The Production of Finite and Nonfinite Complement Clauses by Children With Specific Language Impairment and Their Typically Developing Peers

The purpose of this study was to explore whether 13 children with specific language impairment (SLI; ages 5;1–8;0 [years;months]) were as proficient as typically developing age- and vocabulary-matched children in the production of finite and nonfinite complement clauses. Preschool children with SLI have marked difficulties with verb-related morphology. However, very little is known about these children’s language abilities beyond the preschool years. In Experiment 1, simple finite and nonfinite complement clauses (e.g., The count decided that Ernie should eat the cookies; Cookie Monster decided to eat the cookies) were elicited from the children through puppet show enactments. In Experiment 2, finite and nonfinite complement clauses that required an additional argument (e.g., Ernie told Elmo that Oscar picked up the box; Ernie told Elmo to pick up the box) were elicited from the children. All 3 groups of children were more accurate in their use of nonfinite complement clauses than finite complement clauses, but the children with SLI were less proficient than both comparison groups. The SLI group was more likely than the typically developing groups to omit finiteness markers, the nonfinite particle to, arguments in finite complement clauses, and the optional complementizer that. Utterance-length restrictions were ruled out as a factor in the observed differences. The authors conclude that current theories of SLI need to be extended or altered to account for these results.

KEY WORDS: specific language impairment, complement clause, complex syntax, finiteness, language disorder

For over 40 years (see Menyuk, 1964), grammatical deficits have been described as a major symptom of specific language impairment (SLI) in children. However, over the course of that period, the great majority of research devoted to these deficits has been concerned with the grammatical details of simple sentences. There are good reasons for this emphasis. Grammatical deficits are conspicuous at this level, often involving omissions of function words and grammatical inflections. Furthermore, problems at this level are usually seen in younger children with SLI and, thus, represent a potential means of early identification of SLI.

However, it is likely that, for many children with SLI, grammatical deficits persist and are still present when these children begin to produce complex sentences. In the present study, we examine later
syntactic abilities of children with SLI by focusing on one general class of complex sentences, those that involve complementation.

**The Grammar of Complementation**

According to Limber’s (1973) definition, a complex sentence is “any sentence with more than one verb... auxiliaries and possessives are perhaps arbitrarily excluded” (p. 171). Limber, then, was referring to sentences with two or more lexical (nonauxiliary) verbs, each of which usually resides in its own clause. These include sentences that contain elements such as adjunct clauses, relative clauses, and complement clauses. Complement clauses play a unique role in the sentence because, unlike adjunct and relative clauses, the complement clause serves as an argument of the lexical verb in the main clause. Because the complement clause serves as an argument of the main verb, its properties are chosen in part by the selection properties of that verb.

First, we review the role of argument structure, followed by the properties that are unique to each complement clause type. Only those elements most pertinent to this study are discussed here.

**Verb Argument Selection**

The role of argument structure and the selection properties of the main verb are more transparent in simple sentences. Individual lexical verbs select different numbers of arguments and may require that those arguments have distinct properties (e.g., animacy). Some verbs possess a range of argument structures, whereas other verbs have a very restricted set of argument structures available to them. Although this is in part tied to the semantic properties of the action, it is also tied to the verb itself. For example, eat and devour are two verbs with similar meanings. Eat can be used as an intransitive verb with one argument (Ernie ate) or as a transitive verb with two arguments (Ernie ate the sandwich). In contrast, devour is always transitive, requiring both a subject and an object (*Ernie devoured; Ernie devoured the sandwich). A few verbs are ditransitive and take three obligatory arguments, such as give or put (Ernie gave Elmo the sandwich; Ernie put the sandwich on the table). Information about how many and what type of arguments a verb takes is generally considered to be stored with the verb in the lexicon. Nevertheless, this information works together with the syntax. Argument structure dictates what syntactic frame will be used and how the verb will interact with other elements in the sentence (Bock & Levelt, 1994).

For certain verbs, complement clauses may serve as one of the required arguments. The verbs that commonly take complement clauses as an argument can be generally classified as mental state verbs, verbs of desire, and verbs of communication. The complement-taking verb occurs in the main clause and may also be called the matrix verb. The matrix verb must be marked for finiteness and places certain restrictions on the types of complement clauses that it takes. One major restriction of the matrix verb has to do with the marking of finiteness (tense and agreement) within the complement clause. A common example is to contrast the verbs think, want, hope, and wonder. Some verbs, such as think, only allow complement clauses that are marked as finite (e.g., Ernie thought that Elmo ate a sandwich). Other verbs, such as want, only allow nonfinite complement clauses (e.g., Ernie wanted Ernie to eat the sandwich). A few verbs, such as hope, permit both types of clauses (e.g., Ernie hoped to eat a sandwich; Ernie hoped that Elmo ate the sandwich). Finally, some verbs, such as wonder, allow either finite or nonfinite complements but require that a conditional or question word be used to introduce the complement (e.g., Ernie wondered if he should eat the sandwich; Ernie wondered what to eat). These forms that require a question word are often termed wh-complements and introduce an additional set of variables related to the role and form of the wh-word. For this reason, wh-complement clauses were excluded from this study.

Another major selection property of complement-taking verbs has to do with the total number of arguments that they require. Verbs such as say only take two obligatory arguments, the subject and the complement clause (Ernie said that the sandwich tasted good; *Ernie said Elmo that the sandwich tasted good), whereas verbs such as tell require three (Ernie told Elmo that the sandwich tasted good; *Ernie told Elmo that the sandwich tasted good). In general, mental verbs and verbs of desire require two arguments and verbs of communication require three, although these do not pattern together perfectly, as seen in the example above.

**Nonfinite Complement Clauses**

In nonfinite complement clauses, the lexical verb in the complement clause is not marked for finiteness. Nonfinite complements may be marked for nonfiniteness through the use of the nonfinite particle to (e.g., Ernie forgot to wear a hat), or the verb in the complement clause may appear in its bare or participial form, depending on the main verb and the meaning being conveyed (e.g., Ernie made Elmo wear a hat; Ernie saw Elmo wearing a hat, respectively). The nonfinite complements in the present study were all introduced by the nonfinite particle to.

The subject of a nonfinite complement clause is generally unspoken and is frequently indicated in notation by PRO. For example, in the sentence, Ernie, tried PRO,
to eat an apple, Ernie is the one eating the apple. The referent for PRO should be available within the sentence or the discourse environment. For the purposes of notation, coindexation (the subscript i on Ernie and PRO) identifies the referent of PRO. PRO can refer to the subject of the matrix clause, to the object of the matrix clause, or to something only available within the discourse (e.g., The waiter, promised the patron PRO, to bring the food; The teacher told the class, PRO, to start the test; The mother said PRO, to play outside). The possible referents of PRO are another aspect of the complement clause that is closely tied to the main verb. It is most common for PRO to refer to the subject of the main clause when the verb takes two arguments (as with try) and to the object of the main clause when the verb takes three arguments (with verbs such as tell), but this mapping is by no means reliable (consider say and promise as counterexamples). As children learn the selection properties of each verb, they must also learn what the possible referents of PRO are in order to use the verbs appropriately. See Eisenberg (1989) and Eisenberg and Cairns (1994) for a more complete discussion of the properties of nonfinite complement clauses. To simplify problems of reference, all items in the present study took the nearest prior noun phrase as the referent for PRO.

Finite Complement Clauses

In a finite complement clause, the lexical verb must be marked for finiteness. In addition to marking tense and agreement information that is appropriate for the complement clause, the tense, aspect, and modality of the verb in the complement clause are also restricted by the properties of the main verb. Thus, a sentence such as, Ernie decided that Elmo should eat a sandwich, is generally more felicitous than #Ernie decided that Elmo eats a sandwich given that the latter requires an extremely unusual context to be an acceptable sentence (for a fuller description of this topic, see Hornstein, 1990). Finite sentential complement clauses may be introduced by the complementizer that, although they are equally grammatical if that is omitted. There are several varieties of finite complements, including complements introduced by wh-words (e.g., Ernie decided what Elmo should eat) and conditionals (e.g., Elmo wondered if the sandwich would taste good), but only complements potentially introduced by that were included in this study.

Sentences that contain finite complement clauses must have two overtly expressed grammatical subjects, one in the main clause and one in the complement clause. When a noun phrase is used as the subject of a finite complement clause, there is no confusion about coreference. However, when pronouns are used, questions of coreference between elements also occur in finite complement clauses. When a pronoun is used for the subject of the complement clause, it may refer to the subject or object of the main clause or to something within the discourse (e.g., Big Bird, remembered that he brushed his teeth; Ernie, told Elmo, that he picked up the box). Unlike PRO, the referent of a pronoun subject of the complement clause is not a property of the main verb but is entirely determined by the discourse.

Summary

The matrix verb is the heart of the sentence, and its lexical properties drive the selection of the other elements within the sentence, including whether a complement clause is present. The matrix verb also plays a role in the type of complement clause selected. It interacts with the lexical verb in the complement clause to influence the way that finiteness is marked within the complement clause and to determine issues of coreference between elements in the main and complement clauses. These are details that must be acquired at some point by English-speaking children in order for them to produce grammatical utterances.

The Acquisition of Complement Clauses

Typically developing children begin producing nonfinite complement clauses between the ages of 2 and 3 years, followed shortly after by finite complement clauses (Bloom, Rispoli, Gartner, & Haftiz, 1989; Diessel, 2004). Initially, children may use catenatives or reduced forms, such as wanna, gonna, or hafta, to introduce nonfinite complements. At that point, it is not clear if the child is actually using a nonfinite complement clause or if the reduced form is instead functioning as a semi-auxiliary and the child is actually producing one-clause utterances (Limber, 1973). Gradually, children begin to use the more adult phonological form, to, and use nonfinite complements with a wider variety of matrix verbs (Bloom, Tackeff, & Lahey, 1984). Five-year-old children do not yet fully use all of the available variations in nonfinite complement clauses with all possible verbs (Eisenberg & Cairns, 1994), and comprehension errors have been documented as late as age 9 for low-frequency matrix verbs that require less common complement clause types (Chomsky, 1969). However, by age 5, typically developing children are reasonably productive with these forms, with productivity defined either as the ability to use more than one nonfinite complement clause type with a single verb or as the use of a single, nonfinite complement clause with multiple verbs (Eisenberg & Cairns, 1994).

Finite complements are acquired somewhat later than nonfinite complements (Diessel, 2004), and, just as with nonfinite complements, children may not actually be producing utterances that consist of two clauses when they first appear to use finite complement clauses.
Diessel and Tomasello (2001) presented a detailed analysis of children’s spontaneous speech that suggested that children first use the matrix clause in a highly formulaic fashion as a discourse marker attached to the complement clause. Only later do children provide evidence that they understand that the sentence actually contains two propositions and that they can use the matrix clause flexibly with a variety of person and tense markers. Although this transition from formulaic use to full use is hypothesized to occur in a verb-specific manner, the data suggest that most typically developing children have achieved this flexibility around age 4 (Diessel & Tomasello, 2001). Imitation studies have corroborated this sequence of complementation development in typically developing children. Children move from only imitating the complement clause at approximately 3;7 (year;month), to imitating both clauses but omitting the complementizer at a mean age of 4;9, to imitating both clauses and including the complementizer around age 5;0 (Phinney, 1981).

The Use of Complement Clauses and Related Structures by Children With SLI

Children with SLI appear to be using a variety of nonfinite complements with a limited range of verbs in spontaneous language samples verbs by age 5 (Eisenberg, 2003). These children also appear to use finite complement clauses in spontaneous language but at slightly older ages than typically developing children. For example, a group of children with SLI between ages 5 and 7 were reported to use finite complement clauses in spontaneous speech at rates that were comparable with younger, typically developing children matched according to mean length of utterance (MLU; Schuele & Wisman Weil, 2004). Similarly, in a longitudinal case study of a child with SLI, the first finite complement clause was documented at age 3;9, with use becoming more common around age 5;9 (Schuele & Dykes, 2005). Of course, demonstrating that children are using complement clauses in spontaneous language does not allow us to say that children have mastered these complicated structures. There are several areas related to the production of sentences that must be mastered, and each of these areas has potential to be difficult for children with SLI. Some of these elements are common to other structures and have been well studied, whereas other elements are unique to sentences with complement clauses, and the abilities of children with SLI with these elements are less well documented.

Argument Structure

The appropriate selection of arguments is one area of overlap between simple sentences and sentences with complements. Preschool-aged children with SLI have been shown to omit more obligatory arguments than typically developing control children, particularly with ditransitive verbs. These differences have been found using both spontaneous language samples and in an elicitation paradigm (Grela, 2003; Grela & Leonard, 1997). School-aged children with SLI were also shown to be more likely to omit obligatory arguments, to realize fewer optional arguments (Ingham, Fletcher, Schelletter, & Sinka, 1998; Johnston & Kamhi, 1984; King, 1996), to use less diverse argument structure (Thordardottir & Ellis Weismer, 2002), and to use fewer or less sophisticated alternations in argument structure for a single verb (King, Schelletter, Sinka, Fletcher, & Ingham, 1995; Loeb, Pye, Richardson, & Redmond, 1998; Thordardottir & Ellis Weismer, 2002) than typically developing comparison groups, even when other contributing factors such as age, verb vocabulary size, or utterance length were controlled.

Studies examining these children’s productivity with the argument structure of nonfinite complement clauses showed mixed results. In spontaneous language samples, preschool-aged children with SLI produced few nonfinite complements and demonstrated limited productivity compared with their typically developing peers (Eisenberg, 2003). However, in an elicitation paradigm, these same children showed relatively strong productivity with a variety of types of nonfinite complements and appeared primarily to be limited by those complements that require a noun phrase between the complement-taking verb and the nonfinite complement clause (Eisenberg, 2004). In both studies, difficulties were limited to a subset of children with SLI, rather than the entire group.

Functional Morphemes

The use of finite verb morphology is another area of overlap between simple sentences and sentences with complements. English-speaking children with SLI have clearly documented difficulties with the use of finite verb morphology in both spontaneous speech and in elicited situations (Leonard, 1989; Leonard, Eyer, Bedore, & Grela, 1997; Rice & Wexler, 1996; Rice, Wexler, & Hershberger, 1998). Although these difficulties resolve around the end of the preschool years (Scarborough & Dobrich, 1990), certain difficulties, such as the use of the past tense, persist well into elementary school in spoken and written language (Fletcher & Peters, 1984; Windsor, Scott, & Street, 2000). There is little dispute that these deficits exist, and it is highly likely that they would be an area of difficulty within complement clauses, as well as within the more well-studied main clause.

An area of investigation related to verb morphology that is unique to complement clauses is the use of the nonfinite particle *to*. In fact, previous research has
suggested that children with SLI begin to use the nonfinite particle to at later ages and use it at lower rates than do typically developing children (Leonard, 1995; Leonard et al., 1997; Schuele & Dykes, 2005; Schuele & Wisman Weil, 2004). These difficulties have been reported in children as old as age 7;10, the latest time point studied in the case study by Schuele and Dykes. Studies of spontaneous language have reported a heavy reliance on catenatives by children with SLI at age 5, well beyond the age when typical children have demonstrated that they can use nonfinite complements appropriately (Eisenberg, 2004; Johnston & Kamhi, 1984; Schuele & Dykes, 2005; Schuele & Wisman Weil, 2004). However, additional work may be needed because other studies have found no differences between preschool children with SLI and their typically developing peers in their provision of the nonfinite particle to, using both elicitation and observational paradigms (Eisenberg, 2003, 2004).

The complementizer that is a functional morpheme that optionally introduces finite complement clauses. The data are very limited with regard to the use of that as a complementizer introducing sentential complements by children with SLI. Because that is optional and finite complement clauses are relatively infrequent, it is difficult to examine the use of complementizers in spontaneous language samples. Leonard (1995) found low rates of use of overt complementizers and indirect questions by both typically developing children and children with SLI in spontaneous language samples. Schuele and Dykes (2005) reported no cases of optional complementizer use within their longitudinal case study of a single child with SLI and omission of the only obligatory complementizer that was required in the sample, if. They also reported a low rate of use of finite complement clauses, which may limit the ability to find differences. Johnston and Kamhi (1984) included that in their composite measure of grammatical morpheme use but did not discuss its use separate from the other morphemes included in the composite.

Predictions of Current Accounts of SLI

A variety of accounts have been put forth that address the difficulties seen by preschool children with SLI in the area of grammatical morphology. Accounts can be generally divided according to general cognitive accounts and linguistic-based accounts. One type of general cognitive account would be an information-processing account (e.g., Hoffman & Gillam, 2004; Miller, Kail, Leonard, & Tomblin, 2001; Montgomery & Leonard, 1998), which hypothesizes that children with SLI have particular difficulty with the processing load associated with language (or with processing in general). Diminished processing abilities lead to difficulty with learning and storing the grammatical elements and/or with accessing and producing grammatical elements during fluent speech. In particular, these accounts predict increased difficulty as the information that must be dealt with increases (Deevy & Leonard, 2004; Grela & Leonard, 2000). In these kinds of accounts, the amount of information to be processed is the crucial factor; when processing load is excessive, errors might be seen in a variety of areas. In the context of the present study, the demands of complementation might lead children with SLI to have greater difficulty than their typical peers in the number of arguments they include in their responses, the consistency that they show in maintaining appropriate tense from one clause to the next, and the omission of function words such as to and that.

Another cognitively based account is the surface (RDDR) hypothesis (Van der Lely, 1994, 1998; Van der Lely & Battell, 2003) is another linguistically motivated account that is predicated on difficulties with long-distance dependencies and relies heavily on movement as an explanation for the difficulties shown by children with SLI. This account provides a basis for expecting difficulties with tense-related details of the verb, because the account uses a linguistic framework that assumes...
movement of grammatical features for checking. Unlike some of the other accounts, the RDDR account attempts to explain grammatical problems that go well beyond those of verb morphology, such as problems in the use of wh-questions and passive sentences. However, some of the potential problems in the use of complementation clauses are not predicted to be difficult by this account. In particular, the elements required by the verb are generated in situ, as are the forms to and that. Because these elements are unrelated to movement, they should not reveal differences between children with SLI and their typically developing peers.

The functional category deficit account (Leonard, 1995) suggests that children with SLI have difficulty using those elements that are found in functional projections. Functional categories are involved when children must produce finite verb forms in complement clauses. In addition, to is generated in a functional category. Likewise, that occupies a (different) functional category. In contrast, arguments occupy lexical categories and are not expected to be affected by this type of deficit. On the basis of the proposals of Leonard (1995), functional projections are not absent from the grammar of children with SLI. However, these projections appear inconsistently. Leonard’s proposal assumes that all functional categories have the same status; thus, differences between children with SLI children and their typically developing peers should be of approximately the same magnitude regardless of the functional category involved.

Summary

Complement clauses provide researchers with an area of grammar that has the potential to inform current theories of SLI and that has not yet been well explored. The characteristics of complement clauses provide a unique testing ground for exploring current theories of SLI. Thus, the use of to and that provide the opportunity to contrast both the functional category deficit hypothesis and the surface account with the RDDR account. By exploring whether tense problems are seen in complement clauses, we can determine whether the EOI account is likely to apply to later stages of grammatical development, when children produce multiclause utterances. An increased overall error rate in conjunction with an increased number of arguments could support an information-processing account, whereas difficulty with the selection properties associated with each matrix verb would put the focus on poor lexical representations. The available data suggest that all of these areas are potential areas of weakness for children with SLI and warrant additional investigation. To explore the area of complement clause production in children with SLI, we examined the ability of these children to produce finite and nonfinite complement clauses with seven matrix verbs through an elicitation paradigm. Four of the matrix verbs were mental verbs that only took the subject and the complement clause as an argument, whereas three of the matrix verbs were verbs of communication and required an additional argument in order to be grammatical.

Overall Method

Participants

Three groups of children participated in this study: a group of 13 children with SLI, a group of 13 typically developing children matched according to age, and a group of 13 younger, typically developing children matched according to expressive vocabulary abilities. The use of complement clauses may be attributed in part to lexical knowledge because children must learn the range of complement clauses available to each verb. Thus, a younger, typically developing group matched according to vocabulary abilities was included for comparison. The Expressive Vocabulary Test (EVT; Williams, 1997) was used to match children on the basis of expressive vocabulary skills. The EVT is a commercially available, norm-referenced expressive measure that assesses vocabulary knowledge by asking children to provide labels and synonyms for a variety of words, including nouns, verbs, and adjectives (e.g., Another word for hopping is jumping). An age-matched group was included to validate the experiments. Because the matrix verbs allow alternations between finite and nonfinite complements, it was important to verify that typically developing children of a similar age to the children with SLI would respond appropriately to the elicitation scenarios.

Although it is common to include a group matched according to MLU in studies such as these, the validity of MLU beyond 5.0 morphemes or 5 years of age has been questioned (Klee & Fitzgerald, 1985; Wells, 1985). Most of the children participating in this study were older than 5 years, and all had to be producing at least some utterances longer than 5.0 morphemes. Thus, a younger, MLU-matched group was not included.

All children met the conventional criteria for participation in a study on SLI. Each child passed a hearing screening at 25 dB (HL) for each ear at 500, 1000, 2000, and 4000 Hz; demonstrated adequate oral structure and function for speech (Robbins & Klee, 1987); and obtained a standard score above 85 on the Columbia Mental Maturity Scales (CMMS; Burgemeister, Blum, & Lorge, 1972). According to parent report, no child had a history of frank neurological impairment or a previous diagnosis of autism or pervasive developmental disorder. For all participants, the mean length of the five longest utterances (MLU5) in a representative
language sample was equal to or greater than 9 words. This criterion was included to ensure that long utterances were within the capabilities of all participants because the target structures of interest required the children to produce utterances of up to 9 words in length.

The children in the SLI group scored below the 10th percentile on the Structured Photographic Expressive Language Test, Second Edition (SPEL'T–II; Werner & Kresheck, 1974). The SPEL'T–II was used as the primary selection criterion because of its high sensitivity and specificity in identifying children with SLI (Plante & Vance, 1994). Twelve of the children in the SLI group were receiving speech and language intervention at the time of the study or had a history of speech and language difficulties significant enough to warrant intervention within the previous academic year. The remaining child was home schooled and had not been tested prior to being seen for this study; as a result of his assessment, the family was seeking speech and language intervention. The children with SLI ranged in age from 5;1 to 8;0, with a mean age of 6;1. They had a mean raw EVT score of 54, with a range of 41 to 71. Relevant participant information is summarized in Table 1.

The children within the vocabulary-matched group ranged in age from 4;0 to 4;11, with a mean age of 4;7. They all demonstrated typical language abilities as documented by a score above the 16th percentile on the SPEL'T–II. Each child was matched within 5 raw score points of a child with SLI on the EVT. The vocabulary-matched group (VOC) had a mean EVT raw score of 52.9, with a range of 39 to 70. When these children’s vocabulary scores were compared with those of the children with SLI, we obtained a low effect size (\( d = 0.12 \)), or an overlap in the distributions of more than 85.3%, as described in Cohen (1988).

Each age-matched child was within 3 months of age of 1 of the children with SLI. They ranged in age from 5;1 to 7;10, with a mean age of 6;2. When these children’s ages were compared with those of the children with SLI, we obtained a low effect size (\( d = 0.12 \)), or an overlap in the distributions of more than 85.3% (Cohen, 1988).

### Procedure

We used two experiments to consider the children’s ability to produce the complement clause in four types of sentences. The first experiment addressed children’s production of simple finite and nonfinite complement clauses (Ernie knew to wear a hat; Ernie knew that Elmo wore a hat). The items in the second experiment required an additional argument prior to the finite or nonfinite complement clause (Ernie reminded Elmo to wear a hat; Ernie reminded Elmo that Big Bird wore a hat).

An elicitation task was used to examine children’s production of these sentence complements. After watching a scenario, which provided a particular pragmatic situation, children were asked to complete the sentence by supplying an appropriate complement clause. In both experiments, the matrix verbs chosen allowed for the appropriate types of finite and nonfinite complement clauses. Thus, the scenarios that the children observed were designed to increase the likelihood that the children would attempt the particular complement clause being targeted at that time. This allowed us to measure children’s ability to produce grammatically accurate responses for both types of sentence complements while controlling the matrix verbs used to elicit the complement clauses.

### Experiment 1: Finite and Nonfinite Complement Clauses

In the first experiment, the production of simple finite and nonfinite complement clauses was compared. Two sample sentences with complement clauses are illustrated below:

1. Nonfinite example: Big Bird knew to feed the dog.
2. Finite examples: Big Bird knew that Elmo fed the dog or Big Bird knew Elmo fed the dog.

Four verbs were chosen for Experiment 1: decide, forget, know, and remember. The matrix verbs that were chosen were capable of being used with both finite and nonfinite complement clauses. They were all mental verbs (Levin, 1993) that occurred with medium–high frequency (Francis & Kučera, 1982). All four matrix verbs were listed in at least one grammatical form as a word used spontaneously by first-grade children (Moe, Hopkins, & Rush, 1982).

Eight sentences were constructed for each of the 4 verbs within the 2 types of complement clauses, resulting in a total of 64 items. Where possible, the same
lexical verbs were used in the complement clauses across both complement clause types for a given matrix verb (e.g., decide/eat: The count decided that Ernie should eat the cookies; Cookie Monster decided to eat the cookies).

Each set of sentences for a given type of complement clause was elicited in a single list of 32 items to increase the likelihood that a child would use each clause type. Within each of the lists, sentences were presented in a pseudorandom order, such that no 2 items using the same matrix verb were presented together. The order of presentation of the lists was counterbalanced across children, and each list was administered on a different day.

All sentences were elicited using brief enactments. For each item, the child watched a scenario acted out with small toys and puppets that created an appropriate pragmatic situation for that particular item. Efforts were made to ensure that the scenarios for each item were most likely to elicit the intended complement clause type. Semantic differences between finite and nonfinite complements were capitalized on, with the elicitation scenarios for finite complements emphasizing the factive nature of the target sentence and the nonfinite complements focusing on a sense of obligation or future action by the participants. Syntactic differences were also used. For example, scenarios for items with a finite complement clause as a target were constructed so that the subject of the matrix clause and the subject of the complement clause were clearly different characters, because this obligates a finite complement. Nonfinite complement clause target items depicted the subject of the matrix clause and the subject of the complement clause as coreferential.

As much information as possible was built into each scenario. The matrix verb and the lexical verb for the complement clause were each used at least once by the experimenter during the scenario. These verbs were used in sentences that differed in construction from the target complement clause. At the end of the scenario, one experimenter asked a question designed to focus the child on the particular elements within the sketch that were important. Then a second experimenter assisted the child in answering. For example, to elicit the sentence, The count decided that Cat should eat the cookies, the following scenario was enacted:

Cat: I want to eat something. I can’t decide. What should I eat? Count, help me decide. [Cat is looking at a cupcake and some cookies.]

The Count: I’ll decide. You should eat the cookies.

Experiment 1: What did the count decide?

Experiment 2: The count decided to...

Child target: …(that) Cat should eat the cookies.

It can be seen from the example that the final question to prompt the child to respond and the phrase beginning the elicited sentence provided the subject and verb for the matrix clause (The Count decided...). The intention of the item was to determine how the child would complete the sentence, rather than to determine whether the child could provide the matrix verb. The items and characters used in acting out the scenario were left in sight of the child to serve as memory aids while the child formulated a response. All of the matrix verbs occurred in the past tense with third-person singular subjects, so that the full meaning of the matrix verb was required, rather than allowing an alternative interpretation as an adverbial or discourse marker.

**Experiment 2: Finite and Nonfinite Complement Clauses Plus a Phrasal Object**

Experiment 2 differed from Experiment 1 in that it focused on finite and nonfinite complement clauses that included an additional argument. The two complement clause types included were as follows:

1. Nonfinite + argument: Ernie told Elmo to pick up the box.
2. Finite + argument: Ernie told Elmo that Oscar picked up the box.

Three verbs were chosen as matrix verbs for the complement clauses elicited by this experiment: advise, remind, and tell. All three verbs are verbs of communication (Levin, 1993). Tell is a high-frequency verb, according to Francis and Kučera (1982), whereas remind and advise are low-frequency verbs. Two of these verbs, remind and tell, are verbs reported as being used spontaneously by first-grade children (Moe et al., 1982). An advantage of using verbs of communication is that these verbs permitted us to assess the children’s ability with both finite and nonfinite complement clauses that included an additional argument. Mental verbs such as those used in Experiment 1 did not offer this possibility (e.g., *Ernie decided Elmo to …*).

For each of the three matrix verbs and two complement clause combinations, 8 sentences were constructed, resulting in 48 sentences. Attempts were made to use the same complement verbs in combination with each matrix verb to make the items as comparable as possible.

All sentences of a given complement clause type were administered in a single list of 24 items to increase the likelihood that a child would use the target type of complement clause. Within each list, sentences were presented in a pseudorandom order, such that no 2 items using the same matrix verb were presented together. The order of presentation of the lists was counterbalanced, and each list was presented on a different day.

The elicitation methods for this experiment were similar to those of Experiment 1; the differences...
between the two experiments are highlighted here. Three characters, rather than two, were used to elicit the finite complement clauses, to make the finite complement obligatory. In the nonfinite complements, the subject of the complement clause was always coreferential with the phrasal object in the matrix clause to make the use of the nonfinite complement more likely. In this experiment, the matrix verb was not used in the scripts, because it could not be used grammatically without the phrasal object or a complement clause. For similar reasons, at the end of each scenario, the experimenter simply began the sentence for the child to complete, rather than prompting with a question.

A sample elicitation scenario for the target sentence, *Monkey told Butterfly that Rabbit picked up a desk*, illustrates these changes:

**Experiment 1:** Monkey is watching. [Rabbit enters, picks up desk, and retreats to off-stage area. Butterfly enters near Monkey and the desk.]

**Monkey:** Guess what Butterfly? You know how Rabbit isn’t very strong? Yesterday I saw Rabbit pick up a desk!

**Experiment 2:** Monkey told...

**Child target:** ...Butterfly (that) Rabbit picked up a desk.

The items and characters used in acting out the scenario were left in sight of the child to serve as memory aids while the child formulated a response. The experimenter could indicate the character who initially carried out the action (e.g., Rabbit) by lifting or moving the character if the child seemed to have trouble recalling all the elements for the production of the sentence. Because *advise* was not used spontaneously by first-grade children (Moe et al., 1982), there were some concerns that it was a less familiar word. To avoid any confusion about the meaning of the scenario, the noun *advice* was incorporated into each attempt to elicit a complement clause associated with *advise*. As in Experiment 1, all of the matrix clauses occurred in third-person, past-tense contexts. Although the verbs in the matrix clauses were all verbs of communication and, thus, were less likely to be misconstrued as a discourse marker, this seemed like an appropriate safeguard against possible adverbial or discourse marker interpretations of the matrix clause. Elicitation scenarios for *tell* in the nonfinite complement clauses were modeled after scripts created by Eisenberg (1989).

**Transcription and Scoring**

All responses were audio-recorded and transcribed by an experimenter who had been present during data collection. Children’s responses were initially categorized as attempting one of the target complement clauses for the experiment or attempting alternative sentence frames. Following this classification, the responses that qualified as attempts at one of the target complement clauses (scorable responses) were scored for grammatical accuracy.

**Global Analyses**

Classification of items was completed by two experimenters from typed transcripts. These two experimenters were undergraduate speech pathology students who had grown up in Indiana and had actively participated in the data collection process. A third experimenter, the first author, resolved any disagreements between the first two experimenters. For each item, experimenters were asked to judge whether children were attempting to produce the target utterance. For grammatically correct forms, this task was straightforward. However, grammatically incorrect forms were more difficult to classify. For these cases, experimenters were asked to judge which type of sentence was being attempted by assuming the fewest possible changes required to make the utterance grammatical. A hierarchy of cues was developed to resolve differences with regard to whether the target complement clause was being attempted. These cues are listed in the Appendix and were applied in the order listed. For example, if a child produced an utterance such as, *Ernie knew to wear a hat*, the utterance would be classified as an attempt at a nonfinite complement clause because the nonfinite particle *to* was used, as listed for Level 1. If for some reason the criteria listed for Level 1 were indeterminate, the criteria listed for Level 2 would be applied and so forth. Irrelevant responses and unclear items were classified as unscorable and excluded from all analyses.

Items classified as an alternative response (e.g., a *wh*-complement clause, as in *Ernie knew how to build a bookshelf*, or a *for-to* construction, as in, *Ernie decided for Elmo to wear a hat*, or *Ernie advised Mom for Elmo to brush his teeth*) were also excluded from all future analyses, even though they may have been accurate descriptions of the scenario presented. The decision to exclude alternative responses was made in part because these alternative responses substantively altered the target under examination. For example, by responding with a *wh*-complement, children could potentially choose the wrong *wh*-word or fill the gap left by the *wh*-word, in addition to other potential errors that were being scored more directly. There was also substantial disagreement within the laboratory and even among the experimenters who scored the protocols about which verbs allowed *for-to* responses as grammatical adultlike productions, leading us to exclude those responses in the analyses of grammatical accuracy.
Experimenter were also asked to judge whether each attempt was grammatical. All items that were judged as attempts at one of the two complement clauses being elicited by the experiment were considered for these analyses, even if the target utterance was the opposing sentence frame. For example, if a child produced the finite complement clause, Ernie knew that he should wear a hat, for the nonfinite target Ernie knew to wear a hat, the sentence would be judged a grammatically accurate finite complement clause. Experimenter were stringent in judging grammatical accuracy, so any errors occurring up to the verb in the complement clause could cause a complement clause to be judged inaccurate for the overall grammaticality scoring. These included substituting an object pronoun for a subject pronoun (Ernie knew him wore a hat), omitting or adding arguments, failing to include the nonfinite particle to, and incorrectly marking tense in the complement clause (Ernie knew that he wear/wears/ wear a hat). The one exception to this was strictly lexical errors, such as using a different verb (substituting walking for running) or renaming the characters (calling Madeline, the girl). Results were recorded as the percentage of grammatically correct productions out of the total number of scorable responses for that complement clause type, to accommodate the differences among the children in the number of attempts at each target complement clause.

Error Analyses

A fine-grained analysis was also completed for certain aspects of each sentence type. These analyses included the number of arguments included before the verb in the complement clause, the use of bare verbs (without a modal) in the complement clause, the percentage of correct use of the nonfinite particle to, and the rate of use of the optional complementizer that. Each of these is discussed in turn.

Argument use. In Experiment 1, a single noun phrase was required to head the finite complement clause (e.g., Ernie decided that Elmo should wear a hat). A subject pronoun (he), proper noun (Elmo), or determiner plus common noun (the guy) could correctly begin the complement clause. In the nonfinite complement clause in Experiment 1, nothing overt (PRO) should head the complement clause (e.g., Ernie decided PRO to wear a hat). Use of any sort of noun phrase constituted an error. The primary distinction between Experiment 1 and Experiment 2 was that the items in Experiment 2 required children to include an additional argument before supplying the complement clause. Thus the finite complement clauses required two arguments prior to the verb in the complement clause (Ernie reminded Big Bird that Elmo wore a hat) to be grammatical, and the nonfinite complement clauses required one argument (Ernie reminded Big Bird to wear a hat). The number of arguments that children used before the verb in the complement clause were counted (thus, a hat would not be considered in the examples above), and the groups were compared on whether they included the correct number of arguments for each type of complement clause.

Use of functional morphemes. In the finite complement clause items in both Experiments 1 and 2, a past-tense verb or a lexical verb plus a modal was required to produce a grammatical utterance (e.g., Ernie knew that Elmo wore a hat; Ernie decided that Elmo should wear a hat). Responses were scored according to whether children marked finiteness in some way (i.e., correct simple past –ed, correct irregular past, over-regularized past, use of a modal, use of present tense –s) or used a bare verb. The groups were compared on the number of bare verbs used out of the total number of scorable finite responses for each child.

In the nonfinite condition in both Experiments 1 and 2, children were required to use the nonfinite particle to before the verb to produce a grammatically accurate utterance (e.g., Ernie knew to wear a hat; Ernie reminded Elmo to wear a hat). Responses were scored in three ways: counting only the full phonological form as correct, counting both the full and the reduced phonological forms, such as [schwa], as correct, and counting the reduced phonological form as unscorable. Groups were compared on these three methods of scoring use of the nonfinite particle to.

Finally, the three groups were compared on the rate of use of the optional complementizer that. Use of that did not affect the scoring of the overall analysis of grammaticality because it is an optional structure, but it seemed to be a productive avenue to explore because it is a structure that is relevant to hypotheses relating to the use of functional categories.

Reliability

A second experimenter who had not been present at the experimental session transcribed all experimental items for 3 children from each group (approximately 23% of the children). This experimenter was a master’s-level speech pathology student who had experience in transcription within the laboratory over the previous 2 years and was familiar with many of the children who participated in this project but had not participated in collecting this data set. Reliability was calculated for those elements that would have affected the scoring. If the two experimenters differed on an element that would have affected scoring, the entire item was counted as a disagreement. Disagreements included hearing schwa for to, considering an item to have an
inflection that made the clause sound like a quotation when the other experimenter considered it to be a complement clause, and disagreeing on when a child revised a sentence and when a child produced an error. In Experiment 1, reliability was 96% for the nonfinite condition and 94% for the finite condition. In Experiment 2, reliability was 90% for the nonfinite condition and 89% for the finite condition.

Results

Production of the Target Complement Clauses

We first examined the data to determine if all three groups of children were equally likely to attempt the particular structures being elicited. To do this, we used a 3 (diagnostic group) × 2 (target complement clause type) × 4 (verb type) mixed-model analysis of variance (ANOVA), with group serving as a between-subjects variable and complement clause type and verb type serving as within-subject variables. In Experiment 1, there were main effects for group, \( F(2, 36) = 4.34, p = .02, f = 0.51 \), and verb type, \( F(3, 108) = 18.24, p < .0001, f = 0.30 \). Children with SLI were less likely to produce either target structure than their typically developing, age-matched peers (\( p = .006 \)) but were comparable with the vocabulary-matched group (\( p = .18 \)). The vocabulary-matched group and the age-matched group did not differ from each other. If children did not produce the complement structure being elicited (e.g., nonfinite complements), overwhelmingly, they produced the opposing structure (e.g., finite complements). Table 2 provides information about what percentage of responses to the elicitation scenarios were finite and nonfinite complement clauses for each group for Experiment 1.

The main effect for verb type is best interpreted in the context of an interaction between verb type and complement clause type, \( F(3, 108) = 23.00, p < .0001, f = 0.30 \). For the verbs forget and remember, children were much more likely to produce a finite response in a finite context than a nonfinite response in a nonfinite context (\( ps < .0001 \)). Conversely, children were much less likely to produce a finite response in a finite context for decide than they were for all other verbs (\( ps < .0007 \)). There was no main effect for target complement clause type, although there was a trend toward producing more finite complements than nonfinite complements for all the verbs except decide. Importantly there were no interactions involving group; thus, the same pattern held for all the verb and complement clause type combinations across groups, with the only differences being in the overall degree of use.

A similar analysis was completed for Experiment 2, using a 3 (diagnostic group) × 2 (target complement clause type) × 3 (verb type) mixed-model ANOVA. No differences were found among the groups, \( F(2, 36) = 0.709, p = .49, f = 0.26 \). Once again, there was a main effect for verb type, \( F(2, 72) = 18.86, p < .0001, f = 0.47 \), and an interaction between verb type and target complement clause type, \( F(2, 72) = 11.82, p < .0001, f = 0.26 \). Children were more likely to produce finite responses for tell and remind in the finite elicitation scenarios than they were to produce any other verb type–complement clause type combination (\( ps < .002 \)). Again, there was a nonsignificant trend toward producing more target responses in the elicitation scenarios for finite complement clauses. Table 3 provides information about the

Table 2. Group means (standard deviations) of percentage of finite and nonfinite response types out of all responses that could be classified for each type of elicitation scenario in Experiment 1.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Nonfinite responses</th>
<th>Finite responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUI</td>
<td>13</td>
<td>64.91 (32.70)</td>
<td>30.88 (35.44)</td>
</tr>
<tr>
<td>Voc.</td>
<td>13</td>
<td>63.70 (41.84)</td>
<td>28.13 (36.71)</td>
</tr>
<tr>
<td>Age</td>
<td>13</td>
<td>74.52 (37.52)</td>
<td>23.56 (35.35)</td>
</tr>
</tbody>
</table>

Table 3. Group means (standard deviations) of percentage of finite and nonfinite response types out of all responses that could be classified for each type of elicitation scenario in Experiment 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Nonfinite responses</th>
<th>Finite responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>SUI</td>
<td>13</td>
<td>56.68 (37.16)</td>
<td>22.45 (31.49)</td>
</tr>
<tr>
<td>Voc.</td>
<td>13</td>
<td>49.97 (38.75)</td>
<td>33.99 (41.62)</td>
</tr>
<tr>
<td>Age</td>
<td>13</td>
<td>60.76 (46.17)</td>
<td>30.56 (43.31)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>71.83 (22.26)</td>
<td>19.16 (20.48)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>64.45 (30.36)</td>
<td>17.38 (26.96)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>75.77 (25.17)</td>
<td>10.08 (9.65)</td>
</tr>
</tbody>
</table>
percentage of finite and nonfinite responses produced in Experiment 2 for each type of elicitation scenario.

Some children in each group also produced other relevant responses that did not conform to either the finite or the nonfinite complement clause types under examination here. Some of these alternative responses were grammatical, and others were not. Common responses included simple noun phrases (e.g., Piglet decided battle-ship), use of for–to type constructions (e.g., Tigger decided for Joe to eat the cookies), quotation-style responses (e.g., Ernie told ‘you should wear a coat or you’ll get cold’), and finite or nonfinite responses beginning with a wh-word (e.g., Magenta knew how to fold her clothes). These alternative responses were not frequent enough overall for statistical analysis but did occur for all groups of children. In Experiment 1, approximately 7% of the responses from the children with SLI, 8% of the responses from the vocabulary-matched children, and 3% of the responses from the age-matched children were counted as alternative responses. These alternative responses were spread across four categories of responses (noun phrase only, for–to responses, wh-complements, other responses). In Experiment 2, the rate of alternative responses was 20%, 19%, and 16%, for the SLI, vocabulary-matched, and age-matched groups, respectively. These responses were spread across the categories of for–to responses, double complementizer use, quotation-style responses, and other responses. A few response types occurred with particularly high frequency for certain children, and some seemed to occur particularly often for certain matrix verb–elicitation scenario combinations (e.g., the for–to construction in place of a finite target for decide).

**Grammatical Proficiency**

We address grammatical proficiency first in overall terms (finite vs. nonfinite complement clauses) and then through error analyses for each experiment. Each child had to produce at least six responses per clause type under consideration to be included in a comparison. All attempts to produce a finite complement clause type for a particular verb were included as finite responses to maximize the number of scorable responses. That is, if a child said, Ernie knew that he wore a hat, for the target, Ernie knew to wear a hat, this was counted as a scorable finite response. Similarly, all attempts to produce a nonfinite complement clause for a particular verb were considered nonfinite responses, even when this response was semantically inappropriate. For example, if Ernie decided to wear the blue hat was produced for the target, Ernie decided that Elmo should wear the blue hat, the production was counted as a scorable nonfinite response. The rate of correct responses as a function of elicitation scenario was visually inspected in comparison to the rate of correct responses collapsed across elicitation scenarios. The type of elicitation scenario did not appear to change the overall rate of correct responses with regards to the grammatical aspects under consideration. Including all possible responses maximized the number of children that were included in the overall comparisons. Because the number of scorable responses varied across children, all summary data are reported in terms of percentages. All percentages were arcsine transformed prior to being entered into the ANOVAs. We used Fisher’s least significant difference comparisons for all post hoc tests.

Groups remained well matched even when participants were excluded for failing to produce enough scorable responses. For Experiment 1, 2 children from each group were excluded from the overall grammatical analyses for failing to produce enough scorable responses in at least one condition. Comparing the remaining vocabulary-matched group and the SLI group on raw EVT scores, we obtained a small effect size of $d = 0.091$, or an overlap in the distributions of more than 92.3% (Cohen, 1988). When the remaining agematched group and the SLI group were compared by age, the effect size remained low, at $d = 0.016$, or an overlap in the distributions of more than 92.3%. All children who remained in the overall comparison produced at least one scorable response for each complement clause type, with a majority of the verb types (three out of four) used as matrix verbs in the experiment.

In Experiment 2, 5 children from each of the vocabulary-matched and age-matched groups and 3 children from the SLI group were excluded for failure to produce enough scorable responses in at least one condition. The remaining vocabulary-matched and SLI group comparisons for raw EVT scores yielded a low effect size of $d = 0.197$ and a distribution overlap of more than 85.3%. The remaining age-matched and SLI group comparison by age produced a small effect size of $d = 0.068$, or an overlap in distributions of approximately 92.3%. All children who remained in the overall comparison produced at least one scorable response for each complement clause type, with a majority of the verb types (two out of three) used as matrix verbs in the experiment.

To qualify as a participant in this study, each child had to be capable of producing sufficiently long utterances to attempt the targets. Nevertheless, it was possible that the children’s MLU influenced these results. The children with SLI had shorter MLUs than either of the two comparison groups; therefore, they might have been more likely to omit elements of a sentence because of utterance-length restrictions. For all comparisons, MLU was considered as a covariate. If MLU was found to be a factor, it was included in the analyses reported; otherwise, it was not incorporated into the results.
Experiment 1

In Experiment 1, we considered children’s ability to produce grammatically accurate finite and nonfinite complement clauses with the verbs know, decide, forget, and remember.

Grammatical production of target structures. A 3 (diagnostic group) × 2 (complement clause) mixed-model ANOVA, with diagnostic group as the between-subjects factor and complement clause as the within-subject factor, was used to consider these children’s ability to complete the target sentence grammatically. MLU was considered as a covariate and found not to be a factor, F(1, 28) = 0.072, p = .790; therefore, MLU was not included as a component of these analyses. There were main effects for diagnostic group, F(2, 30) = 26.18, p < .0001, and for complement clause, F(1, 30) = 13.64, p < .001. As can be seen in Table 4, overall, the children with SLI were less likely to produce grammatical responses (M = 48.58, SD = 34.27) than their vocabulary-matched peers (M = 84.81, SD = 14.33; p < .0001), who were in turn less likely to produce a grammatical response than the age-matched group (M = 95.23, SD = 6.72; p = .03), regardless of the complement clause being used. All groups of children were more likely to produce a grammatical response when they used nonfinite complement clauses (M = 79.70, SD = 32.81) than when they used finite complement clauses (M = 72.72, SD = 25.64). There were no Complement Clause × Diagnostic Group interactions.

Although we found no interactions, an inspection of the means and standard deviations found in Table 4 suggests that differences according to complementation type may have been greater for the two typically developing groups. This was confirmed through computation of effect sizes for each group using d (Cohen, 1988). For the age-matched and vocabulary-matched groups, the complementation type differences showed large effect sizes of 1.20 and 0.948, respectively. For the SLI group, in contrast, only a small effect size of 0.157 was seen.

Factors contributing to incorrect responses. Several areas of the sentence were considered as potential contributors to the production of incorrect responses. Each of the analyses below was conducted as a one-way ANOVA with group as the between-subjects factor. Again, at least six scorable productions were required for the complement clause type under consideration to be included in an analysis. MLU was explored as a covariate for each analysis and found not to be a significant factor. Accordingly, all analyses are reported without using MLU as a covariate.

With regard to argument use, all three groups were highly accurate. As can be seen in Table 5, children included the appropriate number of arguments in the great majority of cases.

Children with SLI were more likely to use a verb that was not marked for finiteness (a bare verb without a modal) than both typically developing groups, F(2, 35) = 10.77, p = .0002, f = 0.62 (SLI–vocabulary-matched groups, p = .001; SLI–age-matched groups, p < .0001). The age- and vocabulary-matched groups did not differ from each other with regard to use of a bare verb (p = .41). The pattern of verb forms used in the responses by each group is shown in Figure 1.

### Table 4. Group means (standard deviations) of percentage of grammatically correct complement clauses for Experiments 1 and 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Experiment 1</th>
<th></th>
<th>Experiment 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonfinite</td>
<td>Finite</td>
<td>Overall</td>
<td>Nonfinite</td>
</tr>
<tr>
<td>SLI</td>
<td>11</td>
<td>49.25 (40.08)</td>
<td>47.91 (29.30)</td>
<td>48.58 (34.27)</td>
</tr>
<tr>
<td>Voc.</td>
<td>11</td>
<td>91.05 (16.55)</td>
<td>78.59 (8.47)</td>
<td>84.81 (14.33)</td>
</tr>
<tr>
<td>Age</td>
<td>11</td>
<td>98.80 (1.67)</td>
<td>91.67 (8.00)</td>
<td>95.23 (6.72)</td>
</tr>
<tr>
<td>All</td>
<td>33</td>
<td>79.70 (32.81)</td>
<td>72.72 (25.64)</td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Group means (standard deviations) of the percentage of items that included the correct number of arguments (Arg.) before the verb in the complement clause in Experiments 1 and 2.

<table>
<thead>
<tr>
<th>Group</th>
<th>Experiment 1</th>
<th></th>
<th>Experiment 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nonfinite (0 Arg.)</td>
<td>n</td>
<td>Finite (1 Arg.)</td>
<td>n</td>
</tr>
<tr>
<td>SLI</td>
<td>12</td>
<td>98.78 (3.05)</td>
<td>12</td>
<td>97.60 (3.26)</td>
</tr>
<tr>
<td>Voc.</td>
<td>11</td>
<td>98.86 (2.64)</td>
<td>11</td>
<td>99.59 (1.49)</td>
</tr>
<tr>
<td>Age</td>
<td>11</td>
<td>99.70 (1.09)</td>
<td>11</td>
<td>100.00 (0.00)</td>
</tr>
</tbody>
</table>
Children with SLI were less likely than both typically developing age- and vocabulary-matched peers to include the nonfinite particle to (SLI–vocabulary-matched groups, $p = .008$; SLI–age-matched groups, $p = .002$). The age- and vocabulary-matched groups did not differ from each other ($p = .527$; see Table 6). This effect held regardless of whether the use of filler syllables was counted as correct, $F(2, 31) = 6.67, p = .004$, $f = 0.54$; unscorable, $F(2, 31) = 7.66, p = .002$, $f = 0.62$; or incorrect, $F(2, 31) = 11.54, p = .0002$, $f = 0.64$.

With regard to the use of the optional complementizer that, a main effect for group was found, $F(2, 35) = 19.55, p < .0001$, $f = 0.69$. Children with SLI were less likely than vocabulary-matched controls ($p < .0002$), who were in turn less likely than the age-matched controls ($p = .048$), to include that in the finite items (see Table 6).

**Experiment 2**

Experiment 2 explored children’s proficiency with verbs that require different complement clauses than those in Experiment 1. These verbs, advise, remind, and tell, require an additional argument prior to the finite or nonfinite complement clause. The analyses are highly similar to those presented above.

**Grammatical production of target structures.** A 3 (diagnostic group) × 2 (complement clause) mixed-model ANOVA, with diagnostic group as the between-subjects factor and complement clause as the within-subject factor, was used to consider the children’s ability to complete the target sentence grammatically. MLU was considered as a covariate affecting the likelihood that children would produce grammatically correct responses and was not found to be significant, $F(1, 21) = 0.00006, p = .994$. Accordingly, MLU was not included as a factor in this analysis.

There were main effects for diagnostic group, $F(2, 23) = 24.51, p < .0001, f = 3.38$, and for complement clause, $F(1, 23) = 5.08, p = .034$. Overall, the children with SLI ($M = 36.85, SD = 36.18$) were less likely to produce grammatical responses than their vocabulary-matched peers ($M = 80.62, SD = 22.38, p = .0002$), who were less likely to produce a grammatical response than the age-matched group ($M = 97.27, SD = 6.03$; age–vocabulary-matched groups, $p = .03$; age-matched–SLI groups, $p < .0001$). All groups of children were more likely to produce a grammatical response when they used nonfinite complement clauses ($M = 74.47, SD = 36.46$) than when they used finite complement clauses ($M = 63.35, SD = 36.72$; see Table 4).

Again, although there were no interaction effects, an inspection of the means and standard deviations found in Table 4 suggests that the two typically developing groups may have shown larger differences in use of complement clause types than the children with SLI. The complementation type differences showed large effect sizes of 1.07 for the age-matched group and 0.785 for the vocabulary-matched group, but for the SLI group, only a small effect size of 0.211 was seen.

**Factors contributing to incorrect responses.** Although each child should have been capable of producing sufficiently long utterances to respond accurately to the target items, certain components of the responses, such as optional that, may have been more vulnerable to utterance-length restrictions. In this experiment, MLU proved to be a significant factor for certain analyses. Specifically, MLU played a role in the use of the optional

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>To use</th>
<th>n</th>
<th>That use</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLI</td>
<td>12</td>
<td>69.10</td>
<td>12</td>
<td>30.31</td>
</tr>
<tr>
<td>Voc.</td>
<td>11</td>
<td>97.87</td>
<td>11</td>
<td>2.13</td>
</tr>
<tr>
<td>Age</td>
<td>11</td>
<td>100.00</td>
<td>11</td>
<td>0.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Experiment</th>
<th>Group</th>
<th>To use</th>
<th>n</th>
<th>That use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>SLI</td>
<td>76.73</td>
<td>13</td>
<td>35.70</td>
</tr>
<tr>
<td></td>
<td>Voc.</td>
<td>97.62</td>
<td>12</td>
<td>66.03</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td>100.00</td>
<td>12</td>
<td>96.36</td>
</tr>
</tbody>
</table>
complementizer that, $F(1, 34) = 12.22, p = .001$, and the use of the correct number of arguments in the finite condition, $F(1, 33) = 4.47, p = .042$. However, MLU was not a significant factor in the use of the nonfinite particle to, $F(1, 23) = 0.52, p = .476$; the use of the correct number of arguments in the nonfinite condition, $F(1, 25) = 1.15, p = .295$; or the use of a bare verb in the finite condition, $F(1, 33) = 0.45, p = .506$. For those comparisons where MLU was a factor, the results reported reflect the use of MLU as a covariate.

**Argument use.** The groups were compared for each complement clause by their ability to include the correct number of arguments at the beginning of the complement clause. For the finite complement clauses, there were group differences, $F(2, 33) = 8.60, p = .001, f = 0.50$, even when MLU was included in the analysis as a covariate. The age-matched group was more likely to include the correct number of arguments than the other two groups (both $ps < .04$). However, the vocabulary-matched group and the SLI group did not differ from one another ($p = .238$). Table 5 shows the number of items where the correct number of arguments was used before the verb by children in each group.

For the nonfinite complement clauses, there were also significant differences among the groups, $F(2, 26) = 6.53, p = .005, f = 0.57$, but MLU was not a factor in these results. The children with SLI were less likely to include the correct number of arguments than the age- and vocabulary-matched groups (both $ps < .008$), but the latter two groups did not differ from each other ($p = .777$; see Table 5).

**Use of functional morphemes.** As shown in Figure 2, children with SLI were more likely to use a bare verb than both typically developing age- and vocabulary-matched groups, $F(2, 34) = 15.64, p < .0001, f = 0.71$ (vocabulary-matched–SLI groups, $p < .0001$; age-matched–SLI groups, $p < .0001$). The age- and vocabulary-matched groups did not differ from each other with regard to use of a bare verb ($p = .730$). MLU was not a factor in these results. It is worth noting that all three groups of children occasionally used the present tense in their responses, a response that was not accurate given the elicitation scenarios.

There was a significant effect for group with regard to the rate of correct use of to, $F(2, 24) = 5.09, p = .014, f = 0.54$. Table 6 shows that the children with SLI were significantly less likely than typically developing, age-matched peers ($p = .005$) and slightly less likely than typically developing, vocabulary-matched peers ($p = .055$) to include the nonfinite particle to when only correct productions of to were considered. The age- and vocabulary-matched groups did not differ from each other ($p = .264$). When the use of filler syllables were considered as instances of the nonfinite particle to, the main effect remained, $F(2, 25) = 4.44, p = .022, f = 0.49$, but the difference between the vocabulary-matched controls and the children with SLI disappeared ($p = .119$). The age-matched comparisons were not affected (SLI–age-matched groups, $p = .006$; vocabulary–age-matched groups, $p = .198$). MLU was not a factor in any of these results.

A main effect for group was found for the use of the optional complementizer that, $F(2, 34) = 6.71, p = .004, f = 0.63$, even when MLU was included in the analysis as a covariate. Children with SLI were less likely than vocabulary-matched controls ($p = .020$), who were in turn less likely than age-matched controls ($p = .003$), to include that in finite items (Table 6).

**Comparisons Across Experiments 1 and 2**

Given the nature of Experiments 1 and 2, it is tempting to make direct comparisons across the two experiments as a way to eliminate number of arguments or length of response as confounding variables that biased children toward more difficulty with finite items. Indeed, inspection of the data shown in Table 4 suggests that children were slightly more proficient at the items presented in Experiment 1 than they were for the items presented in Experiment 2. For example, if we compare the performance of the children with SLI by the grammatical production of finite complements, we see that they produced 47.91% correct in Experiment 1 and 32.82% correct in Experiment 2. The trend toward better performance in Experiment 1 seems particularly apparent for the SLI and vocabulary-matched groups.
and less strong for the age-matched control group. This leads us to the hypothesis that length and/or number of arguments in the responses are important factors affecting the accuracy of the children’s responses.

Directly testing the role of length or argument structure against that of finiteness is beyond the scope of this study. If the two experiments simply differed in the number of arguments required by the matrix verbs, this would be a straightforward way to compare the use of finiteness while equating for length. Unfortunately, there are more differences between the two experiments than are apparent at first glance. A variety of related issues would also need to be controlled to make this comparison, including the syntactic role of the argument between the matrix verb and the complement verb, the type of matrix verb used, and the frequency of the matrix verbs. Similar properties would also have to have been controlled for the verbs in the complement clauses. Although these verbs were balanced within each experiment here, no effort was made to provide such a control across experiments. In addition, the elicitation scenarios were not directly comparable across the two experiments. The responses to Experiment 1 were elicited with a question from the first experimenter, plus a lead in from another experimenter. The responses in Experiment 2 were elicited with only a lead in from a second experimenter. Elicitation scenarios that were designed to be comparable would provide a stronger test of this hypothesis.

Discussion

In this study, we examined the ability of children with SLI and their typically developing peers to produce finite and nonfinite complement clauses with particular matrix verbs to determine if the weaknesses exhibited by children with SLI extend beyond verb morphology. We found that, overall, children were more likely to produce finite complement clauses than nonfinite complement clauses, although this was qualified by some verb-specific results. Although children with SLI were less likely to produce the target response overall, there were no differences among the groups with regard to the pattern of finite and nonfinite complement clause production in relation to particular elicitation scenarios or with regard to the pattern of production with individual verbs.

In contrast to the finding that children tended to produce more finite responses, typically developing children were more likely to produce a grammatically correct response when they used a nonfinite complement clause than a finite complement clause. The results for this comparison were less clear for the children with SLI. Interestingly, this asymmetry between the attempts at the target complements and grammatical productions was in direct opposition to what would have been expected according to the scoring criteria. Those productions that contained minimal information (e.g., *Ernie remembered wear a hat) would have been classified as an incorrect attempt at a nonfinite complement clause.

Children with SLI were significantly less likely than their typically developing peers to produce a grammatically correct response regardless of the type of complement clause produced. These difficulties could be attributed to errors in argument structure and verb-related finite and nonfinite morphology. In addition, children with SLI were less likely than both typically developing groups to use the optional complementizer that in their finite responses.

Differences Between Finite and Nonfinite Complement Clauses

Across all three groups and in both experiments, children were more likely to attempt a finite complement clause than a nonfinite complement clause. One potential reason for this is that it is always possible to express the same meaning found in a nonfinite construction through a finite construction (e.g., Ernie, knew PRO, to wear a hat; Ernie, knew that he, should wear a hat), but the converse is not true (e.g., Ernie, knew that Big Bird, should wear a hat; *Ernie, knew PRO, to wear a hat).

Another potential reason that children were more likely to attempt a finite complement clause than a nonfinite complement clause is that some of the meanings associated with the finite complement clause may be more transparent and, thus, more familiar to young children than the meanings associated with the nonfinite complement clause. For example, the nonfinite construction with the verb know, as in Ernie knew to wear a hat, conveys the idea that Ernie was aware that he should be wearing a hat. It carries a sense of responsibility or obligation by virtue of appearing in a nonfinite construction. Other nonfinite constructions do not necessarily carry that meaning and may convey a completely different notion (e.g., Ernie wanted to wear a hat). In contrast, know in the context of a finite construction simply has the sense of knowing a fact (Ernie knew that he wore a hat). Any sense of obligation or responsibility is conveyed overtly in the complement clause by a modal verb (Ernie knew that he should wear a hat). Because the finite production is more syntactically versatile, more transparent, and has the potential to convey a broader range of meanings, it may be more familiar to young children. Indeed, in a study by Diessel (2004), finite constructions were more
common than nonfinite constructions in the spontaneous speech of 5 children between the ages of 1;8 and 5;1, even though the finite constructions were acquired later.

Individual matrix verbs seemed to affect the likelihood of a particular complement clause being produced. For example, decide appeared to be somewhat biased toward a nonfinite complement clause, whereas know, forget, and remember seemed more biased toward finite complements. Such verb-specific results could have been related to whether the sentence could be interpreted as factive, on the basis of interactions between the nature of the matrix verb and the type of predicate chosen. Schulz (2000) used children's interpretation and production of sentences involving forget that, forget to, tell that, and tell to to argue that factivity is a critical element in complement clause acquisition. Schulz suggested that prior to age 3;6, children produce complement clauses associated with nonfactive matrix verbs (think, pretend) and interpret all complement clauses as true. After age 3;7, with the onset of theory of mind, children are able to produce and interpret both factive (I forgot that I paid the hotel bill) and nonfactive (I thought that I paid the hotel bill; I forgot to pay the bill) verbs and complements correctly. Decide that seems to carry a somewhat different semantic connotation than do know that, forget that, and remember that. However, in our study, all the finite sentences had a factive interpretation and all of the children were above age 4;0.

Another possibility is that verb and complement clause frequency may have played a role in these results. An imitation study found that children were more likely to accurately repeat grammatically correct sentences and to correct errors in grammatically incorrect sentences if the complement clause occurred with the matrix verb frequently than if the verb and complement clause occurred together only infrequently (Kidd, Lieven, & Tomasello, 2005). Unfortunately, the verbs considered in that experiment did not include the verb decide, so we cannot make direct comparisons. Additional work will be necessary to determine if such results are unique to that experiment, to the individual verbs, or reflect a larger trend associated with an outside factor such as factivity or frequency.

Information about the type and variety of arguments associated with an individual verb is often considered to be stored in the lexicon, and strong biases might indicate an incomplete lexical entry or weak lexical representations. In our study, children with SLI were somewhat less likely than their age-matched peers in the first experiment to produce the target complement clause in response to each type of elicitation scenario. Examination of their responses suggests that, although the rate of alternative responses was low for all groups (8% or less), the children with SLI, like the vocabulary-matched group, were more likely to rely on alternative responses than the age-matched group. No overall group effects were found with regard to these comparisons for Experiment 2. This may reflect the lower frequency of remind and advise and the lack of familiarity that all three groups of children had with these verbs and the types of complements that available to these verbs. Although there were some verb-specific results, all three groups of children showed similar patterns with regard to individual verb and complement clause type use. In fact, if we consider the basic productivity requirements necessary for inclusion in the overall grammatical analyses (i.e., producing each complement clause at least once with a majority of the verb types elicited for each experiment), equal or higher numbers of children with SLI were included than typically developing children from either group. This suggests that children with SLI were not having difficulties that can be directly tied to the lexicon.

**Overall Grammatical Accuracy**

The children with SLI were less likely than both of the comparison groups to produce a grammatical response, regardless of the type of complement clause being considered. One might have expected that the children with SLI would at least perform comparably with age- or vocabulary-matched peers on the simple, nonfinite forms used in Experiment 1 (Ernie remembered to wear a hat), because these were the shortest items, required no use of finite verb morphology, and used a minimal number of arguments. However, the children with SLI demonstrated weaknesses even with these constructions. The children with SLI were at an age where many of these children had MLUs within normal limits and all of the children demonstrated the ability to produce sentences as long or longer than those being tested. However, these results indicate that these children with SLI were not functioning at age-appropriate levels in any of the complement clause types examined here.

The two groups of typically developing children were clearly more likely to produce a grammatical utterance when they produced nonfinite complement clauses than when they produced finite complement clauses. Nonfinite complement clauses emerge first in language development, so it is possible that children have had more practice with them and, thus, are more proficient. In addition, there are fewer elements on which to make mistakes within the nonfinite clause, because it typically involves one fewer argument than the corresponding finite clause. The verb also consistently appears in the same form in the nonfinite frame (to + bare verb).
whereas in the finite frames, the child must have more control over the form of the verb (e.g., modal + bare verb, regular past-tense verb, irregular past-tense verb) for the sentence to be considered accurate. Given that the confound of length or number of arguments with finiteness obscures the reason for children's proficiency with nonfinite complement clauses over finite complement clauses, future experiments should attempt to separate these factors.

Other factors may have also played a role in the children's difficulty with finite complements. Diessel (2004) argued that children first acquire finite complement clauses in two very restricted contexts, termed *formulaic* and *performative senses*. In these contexts, the matrix clause appears in first-person, present-tense form and functions primarily as an adverb or a discourse marker. Only later do children acquire the full meaning of finite complement clauses, in which the matrix clause affects the interpretation of the complement clause. All of the target items in this study had a matrix clause that was in the third-person, past-tense form. Thus, children had to be responding with the full meaning of a matrix clause incorporated into the interpretation of the complement clause, which may be a later acquired structure and more difficult for children to produce accurately.

However, the pattern of responses favoring production of nonfinite complements is less clear when the data for the children with SLI are considered. Effect sizes suggest that the children with SLI were equally likely to produce grammatically correct finite and nonfinite complement clauses. Of course, unlike the two typically developing groups, the SLI group had difficulties with certain details of the nonfinite complement clauses, as described below. These difficulties probably served to reduce the differences between finite and nonfinite clauses in the SLI participant group.

**Factors Contributing to Incorrect Responses**

Perhaps more interesting than simply knowing that children with SLI have general difficulty producing these structures is considering what elements contribute to these difficulties. Children with SLI were less likely than both of the comparison groups to include the appropriate number of arguments before the verb in the complement clause in Experiment 2. For the nonfinite items, this result was independent of utterance-length restrictions and overall accuracy remained relatively high for the children with SLI. For the finite items, accuracy was much lower overall, and even when MLU was included as a covariate, group differences were still evident, indicating particular difficulties for the children with SLI beyond those that could be attributed to reduced utterance length. King (1996) and Grela and Leonard (1997) demonstrated that children had difficulties including all of the appropriate arguments in simple sentences. Our results extend these findings by showing that children also have difficulty with complex sentences taking complement clauses as an argument.

It is important to note that there are at least two explanations for cases where the omission potentially involved the phrasal object in Experiment 2 (e.g., omission of *BJ* in the example below). One explanation is that the children failed to include an argument for reasons related to grammatical accuracy or sentence complexity. A second explanation is that children assumed that the verbs in Experiment 2 required the same sentence frame as the verbs in Experiment 1 and failed to include the extra argument because they did not know that it was required. Such an explanation would suggest an impoverished lexical entry and does not appear to be supported by other evidence, but it remains a possibility nonetheless. Although clues such as case marking on the argument that was included or the location of the complementizer *that* could have resolved this issue, but such evidence was not consistently available because children sometimes made ambiguous errors and did not produce the optional complementizer *that*. For example, in the incorrect production, *Blue* told *it* *picked up the desk* (Target response: *Blue* told *BJ* *that* *Squidward* *picked up the desk*), it is impossible to determine what the referent for *it* is. Future experiments could include grammaticality judgment tasks or use materials that obligate the use of case-marked pronouns to clarify which explanation is correct.

The children with SLI were also more likely than either of the typically developing groups of children to use a bare verb (without a modal) rather than a verb marked for tense. Thus, this experiment adds to the already strong body of literature demonstrating difficulties with tense and agreement for children with SLI (Leonard, 1998). In this study, the children with SLI had difficulty using tense in complement clauses, in addition to their well-documented difficulties with tense in simple sentences. Although trends may be noted for the other types of verb errors (e.g., overregularization), statistical comparisons were not possible because of lack of independence among the variables. Of particular note, both the children with SLI and the typically developing, vocabulary-matched group occasionally used present-tense verb forms in Experiment 2 items. These items were longer and involved a less common sentence frame, so it is possible that the children were having more difficulty keeping track of tense across the clauses.

However, tense and mood within the complement clause were not controlled. In some cases, the scenarios could be appropriately described using simple past responses, and in other cases, a modal plus a lexical verb...
was required. An equal number of the verbs targeted in the complement clause were regular and irregular in past tense, but children were free to substitute one lexical item for another in their responses, so this balance did not remain in the final responses. In other cases, the matrix verb dictated the makeup of the verb in the complement clause (e.g., Ernie decided that Elmo should wear a hat was more felicitous than Ernie decided that Elmo wore a hat, given the scenario presented). In particular, children seemed more likely to make errors with simple regular and irregular past-tense verbs than with verbs requiring a modal.

Tense and aspect marking in the complement clause are dependent on both the tense and aspect of the matrix clause (contrast: You knew I was here and You know I am here with *You knew I am here) and the properties of the situation described in the complement clause (consider: You knew I was here, You knew I would be here, You knew I had been here). To accurately mark finiteness in sentences with multiple clauses, children must be able to understand and hold in their mind the tense and aspect properties relevant for each clause and draw conclusions about the relationships of the two clauses to each other. Drawing on data from English-, Dutch-, Italian- and Japanese-speaking, typically developing children, Hollebrandse and colleagues (Hollebrandse, 2000; Hollebrandse, Delfitto, van Hout, & de Vroeg, 2001) proposed that children do not make the connection between the two clauses in complement clauses until after age 5, but that children acquire the syntax of complementation prior to mastering the temporal relationships between clauses. To clarify these results, experiments that consider tense tracking across clauses will have to be completed with controls for the relationship between the main verb and the use of tense in the complement clause. Additional exploration of the course of acquisition of sequence of tenses by children with language impairment should also be an avenue of future experiments.

In keeping with previous findings (Leonard, 1995; Schuele & Dykes, 2005; Schuele & Wisman Weil, 2004), children with SLI omitted the nonfinite particle to at greater rates than would be expected. Some children in both the vocabulary-matched group and in the SLI group substituted filler syllables, such as schwa, for the particle to in both Experiment 1 and Experiment 2, although this only appeared to affect the findings in Experiment 2. Inclusion of filler syllables as accurate responses primarily boosted the responses of the children with SLI by 10%. This study, like the case study completed by Schuele and Dykes (2005), showed that difficulty with the use of to extends beyond the preschool years into later ages. It also provides experimental evidence to augment the spontaneous speech data used in the previous studies.

Children with SLI were also more likely than their typically developing peers to leave out the optional complementizer that, even when MLU was factored into the analysis as a covariate. Difficulties with complementizers have been hinted at in previous work. There were very few complementizers used by the children with SLI in the study by Leonard (1995). Schuele and Dykes (2005) noted that the only obligatory complementizer in the spontaneous speech data in their case study was omitted, and there were no instances of optional complementizers being included. The differences shown between the two groups of typically developing children in our study support the developmental trajectory shown by Phinney (1981). In her cross-sectional study, children initially reduced a complex sentence to a simple sentence (mean age = 3;7); then, they omitted only the complementizer (mean age = 4;9); and, last, they productively included the complementizer even when the experimenter had not provided it (mean age = 5;0). Because use of that is optional, experimental evidence documenting rates of use by children of similar ages or abilities is especially important to demonstrate that difficulties exist for children with SLI.

Implications for Current Accounts of SLI

Most current theories of SLI were designed to account for the deficits seen in preschool children with SLI. As a result, these theories are not especially well suited to handle the constellation of difficulties demonstrated in our study. For example, the surface account (Leonard, 1989) addresses the difficulties that children with SLI showed in regard to use of tense in the complement clause, the use of the nonfinite particle to, and the use of the optional complementizer that. However, it cannot explain why children with SLI had difficulty with the use of arguments in Experiment 2, because the arguments were full lexical items with a transparent function and were not lacking in phonetic substance.

The EOI account (Rice & Wexler, 1996; Rice et al., 1995, 1998) primarily deals with finite verb-related morphology and was not intended to address phenomena such as reduced complementizer use or omission of arguments. However, the findings of this study support the view that the tense-related problems assumed in the EOI account extend to complement clauses, in children with SLI, well past the preschool period. Consistent with the view expressed by Rice (2004), a failure to grasp the obligatory nature of tense may be a longstanding problem for these children.

The RDDL account (Van der Lely, 1994, 1998; Van der Lely & Battell, 2003) might explain difficulties with tense and agreement morphology because these elements require movement to check their features.
However, it is a struggle using the RDDR account to explain difficulties with elements that are generated in situ, such as arguments and the functional morphemes to and that. This latter point is important because the RDDR account was intended to move explanation of grammatical deficits in SLI beyond the level of finite verb morphology, so that problems with a broader range of sentence construction types could be addressed. Perhaps this account will prove successful for construction types that require movement of constituents, but it provides no basis for predicting difficulties with the details (i.e., nonfinite morphology) observed here.

The functional category deficit account (Leonard, 1995) would hypothesize difficulty with all functional morphemes in the present study, whereas a more current rendition focusing on the complementizer phrase (CP) alone (Clahsen, Kursawe, & Penke, 1995; Hamann, Penner, & Lindner, 1998) would hypothesize difficulties with functional elements, such as that, as well as with the formation of syntactic structures involving CP, like questions and relative clauses (but see Poeppel & Wexler, 1993, for an alternative point of view). The children with SLI in our study did have particular difficulties using functional elements, including the complementizer that, the nonfinite particle to, and verb-related morphology, but did not omit these elements entirely. The children with SLI and the younger, typically developing children used that at particularly low rates, an element that should have been occurring in CP. However, there are two reasons to believe that these children had access to the functional projection CP. First, children frequently responded to the examiner's prompt by repeating the prompt and then completing the sentence, indicating that they were using subordination and not simply replying with an unembedded sentence. In addition, there was evidence from spontaneous speech for the presence of CP. Even using a strict criterion for crediting children with use of a structure (see Diessel & Tomasello, 2000, 2001), all children produced at least two examples of an element considered to rely on the presence of CP, such as an object question, a relative clause, or a complement clause. These results mirror results found with oral deaf children with regard to the potential difficulties with the use of CP, even though a clear argument could not be made for the complete absence of CP in their language (de Villiers, de Villiers, & Hoban, 1994). Furthermore, this account would specifically predict that the children with SLI would include all arguments, because these elements do not serve purely formal roles and are not associated with functional projections. However, children with SLI omitted arguments at a greater rate than their typically developing peers.

The difficulties described in this study do not form a unified constellation of results around a particular aspect of verb use. Indeed, it is difficult to find a unifying element among these errors. Argument structure is purported to be stored in the lexicon according to individual verbs or verb classes. Modals and use of past tense are related to the marking of finiteness and are tied to the tense and agreement system. Infinitival to is also a component of the verb system, but it marks nonfiniteness rather than finiteness and is tied to lexical properties of the matrix verb. The complementizer that strictly occurs at the beginning of complement clauses, introducing either nominal or relative clauses, and is not directly related to the verb system. Children with SLI appear to have difficulties with several components of language and may omit one or more required elements when producing a sentence. Some of these elements are related to the verb system and some are not. Optional elements, such as that, appear to be particularly vulnerable and unlikely to be included in the language of children with SLI.

Our results suggest that any account of SLI needs to go beyond grammatical morphology and include syntactic components at the level of the complement clause and argument structure. Furthermore, such a theory should be able to account for the varied rates of production of each of the grammatical elements that have been identified as difficult for these children. Information-processing accounts (e.g., Hoffman & Gillam, 2004; Miller et al., 2001; Montgomery & Leonard, 1998) may be able to address the difficulties shown by children with SLI with multiple areas of syntax and could potentially be extended to accommodate elements of the linguistic system beyond verb-related morphology, including argument structure and use of complementizers. An information-processing account of SLI could possibly explain why difficulties with argument use became more pronounced in our study as the sentences became more complex and why that was overwhelmingly omitted, whereas use of to and verb-related morphology were only somewhat affected. However, until there is an information-processing account that enumerates the possible mechanisms for language errors in more detail, it is difficult to formally test such an account. Of particular interest would be a metric that quantifies linguistic complexity by considering issues such as the number of arguments, the number and type of movement operations involved, and the complexity of the morphological paradigm. Initial steps of this type are beginning to appear in the literature (Jakubowicz, 2003; Jakubowicz & Nash, 2001). However, this account is confined to subsystems of grammar and does not encompass the range of grammatical elements seen in complement clauses. The development of such a metric would allow for the testing of information-processing hypotheses in such a way that would bridge the gap between the linguistic-based accounts and the processing-based accounts.
Clinical Implications

The results of our study highlight an area that deserves particular attention in the late-preschool and early-elementary-school years. The results suggest that speech-language pathologists should thoroughly investigate children’s use of complementation prior to considering the children ready for dismissal. It is possible that children with SLI may be able to use verb-related morphology or argument structure appropriately in simple sentences but demonstrate weaknesses with these same elements when complement clauses are required. Children with SLI also may show lower usage rates of complement clauses in addition to difficulties with grammatical elements. Furthermore, some grammatical elements, such as to and that, are only available in sentences with two or more clauses, and some grammatical structures are only used with certain verbs. Because finite and nonfinite complement clauses may be areas of weakness, children with SLI may avoid using them, providing fewer opportunities to assess and provide intervention related to these structures. Encouraging children to incorporate more sophisticated linguistic elements into their spoken and written language could improve their ability to participate in academic environments.

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References


**Appendix.** Ranking of cues used to determine response type.

<table>
<thead>
<tr>
<th>Level</th>
<th>Cue/example</th>
<th>Decision</th>
</tr>
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| 1     | a. Use of an overt complementizer, *that*:  
*Ernie knew that* wear a hat | Finite |
|       | b. Overt use of nonfinite particle *to* or schwa:  
*Ernie knew to* wore a hat  
*Ernie knew schwa* wore a hat | Nonfinite |
|       | c. Overt use of *for*:  
*Ernie knew for* him to wear a hat  
*Ernie knew for* wear a hat  
*Ernie knew him for* to wear a hat | Alt. response: for–to |
|       | d. Overt use of *to* and *that* or 2 instances of *to* or *that* in the same response:  
*Ernie reminded Elmo to* wear a hat  
*Ernie reminded Elmo that Big Bird* wore a hat  
*Ernie reminded that Elmo that* Ernie wore a hat | Alt. response: double CP |
|       | e. Use of a 2nd-person pronoun in the complement clause:  
*Ernie reminded You should* wear a hat  
*Ernie reminded Elmo that You should* wear a hat | Alt. response: quote |
|       | f. Use of a quote intonation in the complement clause:  
*Ernie reminded “Hey Elmo, wear a hat!”* | Alt. response: quote |
| 2     | a. Use of a finite verb or a modal:  
*Ernie knew wear* a hat  
*Ernie knew him* wore a hat | Finite |
| 3     | a. Use of a 3rd-person subject pronoun:  
*Ernie knew he* wear a hat | Finite |
|       | b. Use of 2 characters:  
*Ernie reminded Elmo* *Ernie* wear a hat | Finite (specifically of the type in Exp. 2) |
|       | c. Use of a 3rd-person object pronoun:  
*Ernie reminded him* wear a hat | Nonfinite (specifically of the type in Exp. 2) |
| 4     | a. Bare verb with no modal or auxiliary verbs present:  
*Ernie* wear a hat | Nonfinite |
|       | b. No characters present:  
*Ernie* wear a hat. | Nonfinite |

**Note.**  
Alt. = alternative; CP = complementizer phrase. Cues on a higher level were always considered prior to cues on lower levels. Cues on the lower levels were only considered if higher cues had been ambiguous. Cues on the same level were considered mutually exclusive—use of multiple cues on the same level resulted in an item being labeled as unscorable or as an alternative response.  
*If classified at Level 1, stop and do not proceed further.*  
*If classified in Level 2, stop and do not proceed further.*  
*Use of a single character is not definitive because both finite items in Experiment 1 and N2/nonfinite items in Experiment 2 required only 1 character. Other cues are required.*  
*If classified in Level 3, stop and do not proceed further.*