Lexical Aspect and the Use of Verb Morphology by Children With Specific Language Impairment

Purpose: Many typically developing children first use inflections such as –ed with verb predicates whose meanings are compatible with the functions of the inflection (e.g., using –ed when describing events of brief duration with clear end points, such as dropped). This tendency is assumed to be beneficial for development. In this study, the authors examine whether preschool-aged children with specific language impairment (SLI) show a similar tendency.

Method: Sixteen children in each of three groups participated—children with SLI, typically developing children matched for age (TD–A), and younger typically developing children matched for mean length of utterance (TD–MLU). The children described actions in contexts that promoted either past tense –ed or progressive aspect –ing in past contexts. Half of the verb predicates referred to events of brief duration with distinct endpoints (e.g., drop), and half referred to events of considerable duration with less distinct points of termination (e.g., play).

Results: Both the TD–A children and the TD–MLU children used –ed with verb predicates of the first type more consistently than they did with verb predicates of the second type. They showed the reverse pattern for –ing. The children with SLI did not show any effects according to the verb predicate type. However, although the children with SLI made less overall use of –ed than did both groups of TD children, they differed only from the TD–A children in their overall use of –ing.

Conclusion: Difficulties with tense-related morphology may be compounded in children with SLI if they fail to make use of associations between the lexical aspect of verb predicates and the grammatical function of the accompanying inflections. The authors argue that the advantages of using these associations as a starting point in acquisition may be especially important in the case of –ed. Additional studies of children with SLI are clearly needed, including those that employ longitudinal, naturalistic data.

KEY WORDS: language disorders, language assessment, language expression

Children with specific language impairment (SLI) often exhibit a more serious deficit in morphosyntax than in other areas of language. Conspicuous among the special difficulties with morphosyntax is a weakness in the use of grammatical morphemes that mark tense and agreement, such as past tense –ed, third person singular –s, and copula and auxiliary forms of be (is, are, am, was, were). This weakness is most obvious during the preschool years but can extend into the elementary school years (e.g., Marchman, Wulfeck, & Ellis Weismer, 1999; Norbury, Bishop, & Briscoe, 2001; Rice, Wexler, & Hershberger, 1998). Children with SLI not only use such morphemes less consistently than their typically developing (TD) age-mates, but they also use them less reliably than younger TD children with similar mean lengths of utterance.
grammatical aspect, and lexical aspect. To provide a brief review of the relationships among tense, verb morphology by children with SLI and TD comparisons, it is necessary to understand the tense-related difficulties seen in SLI.

The inconsistent use of tense and agreement morphology coupled with the children's clear grasp of certain facts about how the morphemes should be used has been characterized as the product of a grammar that permits "optional" use of these morphemes. Specifically, Rice, Wexler, and their colleagues (Rice et al., 1995; Rice & Wexler, 1996; Rice et al., 1998) have proposed that children with SLI go through an extended phase of development during which they fail to grasp the fact that tense is obligatory in main clauses. Thus, when they produce a tense morpheme, it is usually appropriate; the problem rests in their underlying grammar that permits nonfinite verb forms (e.g., Yesterday she play outside) in the same contexts.

In the present study, we examine the inconsistent use of tense morphology from a different perspective. Although there is ample evidence to believe that the same verbs can appear with and without the appropriate morpheme in the speech of children with SLI (e.g., Miller & Leonard, 1998), there is reason to suspect that factors pertaining to the meanings of verb predicates may also influence the degree to which tense morphemes are applied. Since the early studies of young TD children by researchers such as Antinucci and Miller (1976) and Bloom, Lifter, and Hafitz (1980), it has been known that the initial use of verb morphemes is not evenly distributed across verb types. Rather, morphemes such as –ed are more likely to be used with a verb such as drop than with a verb such as play, whereas for a morpheme such as –ing, the opposite is true. Verbs such as drop refer to actions with clear end points; those such as play refer to actions with longer durations and no distinct end point.

The purpose of the present study is to examine the relationship between verb predicate type and the use of verb morphology by children with SLI and TD comparison groups to determine whether the interplay between these two elements of language can contribute to our understanding of the tense-related difficulties seen in SLI. Before discussing the possible relationships that might be expected in the speech of children with SLI, it is necessary to provide a brief review of the relationships among tense, grammatical aspect, and lexical aspect.

Tense, Grammatical Aspect, and Lexical Aspect

The three constructs—tense, grammatical aspect, and lexical aspect—all pertain to notions of time in either a direct or indirect manner. For English, the familiar construct of tense refers to the temporal relationship between the time of the event and another time, usually the time of speaking. Past tense, for example, typically refers to an event that preceded the speaker's reference to it. Thus, the utterance I broke the window refers to an event that occurred prior to the utterance itself. However, tense also applies to differences in time between two events. For example, in She heard that I broke the window, both the hearing of the event and the breaking itself occurred prior to the utterance, but the breaking occurred first.

Aspect pertains to the temporal distribution of an event rather than to its location in time. A distinction is made between grammatical aspect, often referred to as viewpoint aspect, and lexical aspect, known also as situation aspect (Smith, 1997). A contrast central to grammatical aspect is that between the perfective and the imperfective (e.g., Bybee, 1985). The perfective provides an "outside-in" view of the event and may involve predicates that specify end points (e.g., I read the book [and it was excellent]), whereas the imperfective provides an "inside-out" perspective with no end points expressed or implied (e.g., I was reading the book [when the phone rang]; Wagner, 2002).

The expression of perfective aspect in English is not straightforward. Often, it is best expressed by means of the irregular past or the past tense inflection –ed, although use of these forms does not necessarily signal that the action has been completed. For example, whereas Kendall ate a piece of candy implies that the action has been completed, the same verb form in Kendall ate indicates only that the action took place prior to the time of the utterance. It is sometimes assumed that constructions such as the present perfect (e.g., She has eaten) also mark perfect aspect (see Lyons, 1969). However, present perfect constructions usually describe past events that have present relevance and do not express perfective aspect (see Comrie [1976] for the distinction between "perfective" and "perfect"). Imperfective aspect is reflected in English through the use of the inflection –ing. More precisely, this inflection marks progressive aspect, one subtype of imperfective that expresses a continuous (nonstative) action (Comrie, 1976). (Note that when –ing is applied to stative verbs, as in I am wanting some ice cream, the meaning refers not only to the state but also to its emergence or its intensification.)

As noted by Lyons (1969) and Bloom et al. (1980), among others, tense and grammatical aspect are conflated in English. For example, in a radio broadcast of a baseball game, the verb looked can mark a distinction of

(MLUs; e.g., Leonard, Eyer, Bedore, & Grela, 1997; Oetting & Horohov, 1997; Rice & Wexler, 1996; Rice, Wexler, & Cleave, 1995).
tense in Jones looked over at the runner on first relative to Jones looks over at the runner on first but can mark a distinction of grammatical aspect in Jones looked over at the runner on first (before delivering his pitch) relative to Jones was looking over at the runner on first (when the runner on third broke for home).

Lexical aspect refers to aspeccile elements related to verb semantics. Four semantic categories, first proposed by Vendler (1967), are often employed in this regard. These categories are (a) “states” such as see; (b) “activities,” defined as events that haveduration but an arbitrary end point, as in play; (c) “accomplishments,” which have an inherent end point but also have duration because there are identifiable phases before the end point is reached, as in draw a picture; and (d) “achievements,” which have an end point that is reached instantaneously, as in fall.

The placement of verbs into these different categories is not straightforward. For example, although many activity verbs are intransitive (e.g., walk, run), there are activity verbs that are transitive, as in drive a car and pull a wagon (Dowty, 1979). Furthermore, the same verb that reflects an activity in one sentence (e.g., Francesca drank wine for an hour) can reflect an accomplishment in another sentence when used with a slightly different direct object and prepositional phrase (e.g., Francesca drank a glass of wine in an hour). Given the importance of the contents of the larger predicate, our use of the term lexical aspect will refer to the lexical aspect of the verb in combination with its object or modifier, not of the individual verb divorced from its larger context.

Operational tests to determine the lexical aspect of verbs within the larger predicate have been proposed by several different scholars. In the present study, we make use of the particular tests employed by Shirai and Andersen (1995), which were, in large part, adapted from those proposed by Dowty (1979). First, to distinguish between states and nonstates, we ask whether the verb-within-predicate has a habitual interpretation in simple present tense. States do not (e.g., I love my mother), whereas nonstates do have such an interpretation (e.g., I watch PBS). Second, to distinguish between activities and accomplishments or achievements, we ask if the event as expressed in the present progressive (e.g., Mickey is running; Mickey is running to the store) entails the event as expressed in the present perfect (e.g., Mickey has run; Mickey has run to the store). An affirmative answer applies to activities (at any point in the action of running, it is accurate to say that Mickey has run); a negative answer applies to accomplishments and achievements (there is a point in Mickey’s running to the store where it is not accurate to say that he has run to the store). For reasons soon to be noted, the distinction between accomplishments and achievements was not a central factor in the present study. Tests used to make this distinction include how the addition of almost to the sentence alters the interpretation of the event. If the event has two interpretations (e.g., She almost emptied the trash could mean she almost began to empty the trash or she almost finished emptying the trash), the verb-within-predicate is classified as an accomplishment. If only one interpretation is possible (as in He almost dropped the ball), the verb-within-predicate is regarded as an achievement.

It should be noted that although these tests provide important guidelines, they have limitations. Dowty (1979) has pointed out several subtypes of lexical aspect categories that conform only to select tests. For example, states such as sleep are quite compatible with the progressive (e.g., Mary is sleeping) and, as in activity verbs, Mary is sleeping entails Mary has slept. Both Vendler (1967) and Dowty (1979) have noted that some achievement verbs represent instantaneous events but do not result in a change of state (e.g., knocking on a door). Smith (1997) and Olsen and Weinberg (1999) refer to such verbs as semelfactives.

The four categories of state, activity, accomplishment, and achievement are often distinguished on the basis of three features: durative (vs. nondurative or punctual), telic (vs. atelic), and dynamic (vs. nondynamic; Shirai & Andersen, 1995). Durative, as the name suggests, refers to an event having duration. Telic refers to having an inherent end point, and dynamic indicates that energy is required for the event to occur. Using these features, states are viewed as involving the features of durative, atelic, and nondynamic. Activities reflect the features durative, atelic, and dynamic. Accomplishments and achievements are both telic and dynamic, differing only in the durative (accomplishment) versus nondurative (achievement) feature.

Grammatical Aspect and Lexical Aspect Interactions in Early Language Development

It is probably clear from an inspection of the types of meanings conveyed through lexical aspect that certain verbs with their predicates (e.g., the achievement verb open) combined with an inflection such as –ed convey completion as much as they convey a prior point in time. Other verbs with their predicates (e.g., the activity verb walk) combined with an inflection such as –ing convey actions that are occurring continuously, but because these actions have considerable duration, they are very often taking place during the time of the utterance. The past tense function of –ed and the progressive aspect function of –ing are not clearly distinguishable from verb predicate semantics until these inflections are attached to a verb predicate whose lexical aspect does not naturally lend
itself to these grammatical functions, as in I was opening the window yesterday (when a bird flew in) and I walked yesterday (and am sore today).

Of course, young children do not typically produce \(-ing\) with open and \(-ed\) with walk when they first make use of these inflections. Rather, productions such as opened and walking are much more common. Since the initial studies from the 1970s and 1980s (e.g., Antinucci & Miller, 1976; Bloom et al., 1980; Bronckart & Sinclair, 1973; Weist, Wysocka, Witkowska-Stadnik, Buczowska, & Konieczna, 1984), there has been considerable debate about how to characterize this pattern of use. Initial findings that children first used \(-ing\) with durative, atelic (activity) verb predicates and \(-ed\) with telic (accomplishment, achievement) verb predicates suggested that they were learning an imperfective–perfective aspect distinction and only later acquired tense. However, subsequent studies (e.g., Weist et al., 1984) found that children are able to mark tense as well as aspect. Studies by Aksu-Koç (1998), Olsen and Weinberg (1999), Li and Shirai (2000), and Wagner (2001), among others, have helped clarify how children seem to interpret particular details of tense and grammatical aspect. Based on their review of the available findings, Shirai and Andersen (1995) proposed a prototype account of children’s acquisition of tense–aspect morphology. According to this account, young children are not rigid in their treatment of tense and aspect inflections with particular types of verb predicates, but they do treat certain types of verb predicates as prototypes for \(-ing\) and other types as prototypes for \(-ed\).

An examination of the literature also led Shirai and Andersen (1995) to propose that the relevant features influencing children’s use of \(-ing\) and \(-ed\) with particular verb predicates were not limited to durative/nondurative, telic/atelic, and dynamic/nondynamic. They proposed that children’s use of these inflections was also influenced by a feature they termed result. They distinguished this feature from telic by noting that the end point for many (telic) events may not represent salient outcomes for children. For example, whereas the outcomes in drop the ball or pick up the toy may be quite salient, the outcomes of forget the milk or ask the question are probably not. In the Shirai and Andersen (1995) scheme, the former (which have the result feature as well as the telic feature) are more prototypical than the latter for the use of \(-ed\).

Shirai and Andersen (1995) also argue that when achievement verbs with no clear end points (semelfactives) are used iteratively, such as a character repeatedly hopping or banging, young children view the event as an action-in-progress that is as prototypical of progressive aspect as activities such as running or swimming. In the present study, we adopt the Shirai and Andersen (1995) prototype framework. As features play a critical role in this framework, our descriptions of verb predicates and the operational tests for lexical aspect will be presented in terms of features (e.g., atelic) rather than cover terms such as activity verb.

The Use of Past Tense \(-ed\) and Progressive \(-ing\) by Children With SLI

Given the interaction among lexical aspect, tense, and grammatical aspect, it is not surprising that young TD children’s early use of \(-ed\) and \(-ing\) is not evenly distributed across verb predicate types but, rather, clusters around verb predicates with highly compatible lexical aspect. The inflection \(-ed\) seems most likely to be used with verb predicates reflecting nondurative, telic, and result features, and the inflection \(-ing\) appears most likely to be used with verb predicates reflecting durative, atelic, nonresult features.

An important question is whether these co-occurrences are not only natural but beneficial to the children’s acquisition of the inflections. Given that this close association between inflections and lexical aspect is seen in young children who are developing language on schedule, it is reasonable to assume that this link is facilitative. However, it is highly plausible that these co-occurrences are merely an expected by-product of the children’s language experience. For example, children might hear dropped more frequently than dropping and playing more frequently than played because at the time of speaking, dropping actions have often already occurred, whereas playing actions might often still be taking place. Children’s own productions might not venture far from those in the input, helped in large part by the same real-world tendencies for brief actions to be already completed by the time they are described and actions with a longer duration to be continuing at the time of mention. Shirai and Andersen (1995) present evidence that indicates that parents’ input to their young children does, in fact, show this uneven distribution of inflections with lexical aspect.

Such input-based production patterns are in keeping with Tomasello’s (2003) usage-based theory of language acquisition. According to this theory, children’s initial use of inflections such as \(-ed\) and \(-ing\) might be tied to specific verbs precisely because of the frequent association between them in the input. At this early point, forms such as dropped and playing may constitute unanalyzed wholes for the children. Only later will children recognize a pattern and treat the inflections as separable elements. Because this early association between inflections and specific verbs is assumed to be widespread in child language, it might well constitute a natural route to the learning of inflections. However, nothing in Tomasello’s account seems to require a semantic correspondence between lexical aspect and these verb inflections. That is, if a particular child were to frequently hear play with \(-ed\) and drop
with –ing, this child’s rate of development would not be expected to differ from the rate seen with the more typical association of play with –ing and drop with –ed. In either case, the child would soon recognize that these inflections occur on a more widespread basis and would gradually treat them as separable from the verbs themselves.

However, an alternative possibility is that the frequent co-occurrence of –ed with actions that are completed or –ing with actions that are ongoing does more than simply bind the verb and inflection together during the initial phase of language development; it also provides the children with an important starting point in learning the grammatical function of these inflections. The frequent association of –ing with verbs such as play could hasten children’s insight that –ing expresses the temporal notion of continuous action. Gradually, through exposure to the appearance of –ing with other types of verbs (e.g., fall, build) and their predicates, children can learn that the function of continuous action is served by the inflection independent of verb predicate semantics.

The frequent association of –ed with verbs such as drop could also provide children with a useful starting point. However, in this case, the route to adultlike mastery might be less direct. Specifically, whereas children’s interpretation of –ing must merely broaden over time to include continuous actions involving nondurative verb predicates (that is, verb predicates with other types of lexical aspect), children’s interpretation of –ed must broaden not only to accommodate verb predicates with differing lexical aspect but also to allow this inflection to describe actions that occurred in the past (tense), whether or not they were completed. This complication could lead to slower development of adultlike mastery of –ed relative to –ing. Fortunately, because actions described by the inflected verb dropped are both a thing of the past and completed, an initial association between –ed and verbs of this type should still put children on the right track.

If, as we assume, the initial association between nondurative, telic, and result features and –ed, and durative and atelic features and –ing, is beneficial to children’s development, we should test the hypothesis that this association is more evident in TD children than in children with SLI. Two types of evidence support the testing of this hypothesis. First, when interpreting the meaning of verbs themselves, children with SLI appear to be relatively insensitive to perfective aspect (e.g., Kelly & Rice, 1994; Schulz & Wittek, 2003). For example, Penner, Schulz, and Wymann (2003) found that TD German-speaking children were more likely than children with SLI to require evidence of an end state before judging the verb open as applicable. Second, on the basis of all evidence known to us, children with SLI are slow to begin using verb inflections in the first place. Thereafter, their pace is significantly protracted relative to that seen for TD children, especially for –ed. This pattern is consistent with the view that children with SLI are not making the initial association between inflections and lexical aspect and, as a result, do not benefit from this useful inroad to discovering the grammatical function of these inflections. Without this insight to serve as a guide, their use of these inflections develops at a slow rate. Because the discovery of the grammatical function of –ed might be especially difficult without the aid of beginning with a lexical association that accommodates both tense and perfective aspect, the development of –ed might be expected to be especially slow.

The purpose of this study, then, was to compare a group of children with SLI, a group of same-age TD children, and a group of younger MLU-matched TD children in their use of –ed and –ing across verb predicates that differ in lexical aspect. The MLU-matched TD children were not yet at an age when adult-level use is reached. Therefore, they should still provide evidence of lexical aspect effects on their verb inflection use. Whether the same holds for children with SLI is the primary question of interest. The inclusion of –ing as an area of focus in this study offers an additional benefit. This inflection is examined in a past progressive context, thus providing us with an opportunity to examine the children’s use of the accompanying (and less often studied) auxiliary forms was and were.

Method

Participants

Forty-eight children participated in the study, 16 in each of three groups. All children were White, monolingual speakers of English. Children with SLI comprised the first group. These children had a mean age of 5;1 (years;months; SD = 9 months). Six of the children were female, and 10 were male. Each of these children had been diagnosed as language impaired and were scheduled for language intervention at the time of their participation in this study. Each child scored more than 1.5 SD below the chronological age mean on the Structured Photographic Expressive Language Test—II (SPELT—II; Werner & Kresheck, 1983a). These children passed a hearing screening and an oral–motor screening and scored above 85 on the Columbia Mental Maturity Scale (CMMS; Burgemeister, Blum, & Lorge, 1972), a test of nonverbal intelligence. No child had a history of seizures or showed any evidence of neurological dysfunction. All children demonstrated the ability to produce word-final [t] and [d] in monomorphemic contexts to ensure that their production of –ed would not be hampered by a lack of phonological ability. The children’s MLUs, which were based on a sample of 100 spontaneous utterances, averaged 4.15 morphemes (SD = 0.46). A composite measure of these children’s use of finite (tense and agreement) verb morphology in spontaneous speech, based on Leonard, Miller, and
Gerber (1999), revealed limitations for their chronological age ($M = 63.44\%, SD = 24.30$). This measure is based on the children’s combined use of copula and auxiliary be forms, third person singular –s, and past tense –ed. The number of obligatory contexts for past tense –ed in spontaneous speech was relatively small. Across all of the children with SLI, regardless of number of obligatory contexts, the mean percentage of use of past tense –ed was $69.07$ ($SD = 33.98$). For only those children with at least four obligatory contexts for this morpheme ($N = 13$), the mean percentage was $75.25$ ($SD = 28.09$). As will be seen, these means are somewhat higher than the means observed during the experimental task, due in large part, we suspect, to the fact that the children can rely on highly familiar forms in spontaneous speech.

A second group consisted of TD children who closely resembled the SLI group in age (hereafter, the TD–A children). Each child in this group was within 3 months of the chronological age of a child in the SLI group. The mean age of these children was $5:0$ ($SD = 10$ months). Six of the children were female, and 10 were male. These children scored at age level on both the SPERT–II and the CMMMS, and passed the hearing and oral-motor screening. Like the children with SLI, these children provided no evidence of neurological impairment. Not surprisingly, the MLUs of the children in this group ($M = 5.39$, $SD = 0.76$) were considerably higher than those of the children with SLI. Similarly, the children’s finite verb morphology composite scores ($M = 98.06\%, SD = 1.98$) were substantially higher than those of the children in the SLI group. These children’s past tense –ed use was likewise quite proficient ($M = 96.47\%, SD = 7.85$, with all children’s spontaneous speech samples providing at least four obligatory contexts).

The remaining 16 children were younger typically developing children who closely resembled the SLI group in MLU (hereafter, the TD–MLU children). These children’s mean age was $3:5$ ($SD = 5$ months). Eight of the children were female, and 8 were male. The MLU of each child in this group was within 0.3 morphemes of a child in the SLI group. The mean MLU for these children was $4.19$ ($SD = 0.43$). These children passed both a hearing and oral–motor screening. Given the younger ages of these children, they were administered, and obtained age-appropriate scores on, either (a) the U.S. standardization of the Reynell Language Development Scales (Reynell & Gruber, 1990) if they were under age 3:0 or (b) the Structured Photographic Expressive Language Test—Preschool (Werner & Kresheck, 1983b) if they were between age 3:0 and 3:11. All children in this group age 3:6 and above scored above 85 on the CMMMS; those below age 3:6 were administered the Leiter International Performance Scale—Revised (Roid & Miller, 1997) and, likewise, scored above 85. These children’s finite verb morphology composite scores averaged $90.63$ ($SD = 7.83$). Across all TD–MLU children, the mean percentage of use of past tense –ed in obligatory contexts in spontaneous speech was $87.73$ ($SD = 20.98$); for those children whose samples provided at least four obligatory contexts for this morpheme ($N = 9$), the mean percentage of use was $90.38$ ($SD = 15.07$). As will be seen (and as is true for the SLI group), the TD–MLU children’s percentages of use of past tense –ed were higher in spontaneous speech than during the experimental tasks.

**Materials and Procedure**

The children participated in a probe task designed to create obligatory contexts for past tense –ed and in a probe task aimed at promoting contexts for progressive aspect –ing. There were 20 items in the past tense –ed task. Ten of the items were selected to be prototypical –ed items, with the features nondurative, telic, and result. We first consulted the list of verbs prepared by Olsen and Weinberg (1998; see also Olsen & Weinberg, 1999) and selected six verbs classified as telic. We then added direct objects to these verbs and ensured that each item passed the operational test for telic verb predicates of Shirai and Andersen (1995) and had salient outcomes consistent with the result feature. The verbs used in these items were open, dump out, close, drop, scrape, and cover. Four other verbs regarded as semelfactives by Olsen and Weinberg (1998) were selected and combined with particles and/or direct objects to meet the operational test for telic verb predicates and the requirements for the result feature. The verbs used in these items were knock over, jumped over, kick, and pop. The specific items are provided in Appendix A. Hereafter, these items will be referred to as prototypical –ed items to indicate that these items reflected the features viewed as prototypical for use with –ed.

The other 10 items for the past tense –ed task were nonprototypical –ed items. Eight of these items employed verbs classified as dynamic, durative, and atelic by Olsen and Weinberg (1998) and passed the operational test for these features after we added the direct object or adjunct. The verbs employed in these items were rake, dance, crawl, play, push, pull, carry, and chase. We then added two semelfactive verbs, hop and brush, and combined them with direct objects or adjuncts that allowed them to pass the test for dynamic, durative, and atelic items. These items also appear in Appendix A.

The 20 past tense –ed items were divided into two lists of 10 items that were presented on separate days. The order of presentation of the lists was counterbalanced for each group of children.

Given that the items used for the past tense –ed probes were selected on the basis of lexical aspect, it was possible that the verbs used for the two categories (prototypical –ed, nonprototypical –ed) differed along other dimensions. We examined several possibilities. First, it
seemed that the two sets of verbs might differ in frequency of occurrence. Accordingly, we compared the verbs in the two categories in terms of the frequency of occurrence of their stems, using the log frequencies in Francis and Kucera (1984). The two types of verbs did not differ on this measure, t(18) = 0.27, p = .787. We also compared these verbs according to the log frequency of their stem + -ed forms. It should be noted that these values might not be independent of lexical aspect, for reasons noted earlier. That is, verbs and their predicates with the features of durative and atelic might be less frequent in past tense form than verbs and their predicates with nondurative, telic, and result features because the events that they represent may be less likely to be completed when mentioned by a speaker. However, the two types of verbs did not differ in this respect, t(18) = 0.47, p = .645. A summary of these data appears in Appendix B.

We performed comparable analyses using two other measures: the sum of the segment frequencies of each verb and the sum of the biphone frequencies of each verb. The former considered the frequency of occurrence of the word position in which the segment appeared in the verb. The latter was a measure of phonotactic frequency. Frequencies were based on Vitevich and Luce (2004). Using the stem form of the verbs, neither segment frequency, t(18) = 1.16, p = .260, nor biphone frequency, t(18) = 0.84, p = .410, revealed a difference between the two categories of verbs. Similarly, no differences were found when frequencies were based on the stem + -ed forms: for segment frequency, t(18) = 1.19, p = .250; for biphone frequency, t(18) = 0.89, p = .387. A summary of these data can be found in Appendix B.

The past tense -ed task was adapted from Schütze and Wexler (2000) and took the form of a game that the children were asked to play with the experimenter. A puppet, Pooh, was introduced and the children were told that Pooh was very forgetful and often forgets to watch what is happening. The children were then asked to help Pooh by paying attention to what was happening and explaining to Pooh what had happened if Pooh forgot to watch. For each item, two characters (puppets or toy figures) were used. These characters asked the children “choice” questions before performing their actions. That is, the first character announced its intention to perform one of two actions and asked the child which it should perform. After the child responded, the character then performed the selected action. The second character then announced its intention to perform one of two actions (different from the first character’s actions), and the child was again asked a choice question, with the character then performing the action selected by the child. After the two characters had performed their respective actions, Pooh then confessed to not paying attention. The experimenter then suggested that she and the child help Pooh. The experimenter described the first of the actions performed, using the past tense of the verb, and prompted the child to describe the second action. An example follows.

Experimenter: Cookie Monster has a lot of beads. He wants to fill up something.

Cookie Monster: Should I fill up my cup or my basket?
Child: Your basket.

(Cookie Monster then fills up his basket.)
Experimenter: And Grover wants to open something.
Grover: Should I open my door or my window?
Child: Your window.

(Grover then opens his window.)
Pooh: I didn’t see what happened. Could you tell me?
Experimenter: Well, Cookie Monster filled up his basket and Grover _____.

It can be seen that the experimenter used a regular past tense –ed form just prior to the child’s response. This, of course, occurred for all items. For the items targeting prototypical –ed verb predicates, one-half of the experimenter’s own past tense –ed productions involved a verb predicate with nondurative, telic, and result features, and the other half involved a verb predicate with durative, atelic features. Likewise, for the items targeting nonprototypical –ed verb predicates, one half of the experimenter’s own productions made use of a verb predicate with nondurative, telic features, and one half involved a verb predicate with durative and atelic features. To assist us in the detection of the appearance of –ed at the end of the verb, we designed items that promoted the use of direct objects with possessive pronouns (as in opened his window) or indefinite articles.

There were 30 items for the progressive –ing task. Sixteen of the items were selected to represent prototypical –ing items with the features dynamic, durative, and atelic. In selecting these items, we first consulted the list of verbs of Olsen and Weinberg (1998) and selected 15 verbs that reflected these features. We ensured that all of these items passed the operational test of Shirai and Andersen (1995) for durative, atelic verb predicates. The verbs used in these items were drive, draw, cry, skate, slide, run, rake, sing, sweep, fly, rock, swim, ride, dance, and march. The remaining verb, sleep, is classified by Olsen and Weinberg (1998) as a state verb. State verbs are durative but nondynamic. However, sleep is used in English as if it carries the dynamic feature, and, as noted by Dowty (1979), is compatible with progressive aspect (one says She’s sleeping, not She sleeps, to describe an event in the present). Furthermore, the item created for sleep involved the character lying in bed, snoring. The verb snore is an activity verb (dynamic as well as durative); however, children typically used the verb sleep rather than snore to describe the event. The prototypical –ing items are shown in Appendix A.
The remaining 14 items were designed to reflect nonprototypical \textit{–ing} items. Such items had to be selected with care because, on the one hand, they had to reflect telic and result features but, on the other hand, they had to lend themselves to a progressive aspect interpretation. To this end, we selected verbs that represented discrete actions that could be repeated. For example, in one item, the characters closed several windows of a toy house. Each act of closing led to an observable outcome (telic and result features), but the event as a whole continued. Furthermore, for all these items, the curtain closed while the characters were about to perform another instance of the action (e.g., another window remained open but was about to be closed). Eight of the verbs for the nonprototypical \textit{–ing} items were drawn from the telic verbs listed by Olsen and Weinberg (1998). These verbs were \textit{fold}, \textit{pick}, \textit{empty}, \textit{tie}, \textit{break}, \textit{open}, \textit{close}, and \textit{cover}. The remaining verbs were selected from the semelfactive and activity verb categories but were used with particles and/or direct objects in a manner that provided a telic interpretation. Smith (1997) refers to some of these as multiple-event activities made up of a series of short-duration events whose stages have a telic or semelfactive property. For example, for \textit{cut}, the character took a large sheet of paper and proceeded to cut it into smaller strips. For \textit{knock over}, the character knocked several toy animals over in succession. Although each discrete act could be identified with a clear outcome, the curtain closed as the event as a whole continued (e.g., additional strips of paper could be cut from the larger sheet, additional toy animals could be knocked over), and, in each case, the character’s movements suggested that the next instance of the action was about to take place. These remaining verbs were \textit{kick}, \textit{blow}, \textit{cut}, \textit{jump over}, \textit{knock over}, and \textit{sneeze}.

Two of the nonprototypical \textit{–ing} items may not have been good examples for the feature result. For the item \textit{The fish was blowing bubbles}, the character blew several bubbles and started to dip the wand into the bubble solution one more time as the curtain closed. Although each act of blowing produced a clear result, the results were quite transient, as the bubbles were no longer visible as the event as a whole proceeded. Similarly, for the item \textit{The elephant was sneezing}, the character was clearly about to sneeze again when the curtain closed, but no effects of the prior sneezes were apparent. Given these possible differences between these two items and the remaining items, we analyzed the data with and without these particular items, as can be seen in the Results section. A list of the nonprototypical \textit{–ing} items is provided in Appendix A.

As was done with the verbs used in the past tense \textit{–ed} task, we determined whether the verbs used in the prototypical \textit{–ing} and nonprototypical \textit{–ing} items differed in frequency of occurrence. Neither differences in word frequency for the stem, \(t(28) = 0.16, p = .874\), nor for stem + \textit{–ing}, \(t(28) = 1.53, p = .138\), were observed. Similarly, the sum of the segment frequencies revealed no difference for either the stem, \(t(28) = 1.78, p = .085\), or the stem + \textit{–ing}, \(t(28) = 1.88, p = .070\). Finally, neither the sum of the biphone frequencies for the stem, \(t(28) = 0.64, p = .530\), nor the sum of the biphone frequencies for the stem + \textit{–ing}, \(t(28) = 0.71, p = .481\), was significant. A summary of the frequency values is provided in Appendix B.

The task used for progressive \textit{–ing} was adapted from McShane and Whittaker (1988). A puppet show format was used, with a small stage and curtain. The child, one experimenter, and a puppet who was referred to as Sleepy Bear sat on one end of the table and constituted the audience. The other experimenter remained behind the stage curtain and manipulated the characters whose actions were to be described. The child was told that they were going to watch some shows but that Sleepy Bear often fell asleep during the shows and needed to be told what had happened. For each item, the experimenter behind the curtain prepared the characters and related props. The curtain was then opened, and the experimenter had the characters perform the action for 12 s. An example of an action involving a durative, atelic verb predicate was a toy plane flying around in the air for 12 s; an example of an action involving a nondurative, telic, result verb predicate was a small doll picking several flowers in succession for 12 s (with the curtain closing before all of the flowers had been picked). Just as the curtain opened, Sleepy Bear fell asleep and did not wake up until the curtain was closed after the 12-s period. Sleepy Bear then said to the child “I fell asleep. Tell me about the show.” After the child provided a description of the show, Sleepy Bear thanked the child. The experimenter sitting next to the child then told the child and Sleepy Bear to get ready for the next show.

For one half of the items of each verb predicate type, a single character performed the action, thus requiring the auxiliary verb \textit{was}. For the remaining half of the items, two characters performed the action, requiring the plural auxiliary form \textit{were}. The items were divided into two lists, presented on separate days. The order of presentation of the lists was counterbalanced for each group of children.

\textbf{Scoring and Reliability} \hfill

Scoring for the past tense \textit{–ed} items was relatively straightforward. As seen earlier in the example under \textit{Materials and Procedure}, the experimenter began the description of each event by describing the first of the two actions with a verb in past tense \textit{–ed} form and then providing the subject of the sentence to be completed by the child. Consequently, the children usually either produced an appropriate past tense form or produced the verb as a bare stem. In rare instances, the children did not remember the action performed or described an action that
had not been performed. Responses in these cases were treated as unscorable. For each child, we then determined the number of items for which scorable responses were obtained and divided this number into the number of items produced with past tense –ed. We then multiplied this figure by 100 to obtain a percentage correct in obligatory contexts.

The progressive –ing task had to be scored somewhat differently, owing to the fact that a response such as danced for an item targeting were dancing is not an error (given that the action took place in the past), even though it makes no reference to the continuous nature of the action that was shown. For this reason, we characterize the children’s use of –ing on this task as simply the degree to which they described the actions with progressive aspect rather than the degree to which they produced correct responses. Responses in the form of a verb with past tense (e.g., danced), a bare stem (dance), a progressive form with an auxiliary (were dancing), and a progressive form without an auxiliary (dancing) were treated as scorable. Of the scorable responses, we calculated the percentage of responses that were in progressive –ing form (progressive forms with or without an accompanying auxiliary). Finally, for those responses with a progressive –ing, we calculated the percentage of responses with an auxiliary. We also scored the auxiliary as accurate or inaccurate and noted the type of substitution error, if one occurred.

We assessed transcription reliability for past tense –ed by selecting the audio-recorded probe responses from 3 children in each of the 3 participant groups. An independent judge then transcribed these responses, and item-by-item agreement was determined. Overall, agreement on the presence or absence of –ed in the children’s responses was 92%. Mean percentages for the SLI, TD–MLU, and TD–A groups were 85%, 95%, and 97%, respectively. The most common disagreement occurred when (despite our best efforts) the child produced an article rather than a possessive pronoun after the verb; on occasion, one judge transcribed the response as, for example, (Arthur) chased a butterfly, whereas the other judge transcribed it as (Arthur) chase the butterfly.

We assessed reliability for progressive –ing and auxiliary was/ware in the same manner, using the audio-recorded probe responses from 3 children in each group. Overall agreement for the presence or absence of –ing was 99%. Mean percentages for the SLI, TD–MLU, and TD–A groups were 100%, 99%, and 99%, respectively. The rare disagreements occurred with the target verb open, whose final syllable resembles the inflection –ing. For assessing reliability for was/ware, an agreement was assumed only if both judges not only regarded the auxiliary as present but also agreed on which auxiliary was produced. Overall agreement for was/ware was 97%. Mean percentages were 98%, 95%, and 98% for the SLI, TD–MLU, and TD–A groups, respectively. Disagreements were few in number, and no one type of disagreement was more common than others.

Results

Past Tense –ed

The first analysis dealt with the children’s use of past tense –ed. A mixed model analysis of variance (ANOVA) was planned, with participant group (SLI, TD–MLU, TD–A) as a between-subjects variable and lexical aspect (prototypical –ed, nonprototypical –ed) as a within-subjects variable. The percentages of use were arcsine transformed for the ANOVA. Least significant difference (LSD) testing at the .05 level was then applied in the cases of significant main effects and interactions. Effect sizes were also calculated through $d$, where values of 0.80 and larger were considered large effect sizes, and those between 0.50 and 0.79 were considered medium effect sizes (Cohen, 1988).

A summary of the children’s use of past tense –ed can be seen in Table 1. An inspection of the data revealed that the TD–A children performed at or near ceiling levels. For this reason, their data were not included in the ANOVA. A significant main effect was found for participant group, $F(1, 30) = 37.66, p < .001$. The children with SLI showed significantly less use of past tense –ed ($M = 35.44, SD = 21.66$) than the TD–MLU children ($M = 78.00, SD = 17.91$). A significant main effect was also observed for lexical aspect, $F(1, 30) = 12.56, p = .001$. Greater use of past tense –ed was seen with prototypical –ed items ($M = 60.66, SD = 30.66$) than with nonprototypical –ed items ($M = 52.78, SD = 27.45$). However, this difference is best interpreted through the significant Participant Group × Lexical Aspect interaction found, $F(1, 30) = 6.24, p = .018$. LSD testing at the .05 level revealed that the TD–MLU children made greater use of –ed than the children with SLI with both prototypical ($d = 2.46$) and nonprototypical ($d = 1.93$) items. However, the SLI group’s use of –ed did not differ as a function of lexical aspect, whereas the TD–MLU children made significantly greater use of –ed with prototypical items than with nonprototypical items ($d = 1.23$).

Recall that for one half of the items for each lexical aspect, the lexical aspect of the past tense form in the experimenter’s model matched the lexical aspect of the verb predicate to be produced by the child. Although this counterbalancing was intended to reduce any potential bias on the children’s productions, in principle it was possible for the children to be differentially affected by the lexical aspect of the verb predicates produced with –ed by the experimenter. However, inspection of the data revealed no such effect. Neither the percentage of use of past tense –ed with prototypical –ed items nor the percentage of use
with nonprototypical –ed items differed as a function of the lexical aspect in the model.

Given the high percentages of use of past tense –ed seen in the TD–A group, these children were not included in the above ANOVA. However, the difference in past tense –ed use as a function of lexical aspect in the TD–MLU group prompted us to explore whether the same type of effect might be seen in the TD–A children. Accordingly, we conducted a mixed model ANOVA involving all three groups of children after excluding the data from all children who showed 100% use in both prototypical and nonprototypical contexts. This process resulted in the inclusion of all 16 children with SLI, 15 TD–MLU children, and 10 TD–A children. (We should note here that no child scored 0% in both prototypical and nonprototypical contexts.) A summary of the results can be seen in Table 1.

Again, a significant main effect was found for participant group, $F(2, 38) = 46.59$, $p < .001$. LSD testing indicated that the TD–A children ($M = 91.45, SD = 9.34$) produced past tense –ed to a significantly greater extent than the TD–MLU children ($M = 76.55, SD = 17.53, d = 1.11$), who, in turn, used this inflection to a significantly greater degree than the children with SLI ($M = 35.44, SD = 21.66, d = 2.10$). A main effect was also found for lexical aspect, with greater use associated with prototypical –ed items ($M = 68.56, SD = 31.08$) than with nonprototypical –ed items ($M = 59.71, SD = 27.73$). $F(1, 38) = 32.80$, $p < .001$. A significant Participant Group $\times$ Lexical Aspect interaction indicated that the lexical aspect effects were not seen in all groups, $F(2, 38) = 6.64$, $p = .003$. LSD testing indicated that the TD–MLU children produced past tense –ed with prototypical –ed items more readily than with nonprototypical –ed items ($d = 1.35$). The same held true for the TD–A children ($d = 2.48$). However, the children with SLI showed no such effect. Thus, although many of the TD–A children had reached ceiling on the past tense –ed task, the remaining children in this group showed the same lexical aspect effects seen for the TD–MLU children.

Given that the children with SLI differed from the other children in showing relative insensitivity to lexical aspect, we examined the SLI data to determine whether the factors of word frequency, segment frequency, or biphone frequency might have influenced the children’s productions. Recall that the verbs used in the prototypical –ed and nonprototypical –ed items did not differ in these characteristics. However, it seemed possible that the children with SLI might have produced past tense –ed more consistently with, for example, words of higher frequency of occurrence than with words of lower frequency of occurrence. Accordingly, for both prototypical and nonprototypical –ed items, we selected the three most frequent and three least frequent verbs according to each of these characteristics, making separate calculations for stem frequency and stem + –ed frequency. The children’s use of past tense –ed did not appear to vary as a function of these characteristics. For example, the mean percentage of –ed use across the three verbs with the highest word stem frequency was 36.50; for the three verbs with the lowest word stem frequency, the mean percentage of use of –ed was 34. When word frequency was calculated for the stem + –ed, both the three most frequent verbs and the three least frequent verbs were associated with a mean of 35% use of past –ed. The largest difference occurred with biphone frequency for stem + –ed forms. Here, past tense –ed was used to a somewhat higher degree with the three forms that had the lowest frequency (40%) than with the three forms that had the highest frequency (30%). However, when we performed the same comparison using the forms with the 4th and 5th highest frequency, and the 4th and 5th lowest frequency, the direction of the difference was in the opposite direction, with a numerically higher percentage for the forms of higher (37.5) than lower (30) frequency.
does not appear that word frequency, segment frequency, or biphone frequency was a significant influence on the use of past tense –ed by the children with SLI.

**Progressive –ing**

The children’s use of progressive –ing was examined through the same type of mixed model ANOVA used in the past tense –ed comparison. A summary of the findings can be seen in Table 2. Although the TD-A children’s percentages were considerably higher than those of the other groups, these children’s mean percentage of use of progressive –ing in nonprototypical –ing items (82.88) was below ceiling level. Nevertheless, 8 of the 16 children scored 100% in both prototypical and nonprototypical –ing items. For this reason, the TD-A children were not included in the first ANOVA computed for the progressive –ing data; only the data from the SLI and TD–MLU groups were included.

The main effect for participant group was not significant, \(F(1, 30) = 0.23, p = .632\). Likewise, there was no effect for lexical aspect, \(F(1, 30) = 0.97, p = .332\). However, the Participant Group × Lexical Aspect interaction was significant, \(F(1, 30) = 4.26, p = .048\). LSD testing indicated that the TD–MLU children were significantly more likely to produce –ing with verbs in prototypical –ing items than with verbs in nonprototypical –ing items (\(d = 0.52\)). However, the children with SLI showed no difference in –ing use as a function of the lexical aspect of the verb predicate.

Earlier we noted that two of the nonprototypical –ing items (involving blowing bubbles and sneezing) may not have been ideal in reflecting the result feature. Therefore, we repeated the ANOVA after excluding the children’s performance on these two items. Essentially identical results emerged, with no main effect for participant group, \(F(1, 30) = 0.06, p = .800\), no main effect for lexical aspect, \(F(1, 30) = 0.18, p = .677\), and a significant Participant Group × Lexical Aspect interaction, \(F(1, 30) = 6.725, p = .015\). Again, LSD testing revealed that the TD–MLU children were significantly more likely to produce –ing with prototypical –ing items (\(M = 74.69, SD = 33.77\)) than with nonprototypical –ing items (\(M = 62.13, SD = 42.19, d = 0.51\)), whereas the children with SLI did not show a difference in their use of –ing across these two types of items (prototypical –ing items: \(M = 63.94, SD = 38.11\); nonprototypical –ing items: \(M = 71.38, SD = 35.20\)).

As we did in the analysis of past tense –ed, we attempted to determine whether the TD–A children who were not at ceiling levels might show the same type of lexical aspect effect seen for the TD–MLU children. We, therefore, performed an ANOVA with all three participant groups, excluding all children who scored 100% on each lexical aspect type. (No child scored 0% on each lexical aspect type.) The resulting analysis employed 14 children with SLI, 10 TD–MLU children, and 8 TD–A children. For this particular analysis, we used all items in the prototypical and nonprototypical –ing categories. A summary of the results appears in Table 2. A main effect for participant group was not found, \(F(2, 29) = 0.99, p = .384\). However, lexical aspect proved significant, \(F(1, 29) = 8.09, p = .008\), with greater use of –ing associated with prototypical –ing verb predicates (\(M = 64.69, SD = 34.65\)) than with nonprototypical –ing verb predicates (\(M = 57.66, SD = 35.03\)). The Participant Group × Lexical Aspect interaction was also significant, \(F(2, 29) = 4.80, p = .016\). LSD testing revealed that the TD–MLU children were more significantly likely to use –ing with prototypical –ing items than with nonprototypical –ing items (\(d = 0.86\)). The same proved true for the TD–A children (\(d = 1.01\)). The children with SLI, on the other hand, showed no such difference. The lack of a significant main effect for participant group should be interpreted with some caution because one half of the children in the TD–A group used –ing at ceiling levels (100%) with both lexical aspect types and, therefore, were not included in this analysis. For those TD–A children included in the analysis, lexical aspect effects were seen.

We repeated this analysis after excluding the two items from the nonprototypical –ing items that seemed less ideal in reflecting the result feature. After removing

| Table 2: Mean percentages of use (and standard deviations) of progressive –ing in prototypical –ing items and nonprototypical –ing items. |
|---------------------------------|-------------|-------------|-------------|
|Lexical aspect                  | SLI group   | TD–MLU group| TD–A group  |
|                                | M          | SD          | M          | SD          | M          | SD          |
|All children (N = 16)           |            |             |             |             |             |             |
|Prototypical –ing items         | 63.94      | 38.11       | 74.69       | 33.77       | 90.75       | 19.69       |
|Nonprototypical –ing items      | 69.31      | 34.62       | 63.13       | 41.60       | 82.88       | 25.77       |
|Children not performing at ceiling level (SLI, N = 14; TD–MLU, N = 10; TD–A, N = 8) |            |             |             |             |             |             |
|Prototypical –ing items         | 58.79      | 38.04       | 59.50       | 34.89       | 81.50       | 25.20       |
|Nonprototypical –ing items      | 64.93      | 34.89       | 41.00       | 37.87       | 65.75       | 27.44       |
these items, 1 additional child with SLI showed 100% performance on both lexical aspect types, reducing the number of children to 13 for this group. The number of children in the TD–MLU and TD–A groups remained at 10 and 8, respectively. The results matched the results for the previous analysis. No main effect was found for participant group, $F(2, 28) = 1.00, p = .380$, but a difference was found for lexical aspect, $F(1, 28) = 4.89, p = .35$, and the Participant Group × Lexical Aspect interaction was found for lexical aspect, $F(1, 28) = 4.89, p = .35$, and the Participant Group × Lexical Aspect interaction was likewise significant, $F(2, 28) = 6.54, p < .005$. LSD testing indicated that both the TD–MLU ($d = 0.88$) and TD–A ($d = 0.88$) children were more likely to produce –ing in prototypical –ing items than in nonprototypical –ing items. For the TD–MLU children, means for the prototypical and nonprototypical items were 59.50 ($SD = 34.89$) and 39.40 ($SD = 37.89$), respectively. For the TD–A children, the respective means were 81.50 ($SD = 25.20$) and 65.50 ($SD = 31.10$). Again, the children with SLI showed no difference in use of progressive –ing as a function of lexical aspect.

Because the SLI group showed no evidence of using –ing as a function of the lexical aspect reflected in the item, we examined the data to determine if word frequency, segment frequency, or biphone frequency might have influenced these children’s productions. For each frequency metric, we examined stem frequency and stem + –ing frequency. As we did in the analyses for past tense –ed, we selected the three forms with highest frequency and the three forms with lowest frequency for both prototypical –ing items and nonprototypical –ing items. No clear evidence of frequency effects was found. Differences between high and low frequency forms were small or non-existent and varied in direction. Representative of these findings was the SLI group’s use of –ing with 65% of the words with low frequency and with 70% of the words with high frequency.

**Auxiliary was/were**

The progressive –ing task was, by design, intended to assess the children’s use of this inflection when a prototypical –ing or nonprototypical –ing action was occurring continuously in the past. This past progressive context permitted us to evaluate the children’s use of auxiliary was and were. These auxiliary forms share the past tense feature with the inflection –ed. However, unlike –ed, they overlap very little (if at all) with grammatical aspect and should probably not be influenced by the lexical aspect of the verb predicate. A summary of the results is provided in Table 3. We report data only on those children in each group for which there were at least five obligatory contexts for each lexical aspect. Obligatory contexts were defined as contexts in which the child produced both the subject and the main verb inflected with –ing. To ensure a sufficient number of obligatory contexts, we combined the items targeting was with those targeting were. (We show the errors associated with each of these morphemes in Table 4.)

As can be seen in Table 3, the TD–A children performed at high levels and, therefore, their data were not included in the ANOVA. A significant main effect was found for participant group, $F(1, 21) = 8.61, p < .008$, with higher degrees of use of was/were by the TD–MLU children ($M = 89.38, SD = 16.40$) than by the children with SLI ($M = 67.05, SD = 30.02$). Neither lexical aspect, $F(1, 21) = 0.12, p = .727$, nor the Participant Group × Lexical Aspect interaction, $F(1, 21) = 0.04, p = .835$, was significant.

Unlike the case for past tense –ed, where all errors were productions of the bare stem, the children’s errors in contexts obligating was and were did not take a single form. In Table 4, we provide a breakdown of the children’s scorable responses. For the children with SLI, approximately 9% of the scorable responses were omissions of either was (14/149) or were (11/123). The remaining errors by the SLI group might be considered “near-miss” errors in that the produced form differed from the target in either number or tense. For example, 22% (27/123) of the responses to the plural were items were productions of the singular was, and 11% (13/123) were productions of the present plural form are. Similarly, 5% (8/149) of the

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**Table 3.** Mean percentages of use (and standard deviations) of auxiliary was/were in progressive –ing contexts in prototypical –ing items and nonprototypical –ing items.

<table>
<thead>
<tr>
<th>Lexical aspect</th>
<th>SLU group (N = 11)</th>
<th>TD–MLU group (N = 12)</th>
<th>TD–A group (N = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Conventional scoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prototypical –ing items</td>
<td>66.00</td>
<td>34.72</td>
<td>89.67</td>
</tr>
<tr>
<td>Nonprototypical –ing items</td>
<td>68.09</td>
<td>26.15</td>
<td>89.08</td>
</tr>
<tr>
<td>Was for were treated as appropriate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prototypical –ing items</td>
<td>73.09</td>
<td>23.06</td>
<td>92.17</td>
</tr>
<tr>
<td>Nonprototypical –ing items</td>
<td>73.73</td>
<td>23.03</td>
<td>91.83</td>
</tr>
</tbody>
</table>

Note. Only children with at least five obligatory contexts for each lexical aspect are included.
responses to the singular *was* items were productions of the present singular form *is*. Less expected were the children’s productions of *were* for *was* items, constituting approximately 5% (7/149) of their responses to these types of items. Although (past) tense was appropriate in these responses, it seemed unusual for plural forms to be produced in place of singular forms. Note that there were no two-feature errors (number and tense) such as *is* in place of *were* or *are* in place of *was*, even though both *is* and *are* were used as substitute forms for other types of items.

The TD–MLU children made fewer errors than the children with SLI. Omissions, as well as one-feature errors such as *was* for *were*, *are* for *were*, and *is* for *was*, could be identified in their responses. They did not commit the plural-for-singular error of *were* for *was* that was observed in the SLI data. However, one two-feature error was seen: *are* for *was*. Errors for the TD–A children were infrequent. Although omissions were seen, most errors were substitutions of *was* for *were*. Approximately 8% of the TD–A children’s auxiliary productions in contexts designed for *were* proved to be productions of *was*.

Table 4. The children’s scorable responses in contexts obligating auxiliary *was* and *were*.

<table>
<thead>
<tr>
<th>Response</th>
<th>Target</th>
<th>(N = 11)</th>
<th>(N = 12)</th>
<th>(N = 14)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SIL group</strong>&lt;br&gt;was</td>
<td>120</td>
<td>165</td>
<td>215</td>
<td></td>
</tr>
<tr>
<td>were</td>
<td>7</td>
<td>8</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><em>is</em></td>
<td>8</td>
<td>6</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>are</em></td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>omission</td>
<td>14</td>
<td>5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td><strong>TD–MLU group</strong>&lt;br&gt;was</td>
<td>27</td>
<td>8</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>were</td>
<td>72</td>
<td>126</td>
<td>163</td>
<td></td>
</tr>
<tr>
<td><em>is</em></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><em>are</em></td>
<td>13</td>
<td>9</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>omission</td>
<td>11</td>
<td>4</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

Note. Values are total frequencies for each participant group. Correct responses appear in bold.

were in Standard American English might be a characteristic of a nonstandard dialect that we had not anticipated. If so, counting these productions as errors—as we did in the preceding analysis—might have distorted the findings. We, therefore, repeated the above analysis of the data from the SLI and TD–MLU groups, counting all instances of *was* in place of *were* as an appropriate, rather than incorrect, response. Although the mean percentages “correct” increased to a somewhat greater degree for the children with SLI (from \(M = 67.05, SD = 30.02\) to \(M = 73.41, SD = 22.49\)) than for the TD–MLU children (from \(M = 89.38, SD = 16.40\) to \(M = 92.00, SD = 12.51\)), the significant difference between the participant groups seen in the preceding analysis was seen again in this analysis, \(F(1, 21) = 10.58, p = .004\). Neither lexical aspect, \(F(1, 21) = 0.15, p = .706\), nor the Participant Group \(\times\) Lexical Aspect interaction, \(F(1, 21) = 0.05, p = .823\), was significant. A summary of the data appears in Table 3. The significant group difference indicates that even if the use of *was* in contexts usually obligating *were* represented a feature of a nonstandard dialect, the children with SLI were, nevertheless, less successful in their use of the auxiliary forms than were the TD–MLU children. Furthermore, as all 28 of the remaining substitutions of the SLI group were also one-feature errors, the conclusion that these children’s substitution errors were always “near-miss” errors continues to apply. In the Discussion section, we return to the issue of nonstandard dialect use.

### Discussion

Both the TD–MLU and TD–A children showed evidence of using past tense *–ed* and progressive *–ing* to different degrees, depending on the lexical aspect features reflected in the item. The children with SLI showed no such effect. The effect seen for the two TD groups is aptly termed a *lexical aspect effect* because these are not differences due, for example, to certain lexical aspect features being more accommodating to inflections in general. Recall that for past tense *–ed*, significantly higher percentages of use were seen for verb predicates reflecting nondurative, telic, and result features than for verb predicates reflecting durative and atelic features. However, for progressive *–ing*, the reverse was true; verb predicates reflecting durative and atelic features were associated with significantly greater use than verb predicates reflecting nondurative, telic, and result features.

These differences did not appear to be attributable to any other factors that we could discern, such as word, segment, or biphone frequency of occurrence. However, two important qualifications must be added to this point. First, we employed the Francis and Kucera (1984) calculations on the basis of written language for our measure of
word frequency because they offered a means of estimating not only the frequency of the word stem but also of the stem when it combined with the inflections of interest in this study. However, it could be the case that word frequency effects are operative when measured in terms of the spoken language input directed toward young children. For example, earlier it was noted that Shirai and Andersen (1995) found that mothers of young children were more likely to use –ed with verb predicates that reflected nondurative, telic, and result features, and were more likely to use –ing with verb predicates that reflected durative and atelic features. This suggests that, in the spoken input directed at young children, dropped may be more frequent than played, even though Francis and Kucera show very similar frequencies for these two forms. To examine this issue in a fully satisfactory manner, one would have to obtain large samples of the adult speech directed toward each child participant.

The second qualification is that segment or phonotactic frequency as measured through biphone frequency may well influence children’s verb use when other factors are controlled. In the present study, we selected the verbs on the basis of lexical aspect features within the broader predicate, and, after examination, found that the verbs in the two lexical aspect categories did not differ in segment or biphone frequency. However, if we were to select verbs that were matched on lexical aspect features (and perhaps other factors such as word length and stress pattern), it might well be the case that the verbs with, say, higher biphone frequencies would be used with greater proficiency by the children. Factors such as biphone frequency were not the focus of this investigation; instead, we examined these factors only to ensure that the intended lexical aspect distinctions were not confounded by unintended frequency differences.

At the outset of this article, we noted that sensitivity to the aspncal properties of verb predicates could be beneficial because it might hasten the development of children’s hypotheses about the function of the accompanying inflections. That is, by associating the inflections with the aspncal characteristics of the verb predicates, children might have a starting point from which to develop and refine their notion of the role of these inflections. For example, initially associating –ing with the durative feature may give children a head start in arriving at the correct hypothesis that this inflection is appropriate for ongoing actions even where the actions have recognizable points of termination. Viewed from this perspective, the finding that only the two TD groups showed differences in their use of past tense –ed and progressive –ing as a function of lexical aspect invites the interpretation that a lack of sensitivity to lexical aspect might contribute to language learning difficulties.

To evaluate the merits of this interpretation, it is necessary to consider one important detail. Even though the children with SLI showed no difference in the use of –ing as a function of lexical aspect, they did not differ from the TD–MLU children in their overall use of this inflection. This finding raises the possibility that the relatively poor use of –ed by the SLI group was unrelated to the fact that they (alone) produced this inflection to the same degree, regardless of lexical aspect type.

We acknowledge this possibility. It might be the case that TD children’s early use of –ed is more closely tied to lexical aspect than that of children with SLI but that there are no particular acquisition benefits to this sensitivity. Thus, rather than suffering the consequences of not pursuing a potentially efficient route to adultlike use of –ed, children with SLI may be experiencing problems of a different type. Evidence supporting this alternative view was seen in the lower percentages of use of auxiliary was/have to the children with SLI relative to the TD–MLU children. These auxiliaries mark past tense but do not seem related to aspect in any clear way; certainly, the TD children’s use of these auxiliaries did not seem to be influenced by lexical aspect.

On the other hand, recall that a lexical aspect–based route to learning grammatical function is more circuitous for –ed than for –ing. In the case of –ing, children may initially associate the inflection with durative and atelic features as seen in predicates that include the verb play, as these frequently express continuous action. Gradually, the children must recognize that –ing applies as well to other verb predicates that mark continuous action, even when their meanings (e.g., fall, build) are quite different from that of play. However, this is a matter of having an initial notion of (progressive) grammatical aspect and expanding its range of application.

The case of –ed is different. Tense and perfective aspect are confounded in English. Thus, an initial association of –ed with predicates that include verbs such as drop—due to the clear end point of the actions to which they refer—is not at all misdirected. However, when children gradually expand the range of application of this inflection, they must not only extend the notion of (perfective) grammatical aspect to other types of verb predicates but also broaden the use of this inflection to include the description of past events, even when their completion is beside the point. That is, they must incorporate past tense into their range of application of –ed. This extra work does not have to be accomplished by –ing, as this inflection remains a grammatical aspect marker in all contexts. These differences between –ing and –ed might render the acquisition process more difficult for –ed than for –ing for all children. Furthermore, it might be the case that a guiding process, however indirect, is not only beneficial but essential if –ed is to be acquired adequately. Thus, even though the children with SLI showed no evidence of a lexically based pattern of use for
either –ing or –ed, the consequences may have been only minor for the acquisition of the former. (Recall that these children made less use of –ing than the TD–A children but not the TD–MLU children.) However, the consequences for the acquisition of –ed could have been significant. (Indeed, these children made less use of –ed than the TD–MLU children as well as the TD–A children.)

Clearly, longitudinal studies of the use of these inflections by children with SLI would be informative. The present study provides only a single picture of the children’s inflection use as it relates to lexical aspect. Future work should attempt to determine whether, for example, children with SLI deviate from TD children from the outset, never using their inflections in close association with verb predicate semantics, and whether, as implied here, this insensitivity has a detrimental effect on their acquisition of, especially, –ed.

An alternative finding might be that, initially, children with SLI do, in fact, vary their use of –ed as a function of the lexical aspect of verb predicates. This may be especially true in spontaneous speech. (Recall that the present study employed probes, not spontaneous speech samples, to assess the children’s use of –ed and –ing.) It could be the case that when children with SLI have greater control of the verb predicates to use, as in spontaneous speech, they show the same effects observed for TD–MLU and TD–A children on the probes of the present study. On the other hand, such a pattern could merely reflect frequency effects in the input, where the children are influenced by the fact that particular verb predicates are more likely to be heard with –ed because of their nondurative, telic, and result features. With longitudinal data, it can be determined whether, as children with SLI expand their inventory of verb predicates, they use these initial asymmetries of –ed use as a guiding process. Certainly, any such effect would be helpful. As noted earlier, these children’s difficulties with –ed are notorious, and the SLI group’s relatively limited use of auxiliary washwere in the present study clearly indicates that problems with tense can occur even when grammatical aspect is not a factor. The question for future research, then, is whether insensitivity to lexical aspect can be a contributing factor, and, if so, how much of the difficulty it might be able to explain.

Although the principal aim of this study was to explore the possible role of lexical aspect in children’s use of –ing and –ed, our task for eliciting productions of progressive –ing provided us with a glimpse into the less commonly studied tense/agreement morphemes, auxiliary was and were. Given earlier findings for copula and auxiliary is and are, we expected a very large proportion of omissions on the part of the children with SLI. Indeed, these children did omit was and were more frequently than either of the TD groups. However, omissions were not their dominant error type. Substitution errors were more frequent than omissions for these children.

The substitution errors seemed to have a principled basis. All substituted forms differed from the appropriate form by either tense or number but not both. It is possible that the productions of was in contexts obligating were (in Standard American English) were instances of nonstandard dialect use that we had not anticipated. Recall that even the TD–A children showed some evidence of productions of this type; approximately 8% of their auxiliary productions in contexts designed for were proved to be productions of was. However, when we reanalyzed the data after treating the was-for-were substitutions as correct productions, the children with SLI continued to perform at significantly lower levels than the TD–MLU children.

Until studies are conducted on the use of were by adults in the community from which our participants were sampled, we will not know if nonstandard dialect use was a factor at all in this investigation. However, it seems even less likely that a factor of this type influenced our findings for past tense –ed. As noted earlier, all of the children were White, and nonstandard dialects of English used by White speakers, even if they allow zero-marking of –ed, do so at rates that are very low. For example, Oetting and Garrity (2006) found that both 4- and 6-year-old typically developing speakers of Southern White English marked past tense in over 90% of contexts in which it would be used in Standard American English.

Along with productions of was in contexts designed for were, there were other types of one-feature substitutions by the TD–MLU children and, especially, the children with SLI. For the latter group, is and are were among the auxiliary forms that were incorrectly produced as substitutes. Yet each time is was used, it replaced a singular past form; likewise, each time are was produced, it replaced a plural past form. Given that is was produced in error on 8 occasions and are was produced in error on 13 occasions, there were, in principle, opportunities to observe two-feature errors such as is in place of were or are in place of was. The fact that these errors were not seen suggests that the children were not selecting auxiliary forms at random. It appeared as if even when they erred, these children had a sense of some of the features that should be included in their production.

These substitutions are a departure from the errors usually reported for preschool-aged children with SLI. When children with SLI fail to use an appropriate auxiliary be form in an obligatory context, they most often produce the utterance with no auxiliary at all. Rice, Wexler, and their colleagues (e.g., Rice et al., 1995; Rice & Wexler, 1996; Rice et al., 1998) treat such utterances as instances in which the child produces a nonfinite option (compare, for example, the auxiliary-less child utterance...
Mommy working on the computer with the adult nonfinite clause (I see Mommy working on the computer). This characterization may well be accurate for the errors classified as omissions in the SLI data of the present study. Within the Rice and Wexler (1996) account, when an auxiliary form is produced, it is almost always correct, because children presumably have knowledge of tense (and agreement), except for the fact that it is obligatory in main clauses. Data reported by Rice et al. (1995) and Hadley and Rice (1996) show accuracy levels of 95% and higher when an auxiliary be form is actually produced. Percentages were somewhat lower in the present study. Of the auxiliary forms produced in contexts that obligated was, 89% (120/135) were, in fact, productions of was. This percentage was lower than the corresponding percentage for the TD–MLU children (96%, 165/172). The difference between the two groups was larger for contexts obligating were (72/112 or 64% for the SLI group, 126/143 or 88% for the TD–MLU group). The ages of the children with SLI in the present study were comparable to those seen in other studies. However, the particular auxiliary forms examined here—was and were—have, at best, been included as part of a larger group of auxiliary forms in previous studies. Therefore, difficulties may have been apparent in the present study because we focused specifically on these two less well-studied forms. The findings suggest that difficulties with tense in SLI may be of two types. Children with SLI may have a primary problem of allowing optional use of nonfinite forms in finite contexts. In addition, they may have a secondary problem of a delay in learning the precise finite function of was and were, such that even when a finite option is selected in contexts obligating one of these forms, the children sometimes select an inappropriate form. This issue seems worthy of future investigation.

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Appendix A. Probe items.

Probe Items for Past Tense –ed

Prototypical –ed Items
1. Grover... opened his door/his window
2. Blue... dumped out his blocks/his beads
3. Mickey... closed his Minnie book/his Mermaid book
4. Blue... knocked over his pink pins/his green pins (= bowling pins)
5. Mickey... dropped his book/his hotdog
6. Blue... jumped over his chair/his desk
7. Zoe... scared Woody/Buzz
8. Blue... covered Elmo/Zoe
9. Blue... kicked his yellow ball/his pink ball
10. Francine... popped the pink balloon/the orange balloon

Nonprototypical –ed Items
1. Cookie Monster... raked grass/leaves
2. Cookie Monster... danced with Spiderman/Barney
3. Grover... crawled on his soft floor/his Lego floor
4. Cookie Monster... played with Big Bird/Bert
5. Mickey... hopped on one foot/two feet
6. Zoe... pushed her motorcycle/her train
7. Arthur... pulled a boy/a girl
8. Francine... carried her suitcase/her backpack
9. Arthur... brushed his brown dog/his Dalmation
10. Arthur... chased a bee/a butterfly

Probe Items for Progressive –ing

Prototypical –ing Items
1. The puppies were driving
2. Minnie Mouse was drawing
3. The baby was crying
4. The man was skating
5. The bugs were sliding
6. Franklin was running
7. The girls were raking (grass)
8. Ernie was singing
9. The girl was sleeping
10. Betty Lou was sweeping
11. The planes were flying
12. The girls were rocking
13. The ducks were swimming
14. Woody was riding
15. The people were dancing
16. The soldiers were marching

Nonprototypical –ing Items
1. The girls were kicking the balls
2. The fish was blowing bubbles
3. The cat was cutting paper
4. The girl was folding the blankets
5. The girls were picking the flowers
6. The boys were emptying the trash
7. The bear was tying knots
8. The girls were breaking the sticks
9. Batman was jumping over chairs
10. They were opening the presents
11. The firemen were closing the windows
12. The clown was knocking over the animals
13. The elephant was sneezing
14. The woman was covering the babies
**Appendix B. Frequency measures.**

**Frequency measures for the verbs used in the past tense –ed probes**

Mean (and standard deviation) word frequency of occurrence (log frequency).

<table>
<thead>
<tr>
<th>Item type</th>
<th>Stem frequency</th>
<th>Stem + –ed frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototypical –ed items</td>
<td>1.0478 (0.5880)</td>
<td>1.2427 (0.4898)</td>
</tr>
<tr>
<td>Nonprototypical –ed items</td>
<td>1.1256 (0.6758)</td>
<td>1.1271 (0.6083)</td>
</tr>
</tbody>
</table>

Segment and biphone frequency of occurrence.

<table>
<thead>
<tr>
<th>Item type</th>
<th>Segment frequency</th>
<th>Biphone frequency</th>
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</thead>
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<td></td>
<td>Stem</td>
<td>Stem + –ed</td>
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<tr>
<td>Prototypical –ed items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.14696</td>
<td>0.21174</td>
</tr>
<tr>
<td>SD</td>
<td>0.04169</td>
<td>0.05740</td>
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<tr>
<td>Nonprototypical –ed items</td>
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<td></td>
</tr>
<tr>
<td>M</td>
<td>0.17591</td>
<td>0.24221</td>
</tr>
<tr>
<td>SD</td>
<td>0.06672</td>
<td>0.05729</td>
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</tbody>
</table>

**Frequency measures for the verbs used in the progressive –ing probes**

Mean (and standard deviation) word frequency of occurrence (log frequency).

<table>
<thead>
<tr>
<th>Item type</th>
<th>Stem frequency</th>
<th>Stem + –ing frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prototypical –ing items</td>
<td>1.1404 (0.5367)</td>
<td>1.2441 (0.5696)</td>
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<td>Nonprototypical –ing items</td>
<td>1.1049 (0.67752)</td>
<td>0.9262 (0.56810)</td>
</tr>
</tbody>
</table>

Segment and biphone frequency of occurrence.

<table>
<thead>
<tr>
<th>Item type</th>
<th>Segment frequency</th>
<th>Biphone frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stem</td>
<td>Stem + –ing</td>
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<tr>
<td>Prototypical –ing items</td>
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<tr>
<td>M</td>
<td>0.17756</td>
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<td>SD</td>
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<td>0.04144</td>
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<tr>
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<td>M</td>
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<td>0.19710</td>
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<tr>
<td>SD</td>
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<td>0.05481</td>
</tr>
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