched SE teachers on gender and grade level were retained (note that the SE settings included

multiple grade levels within each classroom; therefore grade matches are not exact). If more than three samples were available for a single teacher, included samples were selected at random.

Demographic characteristics of the sample are presented in Table 2. Because the special education classes were comprised of children in multiple grades, classrooms were grouped into two bands: early elementary (K-2) and late elementary (3-4). The two groups of teachers were closely matched in terms of years of teaching experience and degrees held and differences in ethnicity were not statistically significant ($\chi^2 = .2.5$, $p>.05$). Finally, 22 of the teachers were located in Tennessee, and six (2 = GE; 4 = SE) were located in Minnesota. Across all 12 schools, 75% of the student population received free or reduced-price lunch (an indicator of school-level socioeconomic status, range = 38% to 99%).

Procedures

Data Collection

The audio tapes of teachers delivering instruction were obtained from the self-monitoring component of the original intervention study. Teachers used mini-cassette recorders to capture and self-evaluate whole-group lessons. Researchers instructed teachers simply to turn on the recorder at the beginning of any large-group lesson and let it run for the duration of the lesson. Teachers later listened to the tapes and evaluated themselves on levels of praise and opportunities for students to respond. Content area was allowed to vary (e.g., teachers could self-select to record math, reading, science, or social studies as long as it was a whole-class lesson). The majority of teachers provided samples during reading or language arts lessons (n = 58), followed by math (n = 13), and other group instruction periods such as morning meetings,

computer, science, or social studies classes (n = 13). Duration of recordings ranged from 10 - 60 minutes, but whole-class instruction seldom lasted more than 15-20 minutes (i.e., longer recordings often included independent practice). On average, participants completed seven recordings (range = 3 - 19). The samples were obtained between October, 2006 and May, 2008.

Transcription

Researchers converted the analog tapes to a digital format. Next, research assistants and the first author transcribed samples in InqScribe software (www.inqscribe.com). Each sample was transcribed, segmented, and coded according to conventions outlined by the authors of the Systematic Analysis of Language Transcripts software (SALT; Miller & Iglesias, 2010). These conventions include rules for spacing, punctuation, indicating mazes, interrupted or abandoned, and inaudible utterances which are required for the software to compute outcome variables accurately. For example, SALT dictates that each line in a transcript begins with a speaker identifier, followed by a single utterance which ends in a punctuation mark. Child utterances often were inaudible and therefore were not transcribed. A blank speaker line was used to represent children's speaking turns, regardless of length in words or utterances. Instances of text reading were noted in the transcript but not coded or transcribed.

Segmenting

This process required multiple passes through the transcripts. The first step was segmenting teacher turns, defined as all consecutive utterances spoken by the teacher. When student talk was acknowledged by the teacher in any way, the teacher turn ended. If a student spoke but the teacher ignored it (e.g., an unacknowledged call-out), the teacher turn did not end.

Next, each teacher turn was segmented into utterances, defined as modified communication units, or C-units. Miller and Iglesias (2010) defined a C-unit as an utterance that contains an independent or main clause and all its dependent (subordinate) clauses. It represents a complete thought and cannot be divided without losing its meaning. Segmenting in this study differed from SALT conventions in one respect: If clauses with coordinating conjunctions (*and*, *but*) were not separated by a pause or change in intonation and communicated a connected thought, these were counted as one C-unit. This decision was made because parsing utterances as students heard them was more logical than segmenting by grammatical rules in this instance.

Coding

The final stage of preparing the data was assigning clarity codes. Each utterance, or C-unit, could receive only one SI code representing the number of clauses; however, multiple clarity codes could be assigned to each utterance. In the example below, mazes are enclosed in parentheses according to SALT conventions. Specific types of mazes (e.g., nonmeaningful repetitions, hesitations, or fillers) were not coded. The code [MSV] references the mental state verb *want*, and the code [AMB] references the ambiguity of the word *somewhere*. In the second line, *popped her head in* is an example of figurative language [FIG], and the asterisk marks a partially omitted word.

t I want [MSV] your hands (to to uh) to stay above somewhere [AMB] [SI-2].

t you all (we*) did a nice job while name popped her head in [FIG] [SI-2].

All instances of mental state verbs, figurative, and ambiguous language were coded and counted individually, then summed. This number was divided by the total number of utterances to represent the proportion of abstract utterances. The same procedure was followed for the measure of disfluency, comprised of codes for maze words, errors, and abandoned utterances. The measure of vagueness includes all the codes classified as abstract and disfluent.

Training and Reliability

Samples were double-transcribed and double-coded until each research assistant (RA) met a threshold of 85% for reliability on each stage of the process (transcribing, segmenting, SI coding, and clarity coding) on three consecutive samples. This resulted in 33% of samples being transcribed by two of three independent researchers (one undergraduate, one masters level, and the author) and compared in Microsoft Word. Using the formula agreements/agreements + disagreements x 100, Interobserver agreement (IOA) was 91% for transcription. The author then reviewed errors with the RA for training purposes and corrected the transcript. After meeting reliability criteria, RAs prepared transcripts independently. The author verified accuracy and made any necessary corrections for all independently transcribed samples. A similar procedure was followed for segmenting. That is, the same transcripts that were double-transcribed also were segmented by two independent researchers, compared in Word, and corrected by the author. Using the same formula, IOA was 89% for segmenting. Double-coding was conducted for 50% of samples, as training to criteria on clarity codes took longer than training to criteria on transcribing and segmenting. Agreement for coding the subordination index was 93%. Reliability for all other (aggregated) clarity codes was 88%.

Dependent Variables

Information about how the dependent variables were developed, defined, and quantified is provided below. Following this section, Table 1 provides a brief definition of each variable included within the categories of quantity, complexity, content, and clarity.

Quantity

All variables related to quantity have been reported in prior research and were calculated automatically in SALT (Miller & Iglesias, 2010). Rate was automatically calculated as words per minute (WPM), or the total number of words produced in each sample divided by the number of minutes. It was not possible to compute the ratio of teacher utterances to child utterances, which were not transcribed verbatim but were entered in transcripts as a single blank line. Therefore the ratio of teacher-to-child language was computed as number of teacher utterances divided by total utterances. When aggregating 10-minute samples, variables were pooled into 30-minute sample according to their original metric. Count variables (e.g., number of words or utterances) were summed; means (e.g., mean length of utterances and turns) and proportions (WPM, ratio of teacher/child utterances) were averaged. This convention was followed for all constructs.

Complexity

Following prior studies of teacher talk in K-8 settings (e.g., Masterson et al., 2006; Sturm & Nelson, 1997), complexity was analyzed in two ways. First, a subordination index (SI) was calculated in SALT, representing the ratio of clauses to utterances. Second, utterances were classified as simple, complex, or fragments. Although dependent clauses may be categorized

according to function or grammatical structure (Arndt & Schuele, 2013), such a fine-grained analysis was beyond the scope of this study. Researchers also have distinguished between complex sentences containing independent and dependent clauses, and complex syntax in which speakers may produce utterances containing dependent clauses while omitting the independent clause (Arndt & Schuele, 2013). However, SI calculation in SALT does not distinguish between main and subordinate clauses (Miller & Iglesias, 2010).

To compute the subordination index, each utterance was coded for number of clauses by counting the number of verbs. SALT uses those codes to compute the ratio of the total number of clauses to the total number of C-units (utterances). Following SALT conventions for SI analysis, unintelligible or nonverbal utterances (vocalizations such as *hmm*) were excluded from the analysis. Contrary to most SI analyses, however, incomplete and abandoned utterances were variables of interest in this study and were retained in the analysis set. Similarly, elliptical responses that are not clauses are commonly excluded from the subordination index in SALT's databases but were of interest here. Teachers' relative use of utterances coded as fragments (no clauses), simple (one clause), and complex utterances (two or more clauses) also is reported.

Content

A commonly used measure of lexical diversity is the type-token ratio (TTR), calculated as number of different words (types) divided by the number of total words (tokens). High TTR indicates the speaker used a wider variety of words; low TTR indicates the speaker used the same few words repeatedly. Because TTR is highly correlated with the number of words in a sample (Hutchins et al., 2005), some authors recommend using the number of different words

(NDW) produced in a sample to measure lexical diversity (Watkins, Kelly, Harbers, & Hollis, 1995). Both were automatically computed in SALT and are reported here.

Computing word frequency was less straightforward. Some researchers have developed their own word lists to determine frequency (e.g., Dickinson & Porsche, 2011); others have used commonly available lists (Beck et al., 2008). The online program used in the current study is called Vocabprofile (www.lextutor.ca). This program analyzes words found in West's (1953) list of the 2,000 most frequently used word families in English.

Vocabprofile also provided the number of academic words in each sample found on Coxhead's (2000) Academic Word List. Coxhead determined academic words based on a large corpus of texts from 414 journals, textbooks, and other academic sources. Coxhead specified that words included on the list must be specialized (defined as not appearing in West's 2,000 most frequent word list) and encountered repeatedly and frequently across academic subject areas (e.g., history, biology, mathematics, and law). Different forms of each word, or word families, also were included (e.g., *concept, concepts, conceptual, conceptually*).

Vocabprofile also counted content words (defined as nouns, verbs, adjectives, adverbs) and function words (e.g., auxiliaries, determiners, prepositions, pronouns, and conjunctions). These categories were used to form a measure of lexical density calculated as proportion of content words to total words. A high-density sentence, or high ratio of lexical to grammatical terms, is considered more complex than a low-density sentence (Bradac, et al., 1977).

Clarity

The variables used to quantify clarity of teacher talk were derived from a variety of sources as described above. Brief definitions used in the current study are provided in Table 1; .

Three variables, mazes, errors, and abandoned utterances, were combined to form an index of disfluency. An overall index of abstract language was formed by combining mental state verbs, figurative, and ambiguous language. All six variables were summed to represent vagueness of teacher talk, and divided by the number of teacher utterances to determine proportion of utterances which contained markers of abstract, disfluent, or vague language. Because each utterance may include multiple codes, proportions for each teacher may be greater than one.

Table 1. *Outcome Variables: Definitions, Sample Means and Standard Deviations.*

Category	Name	Definition	Label	Mean	(SD)
	Total words	Number of total teacher words. Includes mazes; omits partial words.	TW [a]	3061	(706)
	Total Utterances	Total number of utterances, including abandoned and interrupted.	TU [a]	522	(106)
	Utterance length	Mean length of utterances (C-units) in words	MLUw [b]	5.81	(.87)
Quantity	Turn length	Mean length of turns in words	TLW [b]	24.69	(7.13)
	Turn length	Mean length of turns in utterances	TLU [b]	4.19	(.86)
	Percent teacher talk	Ratio of child turns to teacher utterances	PTT [c]	.80	(.03)
	Subordination index	Ratio of total clauses to total C-units.	SI [c]	1.15	(.18)
	Fragment	Proportion of utterances without a clause	FRAG [c]	.315	(.07)
Complexity	Simple	Proportion of utterances with a single clause (main or dependent)	SIMP [c]	.412	(.06)
	Complex	Proportion of utterances with two or more clauses	COMP [c]	.271	(.06)
	Different words	Number of different words	NDW [b]	257	(37.2)
	Type-token ratio	Number of different words (types) / total words (tokens).	TTR [c]	.27	(.04)
	Lexical density	Lexical density, defined as content words/total words	LEX [c]	.48	(.02)
Content	Academic words	% of words matching a list of 550 cross-subject academic words	AW [c]	.01	(.00)
	Frequency 1	% of words within the 1,000 most frequently used words in English	FRE1 [c]	.87	(.02)
	Frequency 2	% of words within the 1,001-2000 most frequently used words.	FRE2 [c]	.07	(.15)
	Ambiguity	Unclear content, including pronouns without referents, cloze statements with many possible correct responses (*kids like to what?).*	AMB [a]	62	(24)
	Figurative language	Nonliteral words or phrases; e.g., idioms, irony, puns, phrasal verbs (cut it out, cut off, cut in, cut above, cut down, cut back)	FIG [a]	76	(21)
	Mental state verbs	Includes verbs of perception (*see, taste*), cognition (*think, believe, know*), desire/ judgment (*want, need*), affect/emotion (*like, love*)	MSV [a]	87	(30)
Clarity	Errors	Grammatical (e.g., subj/verb agreement; *here is things*) or content (incorrect definitions or use of words; e.g., *the fewerest*).	ERR [a]	22	(13)
	Mazes	Number of hesitations, false starts, part words, or fillers (*um, uh, okay*).	MZ [a]	115	(66)
	Abandoned	Number of utterances begun but never finished.	AB [a]	13	(8)
	Abstract	Aggregate of FIG, MSV, AMB	ABS	.44	(.09)
	Disfluent	Aggregate of ERR, MZ, AB	DIS	.29	(.14)
	Vague	Aggregate of all clarity codes (abstract and disfluent)	VAGUE	.74	(.20)

[a] Number summed across samples. [b] Average mean across samples. [c] Average percent, ratio, or rate, across samples. N = 28.

Design and Analysis

Data were analyzed using a 2 x 2 x 3 mixed analysis of variance (ANOVA). The between-group factors included two levels of setting (14 = GE; 14 = SE) and two levels of years of grade level (14 = K-2, 14 = 3-4). The within-group factor included three "levels", or individual 10-minute lessons. Note that the three samples were randomly ordered, and therefore did not represent change over time or three categorically different lessons (e.g., math, reading, and science) as is typically the case with this type of analysis. Before conducting statistical analyses in SPSS, data were examined to assure assumptions of ANOVA were not violated (e.g., sphericity, normality). Post-hoc comparisons were planned using Bonferroni's correction to minimize Type I error.

First, outcomes were calculated for each 10-minute lesson. These samples provided data for the repeated measures analyses. Next, the three 10-minute samples were pooled into a single 30-minute sample and re-entered into the software. The aggregated samples were used to compute all means, standard deviations, and correlations. When aggregating samples, count variables were summed (e.g., total number of words) and mean or proportion variables were averaged (e.g., subordination index, words per minute). To reduce further the probability of family-wise error due to multiple comparisons, the number of variables submitted to statistical analysis was limited to one variable representing each of the four main constructs. Graphic representations of data also are presented as an indication of the variability or stability of the constructs of interest within individual teachers. Between-group analyses were performed only for differences between general and special educators and across grade levels (differences between educators with more and less teaching experience are presented in graphs).

CHAPTER 3

RESULTS

Chi-square tests were performed to establish between-group equivalence on demographic characteristics (Table 2). As previously noted, GE and SE groups were matched on gender and grade ($\chi^2 = 0$, $p = 1$). Similarly, there were no significant differences in ethnicity, degrees obtained, or geographic location. Participants also were grouped according to years of teaching experience. Teachers with less experience had been in the classroom an average of 3.09 years (SD = 2.83 years; range = 0.2 – 9). Mean years of teaching in the more experienced group was 20.14 years (SD = 6.99; range = 10-30), with no differences in experience between groups ($\chi^2 = .57$, $p = .45$). Means and standard deviations are reported for the sample as a whole (Table 1) as well as by setting, grade level, and teachers' years of classroom experience (Table 3).

Table 2. *Sample Characteristics.*

		GE	SE	χ^2	p
Grade Level	K-2	7	7		
	3-4	7	7	0.00	1
Gender	Male	3	3		
	Female	11	11	0.00	1
Ethnicity	African American	3	5		
	Hispanic	1	3		
	European American	10	6	2.5	.287
Years Teaching	0-9	8	6		
	10-30	6	8	.571	.450
Degree	Bachelors	7	6		
	Masters	7	8	.144	.705
Site	Tennessee	12	10		
	Minnesota	2	4	.848	.357

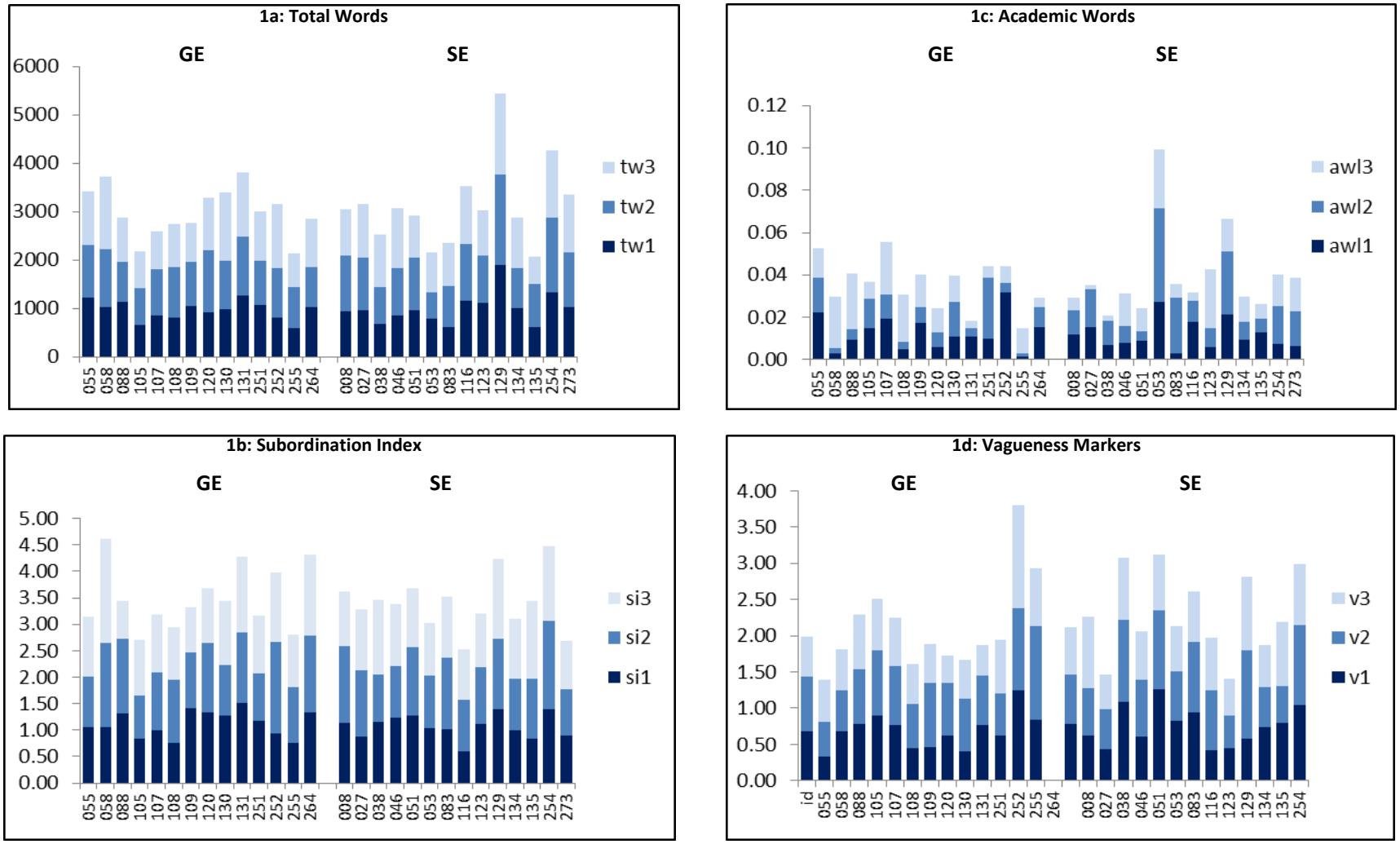
Note. GE = General Educators; SE = Special Educators.

Quantity

Results of a mixed ANOVA indicated that no statistically significant differences in the quantity of teacher talk occurred between GE or SE teachers (F [1, 24] = .43, p = .63) or teachers with younger or older students (F [1, 24] = 2.62, p = .12). The within-group analysis also revealed a non-significant main effect of total words per sample, F [2, 48] = 2.186, p = .12. This finding indicated that on average the three sets of 10-minute samples were not systematically different from one another (Figure 1a).

Further examination of Figure 1a reveals that the amount of talk across samples did vary considerably among individual teachers. Each bar represents an individual teacher; each segment within a bar represents an individual sample. When aggregated across samples, the total number of words ranged from 2067 to 5435 words (mean = 3061, SD = 706). That is, some teachers talked more than twice as much as others in the same amount of time. Similarly, words per minute varied from 70.6 to 181.4 (mean = 103, SD = 23).

Within individual teachers, however, amount of talk appeared to be stable. Examination of Figure 1a shows that teachers tended to use approximately the same number of words in each of their 10-minute samples, regardless of lesson content or topic. Overall, teacher utterances accounted for 80% of the total talk in the classroom, regardless of setting or grade level. The percentage of teacher talk also was stable across the three 10-minute samples (range = 75% - 85% of all utterances).



Figures 1a-1d. *Quantity, Complexity, Content, and Clarity by Teacher*. Segments within bars represent each of three randomly ordered 10-minute samples. All variables were ordered by teacher identification number, so the first bar in each graph represents the same teacher, and so on. Segments within bars represent 10-minute samples. Quantity, complexity, and vagueness of teacher talk are relatively stable across samples for individual teachers regardless of content, but use of academic words is more variable.

Complexity

The proportion of teacher utterances categorized as fragments, simple, and complex was .32, .41, and .27, respectively. These proportions indicated that teachers tended to vary the length and complexity of utterances. Fragments often consisted of a single word such as *no*, *okay*, a student's name, or a phrase such as *good job*. Complex utterances typically contained two to four clauses, although utterances with five to seven clauses were not uncommon. The longest utterance contained 12 clauses. The mean subordination index was 1.15 (.19) for the entire sample. Although this number is not particularly meaningful on its own, it is useful for quantifying differences in complexity within and between groups of teachers. As with the quantity of teacher talk, complexity remained stable within teachers ($F [2, 48] = .99$, $p = .38$; Figure 1b). Similarly, there were no significant differences between teachers for complexity in different settings ($F [1, 24] = .30$, $p = .59$) or grade levels ($F [1, 24] = .079$, $p = .78$).

Content

On average, teachers used 257 (SD = 37) different words per sample, with no significant differences between GE and SE ($F [1, 24] = 1.5$, $p = .24$) or K-2 and 3-4 teachers ($F [1, 24] = 2.83$, $p = .11$). Nearly all (i.e., 94%) teacher talk was comprised of the 2000 most frequently encountered words in English. Only 1% of spoken words were found on the academic word (AW) list and 5% were classified as off list. Off list words included many informal words that do not appear in written text, such as *okay*, *yeah*, *gonna*, as well as colloquialisms such as *criss-cross-applesauce* or *high-five* (transcribed as single words, following conventions for commonly used phrases). Although teachers did use words such as *astronaut*, *countdown*, and *vacuum*, the exact number of content-specific words is unknown. Again, there were no significant between-

group differences in use of academic words. However, visual inspection of the data shows that the use of academic words was variable across individual teachers' lessons (Figure 1c). Unlike quantity and complexity, which remained fairly constant across lessons, use of academic words appeared to vary according to lesson content.

Clarity

The use of abstract (figurative, mental state, and ambiguous) and disfluent (mazes, errors, and abandoned utterances) language also was stable within teachers (Figure 1d). On average, 44.2% (SD = 9.3) of teachers' utterances contained abstract language, and 29.3% (SD = 14.2) contained disfluencies. Summing these figures, the overall proportion of vagueness markers was 73.6 %. Abstract terms (mental state verbs, figurative, and ambiguous language) comprised 60% of the vagueness markers. Disfluency largely consisted of maze words. Errors and abandoned utterances contributed relatively little to the total number of vagueness markers (Figure 2). There were no significant differences between GE/SE teachers (F [1, 24] = .088, p = .37) or higher/lower grade levels (F [1, 24] = .18, p = .67).

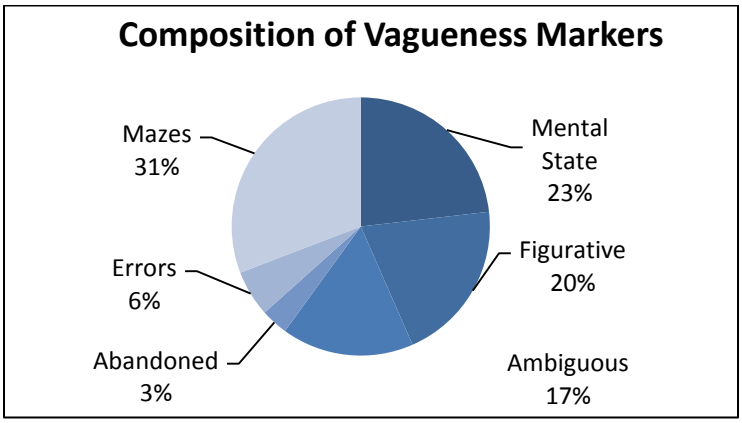


Figure 2: *Relative Contributions of Abstract and Disfluent Language in the Composition of Vagueness Markers*. Labels on the right side of the figure represent Abstract language. Labels on the left side represent Disfluent language.

Table 3. *Dependent Variables: Means and Standard Deviations by Grade Level, Setting, and Years of Teaching Experience.*

	Setting				Grade				Experience			
	GE		SE		K-2		3-4		Less (0-9)		More (10-30)	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Quantity												
Total words [a]	2996	508	3126	877	3277	684	2845	683	3271	861	2851	447
TLU [a]	4.16	0.94	4.23	0.80	4.14	0.87	4.25	0.87	4.29	0.94	4.10	0.79
TLW [a]	25.31	9.81	24.08	6.35	25.28	8.79	24.11	7.71	25.61	10.02	23.78	5.94
Turn ratio [b]	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.03	0.80	0.02
wpm	100.87	16.96	105.29	28.93	110.37	22.26	95.80	22.92	110.13	28.34	96.03	14.99
Complexity												
Subordination [b]	1.17	0.20	1.13	0.18	1.19	0.15	1.12	0.21	1.16	0.23	1.14	0.14
MLUw [a]	5.93	1.00	5.69	0.74	6.01	0.85	5.61	0.88	5.81	0.99	5.81	0.78
Fragment [b]	0.33	0.08	0.31	0.07	0.29	0.07	0.35	0.07	0.32	0.09	0.32	0.05
Simple [b]	0.39	0.06	0.43	0.06	0.43	0.06	0.40	0.06	0.41	0.07	0.42	0.04
Complex [b]	0.28	0.05	0.26	0.06	0.28	0.04	0.27	0.07	0.28	0.07	0.27	0.05
Content												
N. of Different words [b]	248.57	25.12	265.26	45.79	268.45	37.86	245.38	34.02	261.24	44.36	252.60	29.50
Type-token ratio [b]	0.27	0.04	0.28	0.04	0.26	0.03	0.28	0.04	0.26	0.04	0.28	0.03
Lexical density [b]	0.48	0.02	0.48	0.03	0.47	0.02	0.48	0.03	0.48	0.03	0.47	0.02
Academic words [b]	0.01	0.00	0.01	0.01	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.00
Frequency 1 [b]	0.87	0.02	0.86	0.01	0.87	0.02	0.87	0.02	0.87	0.02	0.87	0.02
Frequency 2 [b]	0.04	0.01	0.10	0.21	0.10	0.21	0.04	0.01	0.04	0.01	0.10	0.21
Clarity												
Ambiguous [a]	56	19	68	27	62	20	62	28	67	29	57	16
Figurative [a]	70	18	81	23	81	23	71	20	76	25	75	18
Mental state [a]	85	24	88	36	93	31	80	29	94	35	79	24
Abandoned [a]	11	8	14	8	13	8	12	8	14	10	11	5
Errors [a]	23	14	20	13	27	15	17	10	23	14	20	14
Mazes [a]	99	65	131	65	105	56	126	75	116	62	114	72
Abstract [c]	0.43	0.08	0.45	0.10	0.45	0.06	0.44	0.12	0.44	0.10	0.45	0.09
Disfluent [c]	0.27	0.14	0.32	0.15	0.27	0.12	0.31	0.16	0.28	0.13	0.30	0.16
Vague [c]	0.70	0.16	0.77	0.22	0.72	0.15	0.75	0.24	0.72	0.18	0.75	0.22

Note: [a] Number summed across samples. [b] Average mean across samples. [c] Average percent, ratio, or rate, across samples.
N = 14 teachers per group.

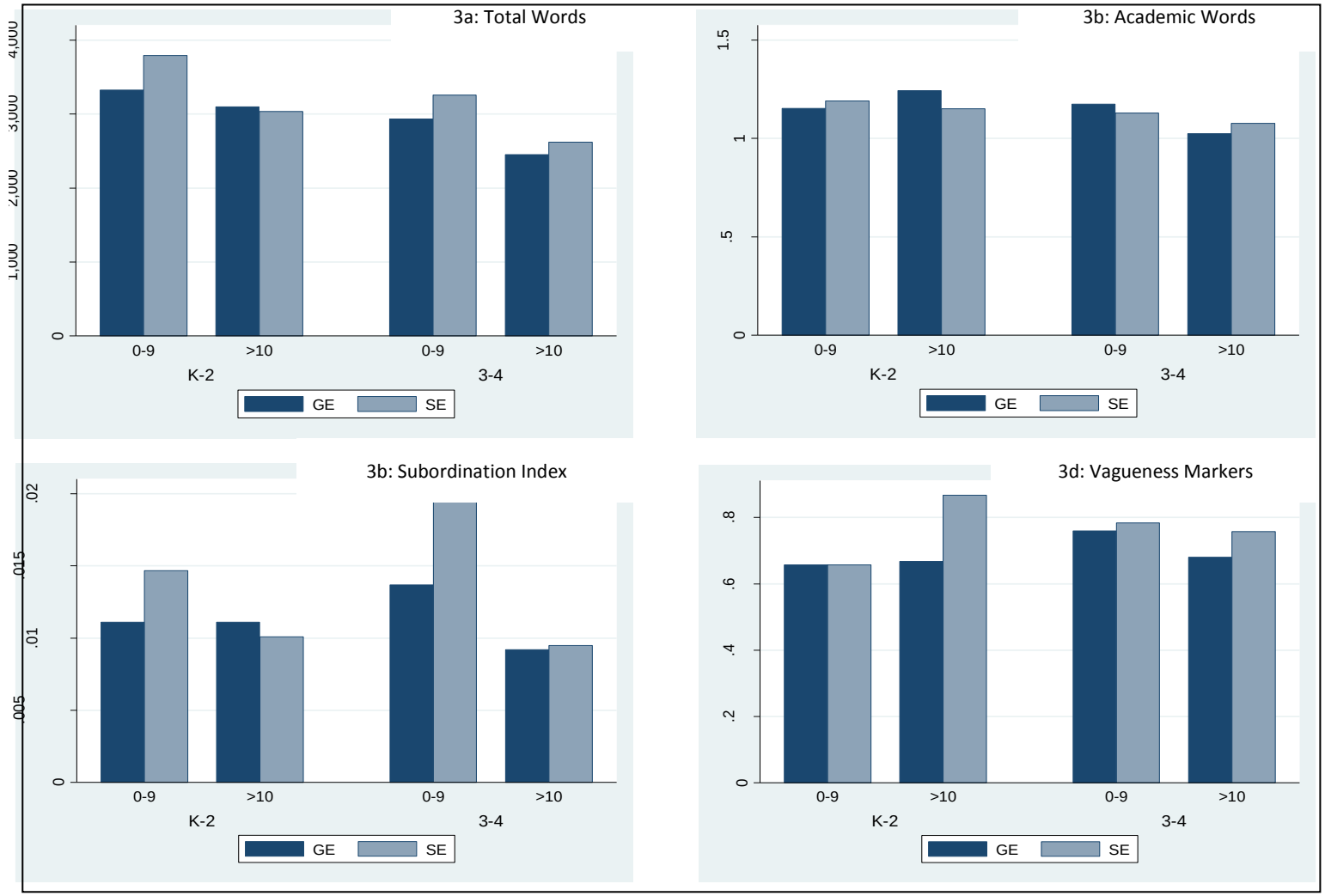


Figure 3. *Variables of Quantity, Complexity, Content, and Clarity by Grade Level, Setting, and Years of Teaching Experience.*

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Relationships Among Constructs

Although no significant within- or between-group differences were identified for any of the variables of interest, several statistically significant correlations were apparent (Table 4). There was a strong, positive association between total number of words and complexity (SI), lexical diversity (NDW), and vagueness markers (ABS and DIS). However, the proportion of teacher utterances to student turns (%TT) was correlated only with complexity (.63). Abstract language, which accounted for the largest proportion of vagueness, was significantly correlated with quantity (.83), complexity (.64), and lexical diversity (.73). However, disfluent language was significantly related only to quantity of talk (.42); not complex (.14), diverse (.23) or abstract (.35) language. Although none of the variables were significantly associated with years of teaching experience, graphic representations of the data are provided in Figure 3.

Table 4: *Bivariate correlations.*

	TW	TLU	% TT	SI	NDW	ABS	DIS	Vague
Total Words		.299 .122						
% Teacher Talk	.378* (.047)	.935** (.000)						
Subordination Index	.531** (.004)	.637** (.000)	.633** (.000)					
Different Words	.828** (.000)	.284 (.143)	.352 (.066)	.465* (.013)				
Abstract	.806** (.000)	.099 (.615)	.172 (.380)	.637** (.000)	.728** (.000)			
Disfluent	.424* (.024)	.116 (.557)	.239 (.220)	.142 (.471)	.231 (.237)	.349 (.069)		
Vague	.702** (.000)	.132 (.503)	.256 (.188)	.408* (.031)	.538** (.003)	.732** (.000)	.894** (.000)	
Years Teaching	-.338 (.079)	-0.01 (.959)	-.090 (.649)	.029 (.882)	-.154 (.433)	-.235 (.229)	.161 (.413)	-.131 (.507)

Notes: TW = Total Words. %TT = percent teacher talk. SI = Subordination Index. ABS = Abstract utterances. DIS = Disfluent utterances. Vague = utterances including all vagueness markers.
* $p < .05$. ** $p < .01$. (p values in parentheses).

CHAPTER 4

DISCUSSION

Form and Content of Teacher Talk

The purpose of this study was to describe the form and content of teachers' oral language in 28 elementary classrooms containing children with or at risk for EBD. Teacher talk has been shown to affect learners' comprehension of academic content, and is hypothesized to influence behavioral outcomes as well. Because students with EBD often have difficulty understanding oral language, they may experience teacher talk as an aversive stimulus and act out or withdraw to terminate instruction. This study is the first to compare teacher talk across general and special education settings, and is the only known study of teacher talk in classrooms including students with or at risk for EBD. Surprisingly, no differences were identified between teachers talking solely to children with EBD and those talking to typically developing and at-risk students.

Previous studies (Lazar et al., 1989; Sturm & Nelson, 1997) have shown that features of teacher talk increase in difficulty across grade levels. Contrary to expected findings, in this study no differences were identified across grade level or settings in this sample of 28 teachers on any of the variables of interest. This result provides no evidence that teachers in this sample encoded messages differently for children of different age or ability levels. With the exception of academic content words, individual teachers' language tended to be highly stable across lessons. That is, each teacher tended to talk the same amount, using the same grammatical structures, expressions, and mannerisms regardless of what they were talking about.

Amount of Teacher Talk

In 1997, Sturm and Nelson observed 15 general education classrooms over a period of three days each and generated a list of 10 rules surrounding teacher talk in elementary school. The first rule, that "teachers mostly talk and students mostly listen (p. 259)," was supported in the current study: Teacher talk accounted for approximately 80% of the language in the classroom in each of three 10-minute large group lessons regardless of lesson type or content. On average, students were exposed to 3061 words per 30-minute period. This number aligns closely with Sturm and Nelson's (1997) results, in which teachers used an average of 2690 words in 27 minutes. Contrary to Sturm and Nelson's findings, however, the amount of talk did not increase with grade level.

Sturm and Nelson's study included only general education teachers, and only one teacher with fewer than seven years of classroom experience. In the current study, SE teachers talked slightly more than GE teachers. Concurrent with Carlsen's (1993) observation that new teachers talk more than experienced ones, the only teachers exceeding 4000 words across samples were first-year special education teachers. The teacher who spoke 4265 words was in a third and fourth grade classroom; the teacher using 5332 words was a kindergarten teacher. The correlation of years of experience and total words was -.34 (p = .07), suggesting a weak inverse association between those variables.

Syntactic Complexity

Another rule of classroom talk reported by Sturm and Nelson (1997) is that complexity of teacher talk increases across grade levels. That result was not replicated in the current study: Complexity was not significantly different between K-2 or 3-4 classrooms. Sturm and Nelson

used mean length of utterance (MLU) to quantify complexity; however, it is unlikely that measurement differences can account for the difference in findings (MLU and SI were correlated at $r = .93$, $p < .001$, supporting the use of either measure). An early study by Kean (1967) also failed to find differences in complexity of grammatical structures between second- and fifth-grade teachers using the subordination index. Kean concluded, "It appears that the teachers in both grades are using normal adult speech patterns that are not related specifically to any differences that might separate them from their students" (p. 1).

As with measures of quantity, complexity also was stable within individual teachers. That is, teachers who tended to use short, simple sentences did so across samples, regardless of lesson content (Figure 1b). Overall, simple sentences containing a single independent clause and no dependent clauses represented 41% of all teacher utterances, followed in frequency by fragments (32%) and complex utterances (27%). Interestingly, these proportions were identical to those reported in a study describing linguistic demands present in after-school sports activities for students in grades 4-8 (Masterson et al., 2006).

Semantic Content

Results of this study appear to support Corrigan's (2011) observation that "teacher-talk in many primary and elementary school classrooms is restricted to commonly known vocabulary items" (p. 752). As in Weizman and Snow's (2001) study of conversations between low-income mothers and their kindergarten-age children, over 97% of the words used in these samples were the most commonly encountered words in English, with very few instances of sophisticated vocabulary use. Statistical analyses confirmed there were no within- or between-group differences in use of academic content words; however, visual analysis of the data suggested that

use of academic vocabulary tended to vary within individuals (Figure 1c). Although differences in level of vocabulary may have been due to extrinsic factors such as lesson topic, intrinsic factors such as teachers' vocabulary skill also may play an important role in children's exposure to sophisticated words (Corrigan, 2011).

Children's exposure to cross-discipline academic words such as *consequence, predict, response, investigate,* and *community* appeared to be infrequent. Examining individual transcripts shows that academic words were used primarily in the context of vocabulary lessons. There was one notable exception to this rule: The word *job* was counted as an academic word, and appeared 339 times across samples. However, there were only 12 total uses of the word in reference to employment. It was most commonly used in praise statements, with 326 instances of phrases such as *good, nice, great,* or *super job*. On average, teachers included *job* in praise statements 11.64 times (SD = 8.38) per 30 minutes. Only two of the 28 teachers did not use the word *job* at all. For other, less frequently encountered academic words, the number of exposures was limited and not distributed throughout lessons as is recommended practice (Beck et al., 2008). For example, the word *orbit* appeared five times during a lesson on space, and all five occurrences took place within a single teacher turn.

Vagueness Markers

Results also contradicted Corrigan's (2011) statement that teachers tend to talk about "the here and now" (p. 752) in elementary school classrooms: 44% of teacher utterances contained abstract language. On average, 14.6% of teachers' utterances contained instances of figurative language. This proportion was similar to results reported by Lazar et al. (1989), in which 11.5% of all teacher utterances contained at least one idiom, and 37% of utterances contained multiple-

meaning expressions (defined as indirect requests, idioms, irony, similes and metaphors). In both studies, there were no differences in teachers' use of idioms across grade levels, but a great deal of variability among individual teachers. Use of opaque language increases the need for students to "fill in the gaps", or infer the meaning of teachers' intended messages. However, inferencing and learning from context are known areas of difficulty for students with SLI (Adams, Clarke, & Haynes, 2009; Bishop, 1992; Karasinski & Weismer, 2010) and EBD (Warr-Leeper, Wright, & Mack, 1992; Ward-Lonergan, Liles, & Owen, 1996).

Comprehension difficulties can only be compounded by use of disfluent language, which accounted for an additional 29% of teacher talk in this sample. Disfluencies consisted primarily of mazes, which occurred at a mean rate of 2.9 per minute. However, the number of mazes per minute ranged from 41 to 277 per 30 minute sample, or a rate of 1.3 to 9.2 per minute. Smith and Land (1980) reported that college students' test performance was negatively affected by hearing only 5.1 mazes per minute. Therefore it is highly likely that even typically developing elementary students had difficulty understanding some teachers in this sample, even in the absence of excessive talk, complex syntax, or sophisticated semantic content.

Limitations

Although this study provides important information about the nature of teacher talk in elementary school classrooms, results must be interpreted with some limitations in mind. The primary consideration is that the data were collected as part of a larger intervention study in which lesson context (time of day, month, year) and content (reading, math) were allowed to vary. Because context has been shown to influence teacher talk in preschool settings (Dickinson,

Darrow, & Tinabu, 2008; Justice et al., 2008), these differences may be important to consider. Further, the intervention took place in each teacher's classroom over a period of two years. Although the GE classrooms always contained 1-3 target students and the SE classes always contained only children with EBD, the individual children within classrooms did vary over time.

Despite differences among samples, some similarities were present. All samples were collected during the first 10 minutes of large group instruction. It is possible that teacher talk may be more sensitive to individual student differences during small group or 1:1 instruction. Also, there may be differences in some outcomes if teachers are more likely to review lesson content during the first 10 minutes of class than to present new information.

Across samples, student utterances could not be transcribed from the audiotapes. This may be an important omission, as it is possible that the meaning conveyed by teacher talk cannot be captured by a system devised to quantify its form and structure. This omission also limits the accuracy of the rate and ratio variables of teacher talk (WPM and %TT, respectively), as well as the ability to quantify functions of teachers' oral language use. Finally, the small sample size in this study may have increased the probability of Type II error. Adding participants may have increased the power to detect an effect if one were present.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

The essence of good teaching is conveying information in a way that students understand. Following an experiment in coaching fifth-grade teachers to deliver strategy instruction, Duffy, Roehler, and Rackliffe (1986) discovered that "the same skill taught to the same kinds of students by identically trained teachers resulted in noticeable differences in what students remembered following instruction (p. 3). They subsequently concluded that “student understanding of lesson content is influenced by relatively subtle differences in what a teacher says" (p. 3). Even following prescribed curricula with high fidelity does not guarantee that teachers deliver high-quality instruction, as measured by linguistic indicators such as frequent conversation, repetition and extension, and use of advanced language (Justice, Mashburn, Hamre, & Pianta, 2008). It is therefore essential to examine how teachers use language to transmit messages related to academic and behavioral goals as a precursor to developing interventions for teachers to improve communication in the classroom.

Implications for Teacher Education

Although the current study did not include student outcomes, some conclusions may be drawn based on patterns observed in the data from this and other studies. First, contrary to expectations, there were no differences in teacher talk between general and special educators on any of the constructs measured. This finding has important implications. Considering that the special educators all taught in self-contained classrooms for students with EBD, it would be

expected that the majority of their students had at least a mild language deficit (Hollo et al., in press). Other studies have shown that special educators do modify language according to learners' perceived language proficiency (e.g., DePaulo & Coleman, 1986; Girolametto et al., 2000; Gremaud & Lambert, 1984). Logically, then, SE teachers' failure to adapt language use may be evidence that they were unaware of students' low language skills.

Of course, evidence for this statement is circumstantial, and other explanations are certainly possible (e.g., the data collection or coding systems failed to capture adaptations). These findings must be corroborated with direct evidence. If, however, this finding is supported, teacher education and professional development programs must include information about the influence of teacher talk on student academic and behavioral outcomes. Programs for all teachers should include methods for assessing students' language skills and strategies for matching their expressive language to students' receptive language. It is particularly important for special education teachers to understand the role of teacher talk in negative teacher-student interactions.

Implications for Developing Interventions

The second conclusion drawn from this study is that the form or structure of teacher talk remains constant over time; therefore teachers' manner of speaking may be habitual and relatively inflexible. This pattern supports the above conclusion, that teachers did not modify linguistic patterns to accommodate children with low language skills. This result also may explain Dickinson's (2011) observation that "changing teacher practices related to language use is proving to be nearly as hard as raising children's performance levels" (p. 967). Dickinson (2011) also proposed that the difficulties he encountered may have resulted from asking teachers to implement too many changes at once.

Instead, researchers should consider presenting teachers with few targeted variables, allowing teachers to prioritize the features of teacher talk they would like to change, introducing changes gradually and sequentially over a period of time using 1:1 support and feedback, then training independent use of the strategies. Starling, Munro, Togher, and Arciculi (2012) successfully used this model, presenting four types of instructional language to secondary school teachers of students with language impairments during an individualized 10-week collaborative coaching intervention with a speech-language pathologist. Results of this randomized controlled trial demonstrated this approach was successful not only in modifying teachers' instructional language, but also in improving student outcomes. Furthermore, the authors reported that changes in teacher talk maintained over time.

Identifying targets for intervention

Another approach to modifying teacher talk is to identify and change a single variable that has the greatest effect across teachers on improving student outcomes. Experimental studies will be necessary to identify that variable; however, results of the current study may help identify targets for change in future research. Given the correlations of total words, complexity, and vagueness markers, it is possible that there is a relation between the quality and quantity of teacher talk: The more teachers talk, the more difficult it may be for students to understand them. As Berlin, Blank, and Rose (1980) noted, "Faced with a seemingly endless flow of words, the language handicapped child might retain only fragments of the total utterance or more likely 'tune out' the auditory stream" (p. 50). Students with low language skills and problem behavior may be more likely to act out than to tune out, effectively averting torrential streams of words.

Decreasing quantity. One way to reduce the amount of teacher talk is to increase the amount of student talk. Increasing student's verbal participation in class is viewed as an important goal for language (Staab, 1991) and literacy (Berry, 2006) development. For example, Dickinson and Porsche (2011) reported that lower teacher-to-child speech ratios in preschool classrooms predicted higher reading comprehension, receptive vocabulary, and word recognition skill in 4th grade. Reducing the amount of teacher talk is supported by behavioral studies of students' opportunities to respond, an evidence-based strategy to increase academic engaged time and decrease problem behavior for children with EBD (Sutherland & Wehby, 2001). Fewer and shorter teacher turns may benefit children because "the longer the speech during a clinician speaking turn, the denser the informational chunk, and the greater the oral literacy demand" (Roter, Erby, Larson, & Ellington, 2007, p. 1445).

Decreasing rate. Another way to reduce the volume of teacher talk is to reduce teachers' speaking rate. It is possible that altering rates of speech is the key to improving other features of teacher talk as well. Total words per sample was the only variable of interest significantly correlated with disfluencies ($r = .42$, $p = .02$), indicating that teachers who talked the most—and presumably the fastest[1]—also had significantly more mazes, errors, and abandoned utterances than teachers who spent less time talking. As Tobin (1986) demonstrated, increasing wait time during middle school math and language arts classes resulted in decreases in the volume of teacher talk and interrupted utterances, and increased both the quality and quantity of student responses. Perhaps slowing down allowed teachers more time to encode messages thoughtfully, and allowed students additional time to process the content of those messages.

[1] Because duration of samples was controlled but pauses in teacher talk were not recorded in this study, rate and total words per sample provided redundant information ($r = .97$).

Simplifying syntax and vocabulary. Syntactically simple utterances may benefit students with poor language comprehension. However, Gruenewald and Pollack (1990) noted that teachers may resist simplifying syntactic structures because they risk "talking down" to students. This is a valid concern, as Huttenlocher, Vasilyeva, Cymerman, and Levine (2002) demonstrated that preschool children increased production of complex syntax in classrooms of teachers with high occurrences of complex language structures. A similar argument can be made against using simple, concrete vocabulary during instruction: Increasing exposure to rich, sophisticated vocabulary is recommended practice to improve language development in young children and learners acquiring a second language.

Consideration of Student Characteristics

Recommended practices for teacher talk may differ depending on students' linguistic strengths and needs. Simplifying teacher talk by decreasing the amount, complexity, and semantic content of teacher talk may not be recommended for some learners (e.g., young, typically developing children). If language development is the goal, most researchers recommend talking slightly above the level of the student's proficiency. Conversely, simplifying teacher talk may exemplify "utilizing language that is relevant and within the student's experience" (Gruenewald & Pollack, 1990, p. 48) for children with vulnerable language systems. One way to ensure that students' needs are met for both language development and comprehension is for teachers to repeat or restate key information using multiple linguistic forms. Although redundancy may increase the volume of teacher talk, it also has been shown to facilitate comprehension for second language learners (Cabrera & Martinez, 2001), general education (Crossan & Olson, 1969), and special education students (Lapadat, 2002).

Future Directions

This study was the first in a line of research about identifying ways to improve teacher-student communication. The purpose for developing the coding system used in this study was to quantify features of teacher talk hypothesized to impede student comprehension, with the goal of identifying the most salient variables teachers may modify to promote students' academic and behavioral success. Future descriptive studies are needed to examine differences in teacher talk using standardized content and tasks, and determining what features of instruction result in the most adaptive student behaviors. For example, it would be instructive to record several teachers presenting lessons using standardized vocabulary lists or wordless story books, then compare language features of teachers according to student performance on academic (e.g., comprehension, language) and behavioral (e.g., engagement, problem behavior) measures.

Future descriptive studies also need to include analyses of student verbal responses, as well as teacher-student interactions. Recording both teacher and student oral language would allow researchers to ascertain the level of match or mismatch between teacher talk and student proficiency. An analysis of language functions (e.g., comprehension checks, clarification requests, feedback, repairs) may help explain how misunderstandings develop. It also would allow researchers to examine what kind of teacher talk precedes escalating chains of problem behavior, and perhaps to identify what works to avoid triggering teacher-student conflicts. Another fruitful area of research will be to examine whether measures other than transcriptions (e.g., direct observations, coding directly from recordings, or use of rating scales) provide useful data for assessing teacher talk variables. In some respects, ratings may be more informative than counts of specific behaviors. For example, many of the teachers in the current study used

recommended practices such as frequent comprehension checks and feedback (Conroy et al., 2008). Anecdotally, however, the quality of those practices varied widely. If able to provide comparable information, other methods data collection may prove far less resource-intensive.

Experimental studies are needed to determine whether teacher talk is amenable to change, and most importantly, the effects of modifying different features of teacher talk on student academic and social behaviors. In concert with recommendations from studies across linguistic, behavioral, and educational literature, correlations among the quantity and quality of teacher talk support further investigations into the most effective way to help teachers increase clarity in communication. It appears that some teachers would benefit from decreasing the quantity of talk. Whether this is best achieved through decreasing rates of speech, increasing length of pauses, or increasing opportunities to respond is an important empirical question. Equally important is to understand whether, and for whom, simplifying the syntactic and semantic content of teacher talk is effective.

All of the questions related to what works to align teacher talk and student comprehension has important implications for practicing teachers, but also for researchers and teacher educators. A great deal of time, effort, and financial resources have been devoted to developing and disseminating evidence-based practices in special education. It is important to recognize that even evidence-based academic and behavioral strategies are doomed to fail if the language used to convey information to students impedes comprehension. Developing an evidence base for refining teacher talk may improve instruction for all students. Furthermore, especially relevant for teachers of children with or at risk for EBD, improving teacher-student communication may facilitate achievement by decreasing occurrences of problem behavior and conflict in the classroom.

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