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Narrative Ability of Children With Speech Sound Disorders and the Prediction of Later Literacy Skills

Rachel L. Wellman[a], **Barbara A. Lewis**[b], **Lisa A. Freebairn**[b], **Allison A. Avrich**[b], **Amy J. Hansen**[b], and **Catherine M. Stein**[b]

[a]Cleveland Hearing & Speech Center, Cleveland, OH

[b]Case Western Reserve University, Cleveland, OH

Abstract

Purpose—The main purpose of this study was to examine how children with isolated speech sound disorders (SSDs; *n* = 20), children with combined SSDs and language impairment (LI; *n* = 20), and typically developing children (*n* = 20), ages 3;3 (years;months) to 6;6, differ in narrative ability. The second purpose was to determine if early narrative ability predicts school-age (8–12 years) literacy skills.

Method—This study employed a longitudinal cohort design. The children completed a narrative retelling task before their formal literacy instruction began. The narratives were analyzed and compared for group differences. Performance on these early narratives was then used to predict the children's reading decoding, reading comprehension, and written language ability at school age.

Results—Significant group differences were found in children's (a) ability to answer questions about the story, (b) use of story grammars, and (c) number of correct and irrelevant utterances. Regression analysis demonstrated that measures of story structure and accuracy were the best predictors of the decoding of real words, reading comprehension, and written language. Measures of syntax and lexical diversity were the best predictors of the decoding of nonsense words.

Conclusion—Combined SSDs and LI, and not isolated SSDs, impact a child's narrative abilities. Narrative retelling is a useful task for predicting which children may be at risk for later literacy problems.

Keywords

speech sound disorder; language impairment; narratives; literacy

Oral narratives are considered an important assessment tool for children because of the wealth of information they provide about children's language ability. Narratives demonstrate a speaker's ability to organize information in a cohesive, rule-governed manner; link events in predictable ways; and anticipate the information needed by the listener for comprehension (Owens, 2004).

Narrative Abilities of Children With LI

Narrative tasks have been used extensively in research to document the deficits seen in children with language impairment (LI). Children with LI tend to produce less complex

Correspondence to Barbara A. Lewis: bxl@case.edu.

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narratives that are lower in overall quality than those of age-matched peers (Fey, Catts, Proctor-Williams, Tomblin, & Zhang, 2004; McFadden & Gillam, 1996). The narratives of children with LI include fewer complete episodes and story grammar components as well as less structure (Merritt & Liles, 1987; Wright & Newhoff, 2001). Other aspects of language that children with LI have difficulty with include syntactic complexity, vocabulary diversity, and story length (Boudreau & Hedberg, 1999; Dodwell & Bavin, 2008; Merritt & Liles, 1987; Paul & Smith, 1993).

Merritt and Liles (1987) found that when school-age children with LI were given a story retelling task, they produced shorter narratives than those told by typically developing (TD) peers. In contrast, when given a story generation task, the children with LI told stories that were equal in length but contained more extraneous information, suggesting that children with LI tend to include less information in their narratives that is crucial to the story (Boudreau & Hedberg, 1999; Girolametto, Wiigs, Smyth, Weitzman, & Pearce, 2001; Paul & Smith, 1993). Cognitive levels may be an important variable to consider when examining the influence of LI on narratives. Wetherell, Botting, and Conti-Ramsden (2007b) demonstrated that cognitive levels in combination with LI impacted adolescents' narrative skills. Adolescents with a history of LI and poor cognitive abilities had poorer narrative skills than adolescents with normal performance IQs (PIQs).

Narrative Abilities of Children With Speech Sound Disorders (SSDs)

Although narratives have been used extensively to assess children with LI, little is known about the narrative abilities of children with speech sound deficits. SSDs include both errors of articulation or phonetic structure (i.e., errors due to motor production of speech sounds) and phonological errors (i.e., errors in applying linguistic rules to combine sounds to forms words). The high rate of comorbidity of SSDs with LI suggests that speech production skills need to be accounted for when examining the narratives of children with LI. Shriberg, Tomblin, and McSweeny (1998) reported 11%–15% comorbidity of SSDs with LI at age 6; Shriberg and Kwiatkowski (1994) suggested 40%–60% comorbidity in preschoolers. Paul and Smith (1993) found that 35% of the children in their study with slow expressive language development scored below the normal range on an articulation test at age 4, but then recovered to the low end of the normal range by age 5 (as cited in Paul, 1996). Most studies of LI and narrative ability do not control for a history of SSDs in their participants (Bishop & Edmundson, 1987; Boudreau & Hedberg, 1999; Girolametto et al., 2001; Merritt & Liles, 1987; Paul, Hernandez, Taylor, & Johnson, 1996).

Children with SSDs often present with phonological memory deficits, which are also observed in children with LI and may be related to narrative ability. Speidel (1989) proposed that slow or impaired articulatory development could be related to the development of poor phonological memory skills and difficulty with imitation. Adams and Gathercole (1995) found that 3-year-olds with poor phonological memory produced spontaneous speech that was less grammatically complex, was limited in vocabulary, and consisted of shorter utterances than the speech of same-age peers with good phonological memory. Poor phonological memory can interfere with a child's ability to participate in a narrative retelling task by impacting the child's store of vocabulary and use of grammatical structure needed to tell the story appropriately, as well as the child's comprehension of the story. Dodwell and Bavin (2008) found a significant correlation between performance on narratives and memory tasks for both TD children and children with specific language impairment (SLI).

Rate of speech may also have an adverse effect on the narrative ability of children with SSDs. Sturm and Seery (2007) found that TD children tend to speak at a faster rate when telling a story than when speaking conversationally, as measured by words per minute.

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Increased rate of speech may result in a decrease in intelligibility in children with SSDs. A child with speech production difficulties might try to compensate for reduced intelligibility by using shorter, less complex utterances and avoiding vocabulary that is challenging to produce, such as multisyllabic words and words that contain specific speech sounds.

Combined SSD and LI (SSD+LI) may compound a child's difficulty with a narrative task. In addition to using simplified utterances and avoiding certain vocabulary, a child with SSD +LI might also show weaknesses in syntax, morphology, or overall story organization, resulting in a poor narrative. The first objective of the present study was to compare the narrative skills of children with isolated SSDs (SSD-only) and children with combined SSD +LI.

Narratives and Literacy Development

Narratives have also been used to predict later academic success, including literacy. In a 1986 cluster study, Feagans and Appelbaum reported that 6- and 7-year-olds with good narrative skills had fewer academic problems over a 3-year period when compared with children with poorer narrative skills. Although there are a number of studies attesting to the predictive relationship between early narrative skill and later academic achievement (Fazio, Naremore, & Connell, 1996; Feagans & Appelbaum, 1986; Griffin, Hemphill, Camp, & Wolf, 2004; O'Neill, Pearce, & Pick, 2004; Tabors, Snow, & Dickenson, 2001), there are few studies that evaluate which storytelling skills are associated with specific academic skills.

Several authors have identified deficits in narrative ability in children who struggle with literacy development. Feagans and Short (1984), for example, found that 6- and 7-year-old children with reading disability were more likely to produce fewer action units, fewer complex sentences, fewer words, and more nonreferential pronouns in their paraphrased narratives than TD children. Children with dyslexia demonstrated difficulty with the deep narrative structure in a narrative retell study by Levi, Musatti, Piredda, and Sechi (1984).

Narratives have been used to predict the progression of LI in preschool children. Preschool children with LI demonstrated poorer narrative ability than TD children when assessed using both oral narratives and emergent reading tasks (Kaderavek & Sulzby, 2000). Deficits in narrative ability persist into adolescence. Wetherell, Botting, and Conti-Ramsden (2007a) reported that adolescents with SLI were poorer than TD peers both in story retelling and conversational narratives. Adolescents with SLI differed in the types of errors they made and required more support from their narrative partner. Bishop and Edmundson (1987) found that the likelihood of a good language outcome could be predicted with a high degree of accuracy with a language assessment at 4 years of age, and the best predictor of language outcomes was the story retell task. However, few studies have employed early narratives to predict later literacy skills of children with early SSDs with or without LI.

Relationship of Spoken to Written Language

Many studies have explored the relationships between spoken and written language (Bird, Bishop, & Freeman, 1995; Bishop & Clarkson, 2003; Catts & Kamhi, 1999; Nelson, 2010; Pennington & Bishop, 2009; Peterson, Pennington, Shriberg, & Boada, 2009; Peterson, McGrath, Smith, & Pennington, 2007; Snowling & Hayiou-Thomas, 2006; Stackhouse & Wells, 1997). Although spoken and written language differ mechanically, conceptually, and linguistically, most researchers agree that these two domains share semantic, syntactic, and phonological processes (Gillam & Johnston, 1992). Furthermore, there is considerable evidence for overlap in etiological basis and cognitive deficits of SSDs, LI, and reading disability (Pennington & Bishop, 2009). Stackhouse and Wells (1997) provided a detailed model illustrating the unique and shared processes between spoken and written language. In their model, phonological, semantic, and grammatical representations are shared processes, whereas auditory processes and motor processes are unique to speech sound discrimination and production. However, the model by Stackhouse and Wells does not include a pragmatic or discourse component that may illuminate the relationship of spoken narratives to literacy skills. Snowling and Hayiou-Thomas (2006) built on the triangle model proposed by Bishop and Snowling (2004) to include a pragmatic or discourse component that may be useful in interpreting the relationship between spoken narratives and literacy skills.

Proficient literacy skills require both the decoding of text as well as its comprehension. Children with phonological difficulties will have problems with decoding text; children with other LIs will have difficulty comprehending text (Snowling & Hayiou-Thomas, 2006). Children with poor reading comprehension may demonstrate good phonological skills and accurate reading decoding and fluency but have deficits in spoken language, including receptive and expressive skills, semantics, listening comprehension, and grammar (Nation, Cocksey, Taylor, & Bishop, 2010; Nation, Snowling, & Clarke, 2007). Children with LI are at risk for reading impairment due to their poor comprehension and metalinguistic skills and slow information and linguistic processing (Menyuk et al., 1991; Miller, Kail, Leonard, & Tomblin, 2001; Montgomery & Evans, 2009). They are likely to have written language impairments as well. Children with LI often struggle with the planning, organization, and revision needed to write, and frequently devote a disproportionate amount of cognitive energy to mechanics such as spelling, handwriting, and punctuation (Owens, 2004).

Children with phonological deficits may have deficits in reading decoding, whether or not they have comorbid LI (Catts & Kahmi, 2005). Although children with SSD-only tend to fare better on literacy measures at school age when compared to children with LI, they still struggle with reading decoding and spelling, most likely due to underlying phonological deficits (Lewis, Freebairn, & Taylor, 2002; Young et al., 2002). A 2004 study by Nathan, Stackhouse, Goulandris, and Snowling also found that children with co-morbid speech and language deficits had greater problems with literacy tasks compared to children with SSD-only, but children with SSD-only were still more likely to have deficits in literacy acquisition than TD children. SSDs appear to be particularly problematic for literacy development if they affect the phonological skills needed for learning to read (Preston & Edwards, 2010). Literacy outcomes for children with SSDs may be related to the severity and persistence of the SSD (Hayiou-Thomas, Harlaar, Dale, & Plomin, 2010), nondevelopmental speech errors (Preston & Edwards, 2009), and comorbid LI (Larrivee & Catts, 1999; Raitano, Pennington, Tunick, Boada, & Shriberg, 2004).

Bird, Bishop, and Freeman (1995) proposed that if a child's SSD persists past the age of literacy acquisition, he or she will be at risk for reading problems. In our previous work, we showed that children with combined SSD+LI are at greater risk for literacy problems than children with SSD-only due to deficits both in phonological processing and other language skills that impact reading decoding as well as in reading comprehension (Lewis, Freebairn, & Taylor, 2000; Lewis, O'Donnell, Freebairn, & Taylor, 1998). Children with SSDs may also be at risk for deficits in written language. Children who perform poorly on nonword repetition—a task employing phonological skills such as phonological memory—demonstrated poor written language (Bishop & Clarkson, 2003). In a study of preschool-age children, Sices, Taylor, Freebairn, Hansen, and Lewis (2007) observed that preschool language skills were related to early reading and writing skills.

The second objective of the present study was to determine if the narrative ability of children with early childhood SSDs is predictive of later school-age literacy skills. Children with SSD-only, SSD+LI, and TD children were compared at early childhood on a story retelling task. We predicted that the children with SSD-only would demonstrate poorer performance on a narrative retelling task than the TD children, and that the children with SSD+LI would demonstrate poorer performance than both the SSD-only group and the TD group. Children were followed to school age (8–12 years), and measures of reading and written language were administered. Our second hypothesis was that the early narrative retelling ability of the children would be predictive of their reading and written language abilities at school age.

METHOD

Study Design

This study used a longitudinal, cohort design. A retrospective cohort design was used to evaluate the narrative ability of the three groups of children with emergent literacy (time 1). A prospective cohort design was used to evaluate if the narrative measures at time 1 predicted the children's later literacy outcome measures at time 2.

Participants

Participants were recruited in early childhood before beginning formal literacy instruction (ages 3;3 [years;months] to 6;6) from the clinical practices of speech-language pathologists (SLPs) at community speech and hearing centers or in private practice in the greater Cleveland area. Twenty children diagnosed with a moderate to severe SSD and 20 diagnosed with SSD+LI were chosen to participate in the study. Twenty siblings of the children receiving speech services who had no history of a speech and/or language disorder were also recruited. The participants were part of an ongoing study of the genetics of SSDs (Lewis et al., 2006). Children in the SSD-only group were enrolled in therapy for a moderate to severe SSD. Before enrollment in therapy, participants demonstrated a score of 1.25 *SD*s or more below the mean on the Goldman-Fristoe Test of Articulation (GFTA; Goldman & Fristoe, 1986), at least three phonological error types as identified by the Khan-Lewis Phonological Analysis (KLPA; Khan & Lewis, 1986), and a normal peripheral speech mechanism as defined by the Oral and Speech Motor Control Protocol (Robbins & Klee, 1987). The children in this group scored within the normal range for overall language ability on either the Test of Language Development—Primary, Second Edition (TOLD–P:2; Newcomer & Hammill, 1988) or the Clinical Evaluation of Language Fundamentals—Preschool (CELF–P; Wiig, Secord, & Semel, 1992).

Children in the SSD+LI group met the above criteria for an SSD. In addition, LI was diagnosed based on criteria established by Tomblin et al. (1997), which included scaled scores of less than eight on two subtests of the TOLD–P:2 or CELF–P. These children were also enrolled in therapy. Children in the TD group were never enrolled in speech and language therapy and scored within the normal range for measures of speech, including the GFTA and the KLPA, and for language (TOLD–P:2 or CELF–P). In addition, all children were required to have normal intelligence based on a score of 80 or above on the Wechsler Preschool and Primary Scale of Intelligence—Revised (WPPSI–R; Wechsler, 1989); no history of neurological or developmental disorders other than speech and language according to parent report; and normal hearing, as defined through administration of a hearing pure tone screening the day of testing.

Demographic characteristics of the sample at the time of the initial testing are presented in Table 1. The family's socioeconomic status (SES) was determined using the Hollingshead Four Factor Index of Social Class (Hollingshead, 1975). The three groups did not differ significantly in age, gender, or SES.

The three groups of children (TD, $n = 20$; SSD-only, $n = 20$; SSD+LI, $n = 20$) were followed from preschool to elementary school. Of the 60 children evaluated, 40 were available to participate in the follow-up study at school age (8–12 years; $M_{age} = 10.05$, $SD = 1.12$), with 20 girls and 20 boys followed. Six of the children followed were from the TD group, 19 were from the SSD-only group, and 15 were from the SSD+LI group. Children who were followed did not differ significantly from children who were not followed in age, $t(59) = 1.14$, $p = .260$; SES, $t(59) = 0.29$, $p = .774$; or PIQ, $t(59) = 1.41$, $p = .163$. Nor did they differ on early childhood measures of articulation, GFTA; $t(59) = 1.66$, $p = .103$, or composite language measures, TOLD–P:2/CELF–P; $t(59) = 1.05$, $p = .303$. Children followed did differ on the early childhood measure of phonological processes, the KLPA, $t(59) = 2.38$, $p = .021$, with children followed performing more poorly than children who were not followed. This difference is presumably due to the fewer TD children who were followed.

Measures

Speech, language, and PIQ measures—The speech sound skills of the participants were assessed at early childhood using the GFTA Sounds in Words subtest. Responses were recorded via audiotape and later transcribed. The KLPA was used to further analyze the results of the GFTA and identify phonological errors. Findings from the KLPA were used to identify the presence or absence and the quantity of phonological processes employed by the participants. A conversational speech sample of at least 50 utterances was obtained using technical and interlocutor procedures for free speech sampling described in Shriberg and Kwiatkowski (1982). The percentage of consonants correct (PCC) metric (Shriberg et al., 1997) was calculated.

Table 2 shows the comparisons among the groups on the speech sound measures. Significant differences were observed on the GFTA percentile scores, the KLPA percentile scores, and the KLPA speech simplification ratings. The SSD-only group and the SSD+LI group differed significantly from the TD group. Significant differences were not found on speech sound measures between the SSD-only group and the SSD+LI group, suggesting that the severity of the SSDs in these two groups was comparable. No significant differences were found for the three groups on the PCC.

As shown in Table 3, all three groups employed phonological processes based on the KLPA, with the TD group employing the fewest instances of phonological process use followed by the SSD-only group and the SSD+LI group employing the most instances of process use. Chi-square analyses showed significant differences in phonological process use on deletion of final consonants, syllable reduction, cluster simplification, velar fronting, and consonant harmony. For the purposes of the present study, we did not distinguish between articulatory disorders versus phonological processing disorders.

Language skills were assessed using the TOLD–P:2 or the CELF–P. The WPPSI–R was used to assess nonverbal intelligence. The group of children with SSD+LI differed significantly from the other two groups in PIQ and the composite language score on the TOLD–P or the CELF–P (see Table 1).

Narrative measures—At early childhood testing, a narrative retelling task, the “Fox and Bear Story” (adapted from Stein & Glenn, 1979), was read aloud to each child (see Appendix A). The child was then asked to tell the story back to the examiner. Following the narrative retell, the child was asked a series of questions about the story. Three questions assessed the child’s knowledge of facts, and three questions assessed the child’s ability to make inferences based on the story (see Appendix B).

The children's narratives were audio-recorded and were later transcribed and coded using Systematic Analysis of Language Transcripts (SALT) software (Miller & Iglesias, 2008). The number of T-units, mean length of T-unit, total number of words, and number of different words were calculated. As a measure of articulatory complexity, multisyllabic words employed in the narrative were also coded.

The internal structure of the stories was assessed using story grammars (Stein & Glenn, 1979) and high point analysis (McCabe & Rollins, 1994). As a measure of story accuracy, the number of content items included in each narrative was entered into the analysis. Content items include basic concepts that are essential to the story's plot line. This measure is an index of how many specific details from the story the children were able to recall (see Appendix C).

The relevancy of the children's utterances was coded in SALT. This measure is meant to distinguish children who are able to recall and retell the story accurately from those who resort to fabricating details and creating a new narrative. Utterances were coded as correct, relevant but incorrect, and irrelevant. *Correct* utterances are statements that contained accurate information about the story. *Relevant but incorrect* utterances are statements that were related to the story but demonstrated some incorrect information. A child's utterance was considered *irrelevant* if it relayed information that was invented or related to a different story (see Appendix D).

The examiner's cues were coded by type to confirm uniformity across test groups. Cues were categorized as (a) move forward cues, (b) affirming cues, (c) leading cues, and (d) information cues. *Move forward* cues were neutral and included phrases such as "and then what happened?" Cues that were praiseworthy in nature ("that's right!") were coded as affirming cues. Like the move forward cues, *affirming* cues do not provide any information about the story. *Leading* cues provide structure for the child, but do not give away story content. These cues included specific questions about the story, or sentence starters. *Information* cues gave the child foundational information to use to build a narrative. This is the only cue that provided story content (see Appendix E).

Two other measures were used to evaluate the amount of support needed by each child from the examiners. The first is a measure of spontaneity. The children's utterances were coded as either responsive or spontaneous. Utterances were considered *responsive* if they followed an examiner's question or sentence starter. Utterances were considered s*pontaneous* if they were generated independently by the child or followed a neutral prompt from the examiner, such as "and then what happened?" The percentage of spontaneous utterances out of the total was calculated. The second measure was a direct count of the child's attempts to solicit assistance from the examiner. The number of requests that each child made for help was counted and coded in SALT.

Literacy measures—At the school-age (8–12 years) follow-up testing, tests of reading and written language were administered. Reading decoding skills were measured using the Word Attack and Word Identification subtests of the Woodcock Reading Mastery Test—Revised (WRMT–R; Woodcock, 1987). Reading comprehension abilities were measured using the Reading Comprehension subtest of the Wechsler Individual Achievement Test (WIAT; Wechsler, 1992). Written language ability was assessed using the Spontaneous Writing composite of subtests from the Test of Written Language—2 (TOWL–2; Hammill & Larsen, 1988). All standardized test measures were administered and scored according to the test manual. Standard scores were used in the data analysis.

Reliability

Ten percent of the narratives were analyzed independently using SALT software by a trained, licensed SLP who was blind to each child's group membership. Reliability for mean length of T-unit, number of T-units, number of words, and number of different words was 90.6%, 85.5%, 99.2%, and 95.8%, respectively.

Procedure

Children were tested individually in their homes over two sessions by a licensed SLP. Testing was conducted initially (T1) at ages 3;3–6;6, and again for follow-up (T2) at ages 8–12. Speech production measures were audio-recorded using professional-quality equipment (Sony Professional Walkman, model WM-D6C, with an Audio Technica omidirectional microphone, model AT804) and were later phonetically transcribed. This research project was approved by the University Hospitals of Cleveland's Institutional Review Board. Informed consent and assent were obtained before testing.

Statistical Analyses and Data Reduction

A one-way analysis of variance (ANOVA) was conducted to test for group differences on narrative performance at early childhood. Significant differences ($p < .05$) were followed by a Tukey post hoc analysis.

The number of narrative measures was reduced by employing principal axis factor analysis on age-standardized *z* scores (see Table 4). Factor analysis suggested that a three-factor model of the narrative variables fit the data best: (a) a narrative macrostructure factor, which included two measures of internal structure and two measures of content accuracy; (b) a comprehension factor, which included factual and inferential questions, as well as the number of irrelevant utterances; and (c) a narrative microstructure factor, which included a measure of syntactic complexity and a measure of vocabulary diversity. *Macrostructure* is defined by Hughes, McGillivray, and Schmidek (1997) as "the global, general properties and organization of a narrative" (p. 355) and is used in this study to refer to measures of narrative structure (story grammars and high point analysis) and overall accuracy of content (i.e., number of content items and correct utterances). *Microstructure* is related to the "local, more specific properties of a narrative" (Hughes et al., 1997, p. 355), including measures of syntax (mean length of T-unit) and semantics (number of different words).

Regression analyses, adjusted for age and sex, were employed to determine which narrative factors at early childhood best predicted performance on tests of reading decoding, reading comprehension, and written language at school age. The backward stepwise procedure was used to find the final model demonstrating which early narrative factors predicted later school-age outcomes. All variables were initially added into the model. Variables with the highest *p* values were then systematically eliminated one at a time from the model. The *p* value to keep a variable in the model was .10, and the *p* value to remove a variable was .15. The procedure was considered complete once there were no more variables that could be removed from the model.

RESULTS

Hypothesis 1: Children With SSD-only and SSD+LI Will Differ From TD Children in Their Narrative Skills

Contrary to our prediction, children in the SSD-only group did not differ significantly from children in the TD group on the narrative measures, including the use of multi-syllabic words in narratives. However, children with SSD+LI differed significantly from both the children with SSD-only and the TD children (Table 5). The children with LI answered fewer of the comprehension questions correctly compared to the two groups of children without LI. Group differences for answers to factual questions $F(2, 59) = 8.68$, $p = 0.0005$, $\eta^2 = 0.23$, and answers to inferential questions $F(2, 59) = 4.76$, $p = 0.0123$, $\eta^2 = 0.14$, were significant. Group differences were also found for measures of story accuracy. The number of correct and irrelevant utterances differed significantly between groups, $F(2, 59) = 3.17$, $p = 0.0496$, $\eta^2 = 0.10$, and $F(2, 59) = 3.25$, $p = 0.0461$, $\eta^2 = 0.10$, respectively, but the number of relevant incorrect utterances did not, $F(2, 59) = 1.63$, $p = 0.2040$, $\eta^2 = 0.05$. Also, the number of content items differed significantly between groups, $F(2, 59) = 3.61$, $p = 0.0333$, $\eta^2 = 0.11$. Regarding story structure, use of story grammars, $F(2, 59) = 3.2$, $p = 0.0481$, $\eta^2 = 0.10$, distinguished the group with LI from the two groups without, but high point analysis did not, $F(2, 59) = 1.28$, $p = 0.2869$, $\eta^2 = 0.04$.

Expressive language measures such as mean length of T-unit, $F(2, 59) = 1.0$, $p = 0.3760$, $\eta^2 = 0.03$, number of T-units, $F(2, 59) = 0.05$, $p = 0.9562$, $\eta^2 = 0.00$, number of words, $F(2, 59) = 0.25$, $p = 0.7795$, $\eta^2 = 0.01$, and number of different words, $F(2, 59) = 1.17$, $p = 0.3185$, $\eta^2 = 0.04$, did not differ significantly between the groups.

The three groups were found to require a similar amount of support from the examiners. The number of examiner cues given did not differ significantly between the groups and therefore is not responsible for group differences on other measures. The number of requests for help did not differ significantly between groups, $F(2, 59) = 0.67$, $p = 0.5165$, $\eta^2 = 0.02$, nor did the fraction of spontaneous utterances, $F(2, 59) = 0.22$, $p = 0.8029$, $\eta^2 = 0.01$. Effect sizes were small to moderate (Cohen, 1973), indicating that each narrative measure makes a small contribution to the difference in the narrative scores among the groups.

Hypothesis 2: Narrative Ability in Early Childhood Will Predict Literacy Outcomes at School Age

To test the second hypothesis, that narrative ability in early childhood would predict literacy at school age, we ran a series of regression analyses on the entire group of children ($n = 40$) who were available for the school-age follow-up. The dependent measures were the Word Identification and Word Attack subtest of the WRMT, the Reading Comprehension subtest of the WIAT, and the composite score of the TOWL. Each model included the three factors (macrostructure, comprehension of the narratives, and microstructure) as the independent variables. Age and sex were maintained in all four models. Results are summarized in Table 6.

The Word Identification subtest of the WRMT–R was predicted by the narrative macrostructure factor ($p = 0.074$), age ($p = 0.031$), and sex ($p = 0.065$). This model explained 22% of the variance of Word Identification. The Word Attack subtest of the WRMT–R was predicted by the narrative microstructure factor ($p < 0.001$). This model explained 14.3% of the variance of Word Attack. The Reading Comprehension subtest of the WIAT was predicted by the narrative macrostructure factor ($p = 0.019$) and age ($p = 0.087$). This model explained 20.6% of the variance of Reading Comprehension. The Spontaneous Writing subtest of the TOWL was predicted by the narrative macrostructure factor ($p < 0.001$) and sex ($p < 0.001$). This model explained 29.6% of the variance of spontaneous writing. It is not surprising that macrostructure plays an important part in later literacy development, nor is it surprising that early narrative skills predict later scores on the spontaneous writing subtest.

DISCUSSION

The goal of this study was to evaluate the impact of SSDs on children’s narrative skills and to determine the role that comorbid LI might play in narrative production. A second goal of the study was to determine if a relationship exists between children's early narrative ability and their later literacy skills.

SSDs and Narrative Abilities

It was hypothesized that SSDs could have a negative effect on children's ability to retell a narrative due to limitations in the children's phonological processing, memory, and speech sound production and their use of compensatory strategies to avoid words and sentences that are difficult to articulate. The results indicated that the children with SSD-only did not differ from the TD children on their narrative performance, including measures of syntactic complexity and use of multisyllabic words. Thus, limitations in children's speech production skills did not appear to adversely affect their narrative skills. Children with SSD-only may not have deficits in working memory and therefore may perform well on a narrative retelling task. Rather, their deficits may be specific to phonological aspects of language. As predicted by the Stackhouse and Wells model (1997), children with SSD-only may have deficits in phonetic discrimination, phonological recognition, and phonological representations but not in semantic or grammatical representations—skills that are more crucial to a narrative retelling task. Alternatively, the story retelling task may not have been challenging enough to elicit subtle differences between the SSD-only group and the controls.

SSD+LI and Narrative Abilities

The children with combined SSD+LI retold weaker narratives than the children without LI. Specifically, the children with LI struggled with story comprehension questions, included fewer concepts essential to the plot, and demonstrated a weaker ability to organize their narratives according to story grammars. In addition, a higher number of their utterances conveyed information that was irrelevant to the story, and fewer of their utterances provided accurate story content. Thus, the poorer narratives of the children with SSD+LI appear to be related to their comprehension of the story, working memory, and organizational skills. These findings are consistent with those of Dodwell and Bavin (2008), who reported that the narratives of 6-year-old children with SLI were impacted by a limited working memory. Surprisingly, the children with SSD+LI performed similarly to the children with SSD-only and the TD children on measures of syntax and semantics. The mean length of T-unit, number of T-units, total number of words, and number of different words did not differ between groups, suggesting that these expressive language skills did not limit the children with SSD+LI in a story retelling task. An alternative explanation may be that the story retelling task had ceiling effects. Children in the typical and SSD-only groups may have been capable of more complex syntax or diverse vocabulary, but it was not observed on this task.

Expressive Language and Narratives

Given the wealth of research that suggests that children with LI tend to demonstrate deficits in syntax and semantics during narrative retelling tasks (Boudreau & Hedberg, 1999; Merritt & Liles, 1987; Paul & Smith, 1993), it is surprising that the current study did not support these findings. A possible explanation for the discrepancies between the findings of this study and other reports on narratives of children with LI could be in the type of narrative task employed. One study found that children with LI were better at producing personal narratives than fictional narratives (McCabe, Bliss, Barra, & Bennett, 2008). Another study reported that the story retelling task was better than a story generation or personal narrative for both TD children and children with reading disability (Westerveld & Gillon, 2010). Studies using a fictional story retelling task have also differed in the support provided for the narrative task, with some studies employing wordless picture books, some employing objects, and some using only the auditory modality. In this study, children were asked to retell a story without any visual aids.

Our findings are similar to those of Merritt and Liles (1987), who employed a story generation task without visual cues. As was observed in the present study, Merritt and Liles found that children with LI used more extraneous information in their story generation task. It is possible that the wordless picture books in some way limited children with LI by providing a prescribed chain of events and structural cues. Story generation and story retelling without picture cues allow children more freedom to tell the story that they want to tell. This freedom could ease restrictions on vocabulary and syntactic structure and result in more extraneous and complex utterances. Although the improved performance of children with LI without visual aids appears contrary to current clinical practices in which visual cues are used to facilitate performance, the narrative task differs from therapy tasks in that it is less structured, and a variety of responses are acceptable rather than a specific target response.

Receptive Versus Expressive Language Deficits

The receptive language deficits of children with LI in the narrative retelling task appear more striking than the expressive language deficits. Deficits in story structure, story comprehension, and accuracy of story content are common findings in the narratives of children with LI (Merritt & Liles, 1987; Paul & Smith, 1993; Wright & Newhoff, 2001). The relative paucity of content items, use of extraneous story information, and difficulty answering comprehension questions point to receptive language weaknesses for this group of children with LI. Extraneous utterances with invented content may suggest that the child did not understand and/or could not remember the story as it was presented. Again, without access to pictures to support their story memory, children's constraints and lack of attention may limit their responses.

A study by Wright and Newhoff (2001) presented the "Fox and Bear Story" along with similar stories to 10-year-old children with and without language learning disabilities and concluded that the group differences could be due to deficits in comprehension, language processing, and short-term memory. In the present study, children with LI struggled with both factual and inferential questions, suggesting short-term phonological memory deficits. If the participant had difficulty with higher language functions but not memory, we would expect the child to have difficulty with inferential questions but not factual questions. That is, difficulty with inferential questions alone would suggest that the child remembered the story but then was not able to draw appropriate conclusions using the details of the story. This was not the case, suggesting a possible phonological memory deficit. Alternatively, a child with LI might have problems accessing the semantics of words and sentences, which could impact his or her performance on both factual and inferential questions.

Phonological memory is a component of working memory that is important for temporarily storing verbal content and is limited in the amount of information it can store (Conti-Ramsden & Durkin, 2007). The child needs to have sufficient access to phonological memory to be able to store the essential verbal elements that allow for accurate relay of story content. The interrelationships between memory, expressive language, and receptive language are complex and have been well documented (Adams & Gathercole, 1995; Conti-Ramsden & Durkin, 2007; Gathercole, Willis, Emslie, & Baddeley, 1992; Smith, Mann, & Shankweiler, 1986). These skills are essential to narrative retelling at early childhood and may also be used later in literacy acquisition at school age.

Narrative Skills and School-Age Literacy

School-age abilities in reading decoding of real words, reading comprehension, and written language were all predicted by the narrative macrostructure factor. Reading decoding of nonsense words was predicted by the narrative microstructure factor.

Reading decoding—Reading decoding was predicted in this study by both narrative macrostructure and microstructure, with real-word reading predicted by the macrostructure factor and nonsense-word reading predicted by the microstructure factor. These findings are consistent with studies of children with reading disorders whose narratives are characterized by the use of simplistic and repetitive syntactic structures, decreased lexical diversity, nonspecific pronoun use, and fewer action units (Feagans & Short, 1984; Levi et al., 1984). Although the narratives of children with SSD+LI did not differ in microstructure from the narratives of children with SSD-only at early childhood, microstructure did predict nonword reading at school age. It is difficult to compare these findings as the regression analysis to predict school-age reading was conducted on the combined groups of children who were followed and did not compare differences across groups, as we did with ANOVAs in early childhood. However, it is interesting to note that nonword reading (i.e., a decoding task supposedly without the influence of semantics or syntax) would be related to microstructure. One possible explanation for this is that nonword decoding, syntax, and semantics rely on phonological memory, as proposed in the Gathercole and Baddeley (1993) model. Deficits in phonological memory may underlie all three domains. Alternatively, more general deficits in linguistic ability, which is a broad cognitive skill, may influence all three domains.

Vocabulary has been related to the decoding of real and nonwords (Feagans & Short, 1984; O'Neill et al., 2004). Feagans and Short (1984) found correlations between the total number of words in a narrative and test scores on the Reading Recognition subtest of the Peabody Individual Achievement Test—Revised (PIAT–R; Markwardt, 1998). Similarly, O'Neill et al. (2004) found that their measure of lexical diversity of narratives predicted later test scores on the Reading Recognition subtest. A weak vocabulary may lead to a smaller reserve of sound and word knowledge, thus leading to increased difficulties with decoding real words.

Reading comprehension—The ability to organize an oral narrative into story grammars may also assist in reading comprehension as it provides a rough map for the reader and allows for some predictability (Nelson, 2010). Organizational knowledge aids readers by allowing them to identify and pull out the relevant information from a story such as the main points and supporting arguments. The relationship between early narratives and later reading comprehension is largely supported in the literature (Feagans & Applebaum, 1986; Griffin et al., 2004; Tabors et al., 2001). However, several studies have not found a relationship (Menyuk et al., 1991; O'Neill et al., 2004). These studies did not use measures of narrative structure or organization. Rather, they assessed comprehension, syntax, and vocabulary of the narratives. Griffin et al. (2004) suggested that the ability to evaluate and elaborate on story content and significant elements in the story may be supportive of reading comprehension. Later reading comprehension is likely supported by early awareness of narrative structure and organization that results in a deeper understanding of story content.

Written language—The specific relationship between early oral narratives and school-age written language abilities has not been widely studied. Griffin et al. (2004) found similar results to ours in their longitudinal study of TD children. They reported that the ability of the 5-year-old children to demonstrate an effective use of macrostructure in the oral narrative tasks predicted school-age written narrative skill at 8 years using a holistic scoring system focused on content and organization. It is not surprising that early narrative skill would predict later scores on the Spontaneous Writing subtest of the TOWL–2 given the relative similarity of the tasks. On the TOWL–2, children were asked to compose a fictional story about a given picture. The children who were successful in their use of story structure and were able to provide accurate information in their oral narratives may have had a better understanding of the organizational components of a story, including the organization of ideas, content accuracy, and appropriate syntax and spelling for clarity.

Clinical Implications

Narratives are an excellent method to assess children at early childhood as they provide information not only on discourse but also on component skills such as semantics, syntax, working memory, and general knowledge base. Narratives may be useful in assessing preliteracy skills in young children as well as in predicting children who may be at risk for later written language problems. Narratives are also a useful tool for identifying deficits in children with LI who are at risk for later academically related language skills. Narratives may assist in the generalization of other therapy goals as they promote functional communication and social interaction and may assist parents in carryover outside the therapy setting. Home programs could include routines where the family reads together so that the children can observe narrative structures in diverse stories. Children and caregivers should be encouraged to discuss and elaborate on the stories they listen to and read.

Based on the results of this study, macrostructure appears to play an especially important role in the development of later literacy skills. Language intervention involving oral narratives may boost children's reading comprehension as well as carry over to later written language skills. Children may be taught organizational components to discourse in their early years. Teachers and therapists may focus on scaffolding discussion of narratives to improve comprehension and interpretation of narrative discourse (Nelson, 2010). Parents and teachers may use organizational tools such as story maps. Construction of oral narratives may aid written discourse by direct instruction on story elements such as setting and consequence.

Limitations—Several limitations of the study should be noted. First, the study did not include children with LI without SSDs. Inclusion of this group in future research would allow investigators to tease out the effects of LI on children's narrative performance. Second, the study did not examine the number of hours a child spent in therapy, the frequency that a family reads together, or other environmental factors that might influence literacy. Finally, fewer TD children were followed than children with disorders. Employing early narratives to predict later literacy skills may differ for TD children than children with known disorders. Future studies might also consider the type of narrative task employed and the use of props such as storybooks to support the narrative.

Summary and Conclusion

In summary, children with combined SSD+LI were found to produce narratives with fewer plot concepts, more irrelevant utterances, and weaker narrative structures than those produced by TD children. They also demonstrated more difficulty with both factual and inferential comprehension questions. The children with SSD-only did not demonstrate any significant differences from the group of TD children, suggesting that an SSD may not have a noticeable influence on a child's ability to retell a narrative.

Performance on the narrative retelling task during the years of emergent literacy was predictive of children's literacy skills at school age. Specifically, measures of story structure and accuracy were the best predictors of reading decoding of real words, reading comprehension, and school-age written language, and measures of syntax and vocabulary diversity were the best predictors of the reading decoding of nonsense words. It is not surprising that macro-structure plays an important part in later literacy development. Moreover, it is not surprising that early narrative skills predict later scores on the spontaneous writing subtest. These results support the use of a narrative retelling task to assist in identifying children who may be at risk of later academically related language problems.

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Table 1

Demographic characteristics of study participants at initial testing: typically developing (TD) children, children with speech sound disorders (SSD-only), and children with combined SSDs and language impairment (SSD+LI).

Variable	*TD* (n = *20)*	*SSD-only* (n = *20)*	*SSD+LI* (n = *20)*
Age (years) mean (*SD*)	5.15 (.98)	5.17 (.98)	5.19 (.76)
Male *n* (%)	8 (40)	9 (45)	10 (50)
Female *n* (%)	12 (60)	11 (55)	10 (50)
Family's Hollingshead SES *n* (%)			
1 (lowest)	0	0	1 (5)
2	3 (15)	0	0
3	2 (10)	3 (15)	4 (20)
4	4 (20)	11 (55)	9 (45)
5 (highest)	10 (50)	5 (25)	6 (30)
Unreported	1 (5)	1 (5)	0
Mean (*SD*)	4.11 (1.15)	4.11 (.66)	3.95 (1.0)
Performance IQ mean (*SD*)[a]	106.20 (12.44)	108.15 (11.39)	96.35 (11.78)
Standard language score mean (*SD*)[b]	113.20 (14.23)	110.50 (10.04)	87.00 (13.30)

Note. SES = socioeconomic status.

[a]The children's performance IQ differed significantly: $F(2, 59) = 5.67$, $p = .006$. Results of the Tukey post hoc analysis indicated that the SSD+LI group differed from both the TD group ($p = .030$) and the SSD-only group ($p = .007$).

[b]The children's standard language score differed significantly: $F(2, 33) = 14.18$, $p \leq .001$). Results of the Tukey post hoc analysis indicated that the SSD+LI group differed significantly from both the TD group and the SSD-only group ($p < .001$).

Table 2

Speech sound measures for the TD, SSD-only, and SSD+LI groups.

	TD		SSD-only		SSD+LI				
	M	**SD**	**M**	**SD**	**M**	**SD**	**F**	**p**	**η^2**
GFTA percentile rank[a,b]	62.95	25.11	35.70	26.74	22.40	26.09	12.65	<.0001	0.31
PCC[a]	92.23	3.88	86.09	6.56	89.51	7.64	4.42	.0172	0.15
KLPA percentile[a,b]	63.15	23.67	30.90	29.59	19.10	23.65	15.64	<.0001	0.35

Note. GFTA = Goldman-Fristoe Test of Articulation (Goldman & Fristoe, 1986), PCC = percentage of consonants correct, and KLPA = Khan-Lewis Phonological Analysis (Khan & Lewis, 1986).

[a]SSD-only group differs from the TD group.

[b]SSD+LI group differs from the TD group.

Table 3

Group comparisons of the percentage of individuals in each group employing a phonological process.

Phonological process	*TD*	*SSD-only*	*SSD+LI*	χ^2
Deletion of final consonants	30%	60%	89%	21.7*
Syllable reduction	35%	45%	75%	17.0*
Stopping of fricatives and affricates	50%	70%	68%	13.6
Cluster simplification	65%	75%	89%	17.6*
Liquid simplification	50%	85%	84%	12.4
Velar fronting	25%	65%	68%	16.1*
Palatal fronting	30%	55%	53%	5.3
Deaffrication	10%	15%	21%	3.2
Initial voicing	5%	35%	42%	8.1
Final devoicing	0	20%	32%	7.9
Consonant harmony	30%	65%	84%	24.7*
Stridency deletion	45%	70%	84%	7.0
Deletion of initial consonants	5%	10%	12%	2.8
Glottal replacement	0	5%	13%	2.7
Backing to velars	0	0	0	-

* $p < .05$.

Table 4

Factor loadings of early narrative measures in the three-factor solution.

	Factor		
Measure (variable name)	**Macrostructure**	**Comprehension**	**Microstructure**
Story grammars	**0.88**	−0.52	−0.69
High point	**0.76**	−0.13	−0.48
Content items	**0.90**	−0.53	−0.70
Correct utterances	**0.94**	−0.48	−0.50
Factual questions	0.36	**−0.68**	−0.22
Inferential questions	0.19	**−0.64**	−0.08
Irrelevant utterances	−0.20	**0.64**	0.09
Mean length of T-unit	0.54	−0.18	**−0.95**
Number of different words	0.76	−0.16	**−0.87**

Note. Variables with loadings with an absolute value >.6 were considered the primary contributors for each factor indicated in boldface.

Table 5

Group comparisons: Mean and *SD* scores.

Measures	TD		SSD-only		SSD+LI				
	M	SD	M	SD	M	SD	F	p *value*	η^2
Story structure									
Story grammars	42.90	23.28	40.65	25.05	25.95	20.46	3.2	0.048*	0.10
High point	4.75	1.77	4.70	1.90	3.85	2.30	1.28	0.287	0.04
Comprehension questions									
Factual questions[a,b]	76.50	32.75	73.25	27.91	39.80	31.63	8.68	0.001*	0.23
Inferential questions[a,b]	51.60	38.23	51.50	33.28	23.15	28.67	4.76	0.012*	0.14
Linguistic complexity									
Number of T-units	9.00	3.01	8.75	3.92	8.65	4.37	0.05	0.956	0.00
Mean length of T-unit	5.41	2.53	5.08	2.0	4.46	1.95	1.0	0.376	0.03
Number of words	50.90	29.42	51.95	30.23	45.5	33.06	0.25	0.780	0.01
Number of different words	29.05	12.97	30.80	14.09	24.4	13.99	1.17	0.319	0.04
Articulatory complexity									
2-syllable words	6.60	4.26	5.70	3.92	5.65	4.75	0.31	0.738	0.01
3-syllable words	0.50	0.89	0.55	1.43	0.70	1.42	0.13	0.874	0.00
Examiner support									
Move forward cues	1.5	1.43	1.85	1.98	1.45	1.39	0.36	0.699	0.01
Affirming cues	4.8	4.36	5.35	4.31	4.60	3.57	0.18	0.836	0.01
Leading cues	3.8	2.63	3.75	3.29	3.75	2.84	0.0	0.998	0.00
Information cues	0.30	0.57	0.40	0.82	0.50	0.69	0.41	0.668	0.01
Number of cues	11.40	10.57	11.4	7.08	10.30	7.12	0.11	0.893	0.00
Requests for help	1.25	1.02	1.45	1.4	1.00	1.26	0.67	0.517	0.02
Fraction spontaneous	0.56	0.34	0.58	0.39	0.63	0.32	0.22	0.803	0.01
Content accuracy									
Content items	30.95	20.73	30.55	18.74	17.35	14.64	3.61	0.033*	0.11
Correct utterances[b]	6.35	3.48	7.15	3.68	4.40	3.50	3.17	0.050*	0.10
Relevant, incorrect utterances	0.65	0.93	0.40	0.68	1.00	1.41	1.63	0.204	0.05

Measures	TD		SSD-only		SSD+LI		F	p value	η^2
	M	SD	M	SD	M	SD			
Irrelevant utterances	0.15	0.37	0.05	0.22	1.05	2.33	3.25	0.046*	0.10

[a]The control group differs from the SSD+LI group.

[b]The SSD-only group differs from the SSD+LI group.

*$p < .05$.

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Table 6

Regression model: Measures associated with school-age literacy outcomes.

	Outcome							
	WRMT–R: Word Identification* (n = *40) $R^2 = .220$				***WRMT–R: Word Attack* (n = *39)*** $R^2 = .143$			
Measures	**β**	**SE B**	**F**	**p *value***	**β**	**SE B**	**F**	**p *value***
Age	−4.99	2.23	5.02	0.031	−3.01	2.04	2.31	0.137
Sex	9.37	4.92	3.63	0.065	2.96	4.49	0.43	0.514
Factor								
Macrostructure	1.59	0.86	3.39	0.739	—	—	—	—
Microstructure	—	—	—	—	3.11	1.52	4.17	0.049
	*WIAT: Reading Comprehension (*n *= 40)* $R^2 = .206$				*TOWL–2: Spontaneous Writing (*n *= 37)* $R^2 = .296$			
Age	−3.67	2.08	3.10	0.087	−2.72	2.32	1.37	0.250
Sex	5.15	4.61	1.25	0.271	17.22	5.29	10.6	0.003
Factor								
Macrostructure	1.99	0.81	6.04	0.019	1.66	0.96	2.98	0.094

Note. WRMT–R = Woodcock Reading Mastery Test—Revised (Woodcock, 1987), WIAT = Wechsler Individual Achievement Test (Wechsler, 1992), and TOWL–2 = Test of Written Language—2.

APPENDIX A

NARRATIVE AND STORY GRAMMARS

Fox and Bear Story	
Setting	1. Once upon a time there was a fox and a bear, who were friends.
Initiating event	2. One night they were hungry
Plan	3. and decided to catch a chicken for supper.
Setting Element	4. They ran to a nearby farm where there was a chicken house.
Internal response	5. The bear was worried that the farmer would come
Attempt	6. so he climbed on the roof to watch.
Attempt	7. The fox opened the door very quietly, went inside and grabbed a chicken.
	8. He started to carry the chicken out
Internal response	9. but then he heard a big noise.
Consequence	10. The roof cracked open and the bear fell on top of him.
Consequence	11. The chickens all woke up and got away.
Internal response	12. The farmer heard the chickens squawking
Consequence	13. came out and caught the fox and the bear.
Reaction	14. They were real mad and still hungry.

Note. From “An Analysis of Story Comprehension in Elementary School Children” by N. Stein and C. Glenn, 1979, in R. Freedle (Ed.), *New Directions in Discourse Processing* (Vol. 2, p. 82). Norwood, NJ: Ablex. Copyright 1979 by Ablex (Elsevier). Adapted with permission.

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APPENDIX B

(P. 1 OF 2). COMPREHENSION QUESTIONS

Scoring

Correct

Incorrect – Wrong Answer
Responded by saying, "I don't know."
No response

Factually incorrect responses are of course wrong.

Factual Questions

1. Who wanted to catch a chicken?

The bear and/or fox are the only correct answers. Any addition (e.g., the bear and the chicken) makes the answer incorrect.

Correct	Incorrect
the bear and the fox	the farmer
the bear	all of those animals
the fox	both of them

2. Where did the fox and bear go?

The answer must indicate they went somewhere where they could find a chicken.

Correct	Incorrect
to catch a chicken	on the roof
to the chicken house	to the cave
to a farm	to the forest
in the chicken house	the farmer's house
to see the chickens	
in the barn	

3. Why did the bear get on the roof?

Correct answers must indicate concern about the situation on the bear's part.

Correct	Incorrect
he was afraid of what would happen	he was scared of the fox
he was worried or scared	to catch a chicken
to watch out for the farmer	he watch the fox
to watch	because he always was hungry
so the fox wouldn't get in trouble	in case the farmer caught them
to hide from the farmer	

Inferential Questions

1. What were the chickens doing at first?

Because the story indicates that they later woke up, the only correct answer is that they were asleep.

Correct	Incorrect
sleeping	getting away
	they waked up
	they were working a long time
	they were hiding
	lying down

2. What woke the chickens up?

The answer must indicate a disruption.	
Correct	Incorrect
the bear falling on the fox	the bear
the roof breaking	the fox
all the noise	the farmer
the bear falling down	the fox and the bear
	the roof
3. Why did the roof break?	
The answer must refer to the bear being on the roof and/or the bear being too heavy.	
Correct	Incorrect
the bear was too heavy	the bear
he’s so heavy	because it breaked by itself
the bear was on the roof	because the chickens were pressing hard on the roof

APPENDIX C

DEFINITION OF CONTENT ITEMS

1	Fox and Bear – name two animals and use them consistently throughout the story.
2	friends – state some concept of friendship.
3	hungry – state some concept of hunger or needing food.
4	catch a chicken – some representation for catching (getting/finding) and chicken, or any animal that lives on a farm, as long as they are consistent throughout the story.
5	eat chicken – anything that deals with eating the animal that they have caught.
6	farm – representation of farm (i.e., barn).
7	chicken house – chicken house/coop. If the child discusses the chicken house/coop, he or she will be given credit for concept of farm, even if he or she does not say farm.
8	bear worried – one or both friends are worried. Some concept of worried such as afraid, concerned, orscared.
9	about farmer coming – along with the concept of worried, they need to explain why they are worried, such as, the farmer coming or the farmer finding them.
10	climb on the roof – concept of getting up on top of something, a roof or ceiling. In addition, the child needs to state why the animal is on the roof to watch.
11	fox opens the door – needs to have the other animal (the one not on the roof) opening the door.
12	goes inside – the animal going into the chicken house.
13	gets chicken – the animal taking, grabbing, or getting the chicken.
14	started to carry it out – needs to have the idea that the animal is carrying and taking the chicken with him.
15	heard noise – concept of hearing something.
16	roof cracked open – concept of the ceiling or the roof breaking or cracking above the animal carrying the chicken. Can omit the roof or ceiling if the child had previously specified that the bear is on the roof and falls in.
17	bear fell in – the animal that is on the roof falls into the chicken house.
18	chickens woke up – the chickens wake up. They are no longer asleep.
19	get away – the chickens get away.
20	Farmer heard – a farmer or some person heard a noise.
21	noise from the chicken house – that there is a noise coming from the chicken house.
22	came out – the farmer goes out to the chicken house.
23	caught the bear and the fox – the farmer caught the two animals. It is acceptable if the child only states that the farmer caught one animal.
24	fox and the bear are mad – the two animals are mad, angry, etc.
25	and still hungry – the two animals are still hungry.

APPENDIX D

CHILD UTTERANCE CODES

Help Requests/Dont Know [help]

Request for help

-what?

-This is gonna be hard

Don’t know

-I don’t know it

-um…

-E can’t remember? C uhuh

Won’t Do

-I don’t want to

Correct Utterances [C]

Spontaneous [S]:

Relevant/correct/spontaneous utterance

Child spontaneously corrects him/herself to make accurate

-C and the fox and bear went in [RelInc][S].

-C I mean the fox went in [C][S].

Responses to move forward type questions (“what else?”)

Responsive [R]:

Correct response to specific question

-E who was the story about? C fox and bear.

Correct response to lead

-E there was~ C a bear and a fox

-E Once upon a time~ C there was…

Relevant, but Incorrect Utterances [RelInc]

Spontaneous [S]:

Relevant/spontaneous utterances that are not correct. Example: refers to a wolf (similar to a fox), says that the fox heard a crack in the door (instead of the roof)

Responses to move forward type questions that are relevant but not correct.

-E And then what happened? C they ran home

Responsive [R]:

Relevant, but incorrect response

-E Did someone go in the barn? C the wolf.

Irrelevant Utterances [I]

Spontaneous [S]:

Spontaneous and irrelevant utterances

-there was a big big monster

Spontaneous, irrelevant, and incomplete

-apple

Spontaneous and based on a different story

-a bad wolf and a little piggy

Responsive [R]:

Irrelevant and incorrect response

-E What were they trying to catch? C a fly.

Irrelevant and incorrect response to lead

-E once upon a time there was a~ C cow.

Response based on a different story

Miscellaneous [M]

Spontaneous [S]:

Relevant/spontaneous content, but incomplete (not coded as correct because there is not enough information)

-and the farmer>

Spontaneous formal ending

-happily ever

-the end

Responsive [R]:

Incomplete, relevant response (not coded as correct because there is not enough information)

-E then what did he do? C the roof >

Not coded Spontaneous or Responsive:

Child repeats his/her own information

Imitation of adult

Repeat information when asked

Sound effect

-boom!

Yes/No to questions about story

-uhuh (no)

-uhhuh (yes)

-right

Incorrect Y/N response

Finished with Task

-I can’t think of anything else in the story

-E is that the end? C I think so

-uh that was the end.

Unintelligible (Cannot understand meaning well enough to code)

Unsuccessful utterance attempt (no content)

-and and and and and and>

-and the>

Comment not related to task

-wait, I’m going to move my hair for a minute

-I like that story

APPENDIX E

EXAMINER CUES

Move Forward Cues
Move Forward Statement Prompt
-go ahead
-tell me about…(repeated information)
Move Forward Question Prompt (provided after child gives some information)
-and then what?
-and what else?
Request to Tell Story
-can you tell me the story back?
-do you know what the story was about?
Affirming Cues
Approval
-very good
-exactly
-Any words of encouragement (see you're remembering the story!)
Repeat or Paraphrase Child
Vocalization
-MHM
-UHHUH
Leading Cues
Leading
-there was…
-right on top of his…
Story Starter
-once upon a time…
Specific Question
-what happened to the fox and the bear?
-what did they do?
-where did they go
Information Cues
Question Prompt with Information
-were they really hungry?
Give Information
Comments Not Coded
Deny Request for Help
Ask if Finished
-can you remember anything else?
Question Why Don't Know/Want to Answer
-you forgot?
Question What Child Has Said

-there was a cow?
Comments to Focus Child on Task (used to reduce distractions)
-remember, don’t touch
-we weren’t reading, we were listening
Other Miscellaneous Comments

Notes

If the same prompt is given twice in a row, such that the child could not have responded to the first prompt, only count it once. For example: And then what? What else?

Do not include examiner comments not intended to elicit the narrative from the child. For example, if an examiner concludes the story by saying “ok” or “very good” these should not be coded.

Do not code initial instructions to tell the story back. For example: Now it is your turn to tell the story.

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