Grammatical Categories of Children with Specific Language Impairments

Mabel L. Rice

The condition of interest in this chapter, as elsewhere in this volume, is that of specific language impairment (SLI). This condition is defined operationally as evident in individuals who demonstrate all the prerequisites for language acquisition, such as adequate intellectual ability, intact auditory acuity, neuromotor mechanisms free from defect, and socioemotional competency, but who, nevertheless, demonstrate difficulties with language acquisition. Advances in what we know about this condition have led to a reformulation of how we think about the grammatical limitations of individuals who demonstrate SLI (for reviews of the literature, see Bishop, 1992; Johnston, 1988; Leonard, 1989; Rice, 1991). Many scholars now view SLI as a possible long-term impairment, one that persists into adulthood. It seems to be a longstanding condition, rather than a temporary delay in the onset of language milestones, although the surface symptoms change over time. It is important to note that this is viewed as a likely language impairment in adulthood, not merely a language-turned-reading-impairment, as school-age learning disabilities can be regarded. Another major change in our understanding of this disorder is the recognition that individuals affected with SLI tend to cluster within families (cf. Tomblin & Buckwalter, chap. 2, and Crago & Gopnik, chap. 3, this volume). This finding leads to a reconsideration of possible etiological factors in a way that includes a plausible role for genetic mechanisms of transmission. Finally, another and very significant rethinking is that

I would like to acknowledge the contributions of Ken Wexler. Collaborative work with Ken has shaped much of my understanding of the linguistic frameworks herein. His encouragement of my efforts and his assistance in working out the formulations of the Spec, head, and Optional Infinitive accounts of SLI are greatly appreciated. Whatever inaccuracies and errors of interpretation evident in this paper are my own. I also wish to acknowledge the assistance of my students, Janna Oetting, Soyeong Fae, and Pat Cleave, as well as Mary Howe, Research Associate, with data analyses and interpretation.
with regard to the nature of the language deficit. At issue is where to place the locus of the problem. One dominant view has been a language delay account, in which SLI is viewed as difficulty with some general learning mechanism that initiates the process of language acquisition. Alternative views have focused on processing limitations, in which SLI is thought to be a particular problem with processing the input stream of spoken language. More recently, limited linguistic mechanisms have been proposed, in which selective deficits in the underlying mental representations of linguistic structures are postulated.

This chapter addresses the issue of how to characterize the nature of the language deficit exhibited by children with SLI. The topics are presented in the following order. First is a synopsis of three interpretations of the morphological deficits of children with SLI, highlighting the significance of two English morphemes—regular plurals and verb agreement. Following that is a more detailed discussion of what is involved in the use of these morphemes. Next is a description of recent findings obtained in our laboratory of how children with SLI perform on these morphemes. After identifying some interesting details of the acquisition patterns, a functional categories account of morphosyntax is introduced. This perspective is then applied to the data available from children with SLI, with the identification of two new linguistic accounts of morphological deficits. After that, the competing models are re-evaluated, followed by a discussion of future research directions and clinical implications.

I argue that there is much to be gained by close scrutiny of grammatical particulars and associated theoretical models. At the same time, I also recognize, and have argued elsewhere, that the surface manifestations of difficulties with language acquisition can and do cut across other language dimensions. Word acquisition is often vulnerable (cf. Rice, Buhr, & Nemeth, 1990; Rice, Buhr, & Setting, 1992; Rice, Cleave, Setting, & Pae, 1993; Rice, Setting, Marquis, Bode, & Pac, in press), including limited verb lexicons (cf. Rice & Bode, 1993). Phonological deficits are often concomitant symptoms. Furthermore, the relation between language impairment and social competence is intricate and clinically very significant (cf. Gertner, Hadley, & Rice, 1993; Hadley & Rice, 1991; Rice, 1993a, b; Rice, Hadley, & Alexander, in press; Rice, Sell, & Hadley, 1991).

Full understanding of SLI will require, ultimately, a model that can reasonably integrate these dimensions. That goal rather surpasses the robustness of current models, however. Until such time as comprehensive models are viable, then, work must proceed on multiple, but somewhat separate, fronts if we are to arrive at a full characterization of specific language impairment. It may be that more than one “problem” is evident, with more than one “cause,” or, alternatively, that some surface problems derive from other underlying problems, or, possibly, the various surface manifestations are all part of the same underlying faulty mechanisms or acquisition processes.

At the same time, morphology is a well-documented locus of difficulty for individuals with SLI, and any successful account of this condition must be able to predict the specific problems in this area. Thus, detailed descriptions of morphological competencies are essential for characterizing the nature of the deficits. There are also some clearly articulated and competing hypotheses about the source of morphological difficulties. Thus, this is an area of work where it is possible to bring a theoretical perspective to empirical evidence, and, conversely, to bring evidence to theoretical claims.

THREE INTERPRETATIONS OF MORPHOLOGICAL DEFICITS

Three current interpretations of the morphological deficits of children with SLI are of interest here. The models differ in the status of the language mechanisms attributed to the child, the locus of the problem, and predicted patterns of morphological deficit. These models, and related predictions, are summarized in Table 1.

Delayed Language

Advocates of this account (cf. Curtiss, Katz, & Tallal, 1992; Lahey, Liebergott, Chesnick, Menyuk, & Adams, 1992) conclude that children with SLI do not show unusual grammars or specific difficulties with particular morphemes. Instead, their language is simply slower in development. This Delayed Language model has been evident in the literature since the earliest studies. Adherents to this position argue that there is no difference between the grammar of children with SLI and that of younger, linguistically matched, typically developing children. Thus, the language mechanisms of SLI are regarded as similar to those of typically developing children, but, for unspecified reasons, they are late in activating and/or they require a longer period of time for completion. The distinction between onset and rate of acquisition mechanisms versus underlying linguistic representations is a useful one, in that it is plausible that acquisition mechanisms could be implicated at the same time that underlying structures could be sound. Another valuable contribution of this model is the designation of a language-equivalent normative comparison group as the relevant reference group. This comparison has come to constitute the null hypothesis for studies of the grammar of children with SLI. The prediction of the Delayed Language model for morphology is that children with SLI should not differ from a comparison group of younger language-matched children. However, demonstration of group differences offers strong evidence of focal areas of linguistic deficiencies. Thus, the prediction for the two English morphemes of interest here, regular plurals and verb agreement, is that the mean accuracy levels for the children in the SLI group should not differ from those of the normal comparison group.
Table 1. Models of morphological deficits

<table>
<thead>
<tr>
<th>Model</th>
<th>Status of linguistic mechanism</th>
<th>Locus of the problem</th>
<th>Relevant comparisons</th>
<th>Predicted outcomes (English morphology)</th>
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<tbody>
<tr>
<td>Language Delay</td>
<td>Intact</td>
<td>Delayed onset; faulty rate of acquisition mechanisms</td>
<td>SLI = Language equivalent (LE)</td>
<td>General delay; morphological profile corresponds to normal acquisition. For plurals and agreement, SLI = LE</td>
</tr>
<tr>
<td>Surface Account</td>
<td>Incomplete representations</td>
<td>Morphophonological; unstructured bound and closed class morphemes are systematically filtered from the input</td>
<td>SLI = LE; SLE &lt; CA</td>
<td>Omissions of certain unstressed morphemes For regular plurals and subject/verb agreement marking, bare stems</td>
</tr>
<tr>
<td>Limited Linguistic Mechanisms/Structures</td>
<td>Selective deficits</td>
<td>Morphosyntactic; morphology as manifestation of syntactic relations and principles</td>
<td>SLI = LE; SLE &lt; CA</td>
<td>Difficulties with clusters of syntactically related morphemes</td>
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<tr>
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<td></td>
<td>1) Missing Agreement for plurals, SLI = LE; for agreement, SLI &lt; LE</td>
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<td>2) Missing Feature: for plurals and agreement, SLI &lt; LE</td>
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<td>3) Spec, head: Plurals: SLI = LE for Det + noun; SLE &lt; LE for quantifier + noun Agreement, SLI &lt; LE</td>
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<td>4) Optional infinitive: for plurals, no prediction; for agreement, SLI &lt; LE</td>
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*Introduced in this chapter.*

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Limited Mechanisms

Another interpretation focuses on the underlying linguistic structures, and posits that the source of distortion is found in the linguistic mechanisms that support normal acquisition. This model has been advocated by Chafe (1969, 1972), who concluded that German-speaking children who lack full lexical knowledge (as in Chafe's study of the child's perception of the inheritance of information in utterance) are more likely to have problems with the production of grammatical morphemes, and who tend to omit the affixes, leading to an underproduction of the form of the morphological deficit. These predictions correspond to the exceptional clinical impressions of children with SLI, as children who are more likely to have problems with production of grammatical morphemes, and who tend to omit the affixes, leading to an underproduction of the form of the morphological deficit. Furthermore, the prediction that SLI can be regarded as normal language learners who must compensate for input that is distorted in certain ways. For the two morphemes discussed here, the prediction put forth by Leonard et al. is that by Leonard and Berman (1989), pointing out the limitations of the input, so that the ability to form grammatical paradigms is hampered by the absence of certain unstressed morphemes not only for English-speaking children but also for children with SLI.

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Surface Account

One way in which the mechanisms of language acquisition could be impaired is by an inability to process the incoming stream of speech sounds. Several versions of a simple model have been proposed, with some models operating at base levels of perception (e.g., Talal & Pierce, 1973) and others more concerned with the acquisition process. For example, the Surface Account, first proposed by Leonard (1989; Leonard and Berman, 1989) and recently modified by Bell (1994, in press), is based on the idea that children with SLI have an impaired ability to process the incoming stream of speech sounds. This account is motivated by the observation that children with SLI have difficulty processing the input, leading to a deficit in the ability to form grammatical paradigms. For the two morphemes discussed here, the prediction is that by Leonard and Berman (1989), pointing out the limitations of the input, so that the ability to form grammatical paradigms is hampered by the absence of certain unstressed morphemes not only for English-speaking children but also for children with SLI.
tures Model). These features were thought to be marked on each lexical item, and to trigger related morphological rules. The claim was that the affected individuals were missing feature-marking for the features of number, gender, animacy, mass/count, proper names, tense, and aspect. For example, number marking on the noun would be needed for plural marking. The concept of plurality could be available as a semantic notion, but would not be marked for morphological expression. The relevant prediction, then, is that neither plurals nor agreement would be marked correctly, because of the missing feature of number, which is essential for both.

It is important to note the contrast between the limited linguistic mechanisms perspective and the previous accounts. The level of analysis shifts significantly from the surface properties of morphemes to underlying linguistic representations or mechanisms. In turn, following the tenets of contemporary linguistic theory, the linguistic mechanisms are thought to be part of a universal grammar that is under the direct control of genetic mechanisms. Thus, it is plausible to predict a pattern of familial involvement that is consistent with known mechanisms of genetic transmission. Therefore, this model puts the problem squarely in language-specific deficits that are likely to be inherited.

I argue that this model warrants full consideration. The predictions of the two accounts reviewed so far, those of Missing Agreement Control and Missing Feature, differ somewhat in that the former predicts selective impairment of agreement marking but not plurals, whereas the latter predicts difficulties with both.

ENGLISH REGULAR PLURALS AND VERB AGREEMENT

Consider what is involved in the use of English regular plurals and verb agreement marking. The two morphemes share the same surface form (if we ignore some allomorphic variations), a form that is unstressed and of low phonetic salience. So both are vulnerable for input processing (cf. Leonard et al., 1992). But the linguistic functions of the two morphemes differ.

For the plurals, we restrict our analysis to count nouns, the names of things such as dog and cat, and the regular plural marking, the -s affix. The plural carries a referential assignment, that of referring to numerosity. Dog means a single dog; dogs refers to more than one dog. There is reason to believe that even young children with SLI do not have trouble with the semantics of plurals (i.e., they seem to know the difference between one and more than one thing, and use terms such as lots of to indicate plurality). The question is whether they can convert that knowledge into linguistic form, to mark plurality on the noun. Henceforth, number marking is referred to as NUM; + NUM indicates plural contexts; and - NUM singular. Note that full control of NUM marking requires selectivity of application; that is, selecting the appropriate form class, marking NUM on nouns only. It also requires contrastivity; that is, marking NUM as + only in cases of plurality and not in cases of singularity. Finally, as children learn the rules for NUM marking, they may overgeneralize this rule to exceptional cases, such as mans and fishes. Thus, selectivity, contrastivity, and overgeneralization can serve as linguistic criteria for mastery of NUM. Much of the current literature about plural acquisition, and the competencies of children with SLI, have focused on these levels of NUM marking.

Another kind of marking is relevant at linguistic levels beyond the noun, and is relevant for understanding the nature of the grammatical representations of children with SLI. NUM marking must agree with other information in the noun phrase and the verb phrase. Articles are marked for NUM and this marking must agree with the noun NUM. Thus, a dog or this dog shows agreement, as does these dogs, but *these dog or *a dogs does not. Also, in English, numerical quantifiers are marked for NUM and must agree with the noun NUM marking. Thus, one dog or two dogs shows agreement, but not *one dogs or *two dog.

Verbs can be marked for tense ( unlike nouns), person (a nonreferential linguistic marking), and NUM. The class of verbs of interest here are the matrix, or lexicalized, verbs that can serve as main verbs in a sentence (e.g., walk). So, in English, the final -s morpheme (e.g., he walks), marks present tense, third person, and singular. The final -s is also thought to be marked for agreement, in that the person and NUM markings must agree with the person and NUM markings on the subject. Thus, he goes is acceptable, but *he go or *they goes is not, nor is *I go or allowed.

EVIDENCE FROM ENGLISH-SPEAKING CHILDREN WITH SLI

The evidence reported here is drawn from a study of 50 English-speaking 5-year-old children with SLI. These children's spontaneous language productions were compared to those of a comparison group of 58 younger, typically developing children of equivalent mean length of utterance, whose mean age was 38 months. Because the study is reported in considerable detail elsewhere (Rice & Oetting, 1993), the description here highlights the key findings relevant to the subsequent discussion.

The procedures consisted of computer-assisted transcript analyses, which proceeded in phases. First, a summary measure of the mean percent correct in obligatory contexts was calculated for each group, and the group performance levels were compared. For plurals, the means for the two groups were: SLI, 83%; language-matched comparison, 93%. This difference is statistically significant, p < .01. For third person singular marking on the verb, the means were: SLI, 36%; language-matched group, 54%, also statistically significant, p < .01.
At first glance, then, the findings do not support the Delayed Language account (because of the better performance of the control group for both morphemes, a finding not predicted by this model). However, the group means are consistent with the predictions of the Surface Account. Relative to their language-equivalent peers, the SLI group had lower overall performance on the two unstressed morphemes. Yet the mean performance levels for the plurals are quite high for the SLI group, at or near conventional levels of mastery, suggesting that plural acquisition may be more robust than indicated by a simple group comparison.

In order to evaluate the children’s plural acquisition further, the transcripts were examined for evidence of selectivity, contrastivity, and overgeneralizations. A further criteria, that of productivity, was measured by tallying the number of different nouns marked for NUM. The findings are as follows.

Both groups marked NUM on multiple noun stems, and neither group had problems with selectivity (NUM marking appeared on nouns and not other form classes). Children in the SLI group, as well as children in the control group, made creative errors of overregularization, such as *manz and *herselves. The contrastivity analyses also revealed similarities between the groups. The transcripts were searched for instances of misapplications of plurals to singular nouns (i.e., toys when the referent was one toy). There were such errors in both groups, although the overall rates were low (2.6% for SLI, 3.2% for MLU matches). However, the groups did differ in the other form of contrastivity error, that of zero marking for plurals (i.e., toy for toys). For the SLI group, the average percent of zero marking per child was 16% (53/404); for the MLU matches, these errors were evident in 7% of the nouns (38/473), a statistically significant difference (p < .01).

What are we to make of these findings? On some indices, the SLI group seems to have control of NUM markings on nouns. The overregularizations are presumptive evidence of rule acquisition; + NUM affixes are restricted to nouns, and appear on multiple nouns; and + NUM markings are seldom misapplied to − NUM nouns. (In a subsequent study by Oetting & Rice [1993], with independent samples of 5-year-old children with SLI and control groups of typically developing children, the finding of robust use of plurals by affected children is replicated for plural affixation and observed further in noun compounding tasks.) The problem seems to be with the − NUM markings on the nouns, the bare stems with omitted affixes. What is happening here?

The answer to that question requires consideration of agreement marking on the noun. Inspection of the transcripts revealed that the − NUM occurrences depended upon the configuration of the components within the noun phrase. Concordance listings were generated of all instances of plural marking and coded plural errors (including bare stems), and coded errors with articles. Almost all the instances of − NUM could be classified into one of two categories. One was that of determiner/noun, as in *those bottle. The other was that of numerical quantifier, as in *two bottle. Errors appeared in the transcripts of both groups of children. An overall error rate was calculated by searching for the following determiners, a, an, this, that, these, those, every, and some and the following numerical quantifiers, one, two, three, four, five, and nine, and determining a mean percent correct use in obligatory contexts. The determiner contexts did not differentiate the two groups. SLI and language equivalent children were both very accurate in this context, with 96% correct for children with SLI and 97% for MLU-matched children. However, the groups did differ in the quantifier contexts. The mean for the SLI group was 71%, whereas the language control children were 90% accurate.

Is it the case that the differences in the quantifier contexts account for the group differences in the overall summary of percent correct of plurals? To evaluate this possibility, the summary means were recalculated, without the quantifier contexts. For the SLI group, the mean percentage correct raised to 86%, and the MLU group raised to 94%. The difference between the groups dropped out of the conventional p levels for reliability, with a p value of .09.

What can we make of this? NUM marking seems to be vulnerable in ways not predicted by the phonetic salience of the surface realization of the morpheme, or of the NUM marking itself. Obviously, if children with SLI can mark NUM accurately by affixing the -s to nouns in the 634 out of 660 times when it is preceded by a determiner, they do not seem to be having significant problems with either the affix or the notion of NUM. So what is the locus of the difficulty? The problems with verb agreement suggest that agreement marking may be implicated. Is there reason to believe that there are underlying linguistic similarities between English verb agreement and quantifier + noun agreement that would introduce complexities for children with SLI in a way that is different from that of determiner/noun agreement? Current models of morphosyntax suggest that could be the case.

**FUNCTIONAL CATEGORIES**

Functional categories are elaborations of X-bar syntactic theory (cf. Haegemann, 1991; Radford, 1990). Within this view of syntax, phrase structures are thought to be headed by the lexical categories of nouns, verbs, adjectives, or prepositions. To use the noun phrase (NP) as an example, nouns are heads, which can then be expanded (projected) to a higher level of phrase structure.

For example, the noun phrase “that peanut in the cup” can be represented in the following way:
In this case, “peanut” is the head for the NP, and “in the cup” is a complement that expands it to a next higher level, that of N'. The determiner in this representation adjoins to the N'. The NP is regarded as the maximal projection for the N. Recently, it has been proposed that the determiner is also a head, of what is called a “functional” (i.e., nonlexical) category, which can also project to a higher, maximal level. (The determiner category consists of a/the/this/that/some/any/not much, cf. Radford, 1990.) This can be represented as follows:

In this example, there is an additional position for the Specifier, which adjoins to the D' level. (Specifiers are defined in this relational way [i.e., as sisters to an X', where X can stand for any head].) Notice that the determiner (that) is in a head position (D) and so is the noun (peanut; N).

It is thought that this general schema applies to all four kinds of lexical heads, to generate NPs, verb phrases (VPs), adjective phrases (APs), and prepositional phrases (PPs). Similarly, the notion of functional categories has been extended to other parts of the grammar. These functional categories share several characteristics. They constitute closed classes, they are generally phonologically and morphologically dependent, and unstressed; they mark grammatical or relational features, rather than picking out a class of objects (Radford, 1990, p. 53). In the VP, separate nodes are now identified for complementizers (words that introduce complement clauses, such as that/for/whether/if), agreement, and tense.

Contemporary linguistic theory is concerned with how to configure the functional categories and with the underlying mechanisms and principles. Within these models, inflections are treated as interacting with deeply syntactic processes. The claim is that processes of head movement (where verbs are considered to be heads) are deeply intertwined with inflection. According to Wexler (1992, p. 6) “Thus to ask whether a child knows the processes governing inflection is, in part, to ask whether a child knows head movement, ... and processes controlling head movement.”

Consider a current model of agreement (cf. Chomsky, 1992). The configuration is as follows:

The gist of the interpretation is that the subject is generated in the Spec of the V', and must move to Spec, AGR, so it can be checked for agreement. The verb moves to AGR to be checked for agreement. The checking is carried out at the level of number and person features marked on the verb and the noun, and must conform to certain principles of the grammar.

**FUNCTIONAL CATEGORIES**

**PERSPECTIVES ON THE MORPHOLOGY OF SLI**

An elaborated X-bar schema allows for several important generalizations to be made about the grammar of children with SLI. In our samples from English-speaking children with SLI, lexical heads do not seem to be problematic for children with SLI, nor are the fundamental configurational relations (i.e., word order within constituents generally is not disturbed [although there may be vulnerability in certain contexts requiring verb movement]; also reported by Blaven, 1992, to be true for German-speaking children with SLI).
In some broadly defined ways, then, the grammar of individuals with SLI can be thought to follow the configurational constraints evident in universal grammar.

At a more detailed linguistic level, though, the grammar does not seem to be so robust. Consider, now, the details that were reported earlier about plural and agreement marking of the affected children. Recall that they seem to have + NUM marking worked out for nouns in the *determiner + noun* context, but not completely so for the *quantifier + noun*, and they have considerable difficulty with agreement marking on the verb.

**Spec, Head Agreement**

On the model of functional categories sketched out above, we can see that the derivation of correct subject–verb agreement involves a process of Spec, head agreement. Another observation can also be drawn, that the Determiner, noun agreement occurs at the level of Head, head relation, although the details of how the agreement checking would work are not, as far as I know, worked out well for English NPs. These observations accord well with the evidence that -s agreement at the clause level is less consistently marked by children with SLI than for the control group, whereas plural markings (especially the *Det + noun* context) are at or near mastery for both groups. Thus, configurational differences within the functional categories accord with observed differences across morphemes with the same surface forms, so that Spec, head agreement marking is affected but Head, head plural marking is not.

If these configurational relations are significant factors in the vulnerabilities in the grammar of children with SLI, it suggests that one characteristic of SLI grammar may be that of particular problems with agreement relations at the level of Spec, head. If so, the observed deficit in performance within the NP, in the *quantifier + noun* context (assuming that these differences are reliable and hold up empirically, which certainly needs to be established) implicates a specifier position for the quantifier within the NP. Such details are not yet available for the agreement relations with the NP, and it remains to be seen if this possibility can be established.

A prediction that follows from the Spec, head interpretation is that other Spec, head relations should also be vulnerable. There is evidence available in support of this prediction. Within the model advanced by Chomsky (1992), case assignment on the noun is checked in the Spec position in the NP. Thus, if Spec, head relations are problematic for children with SLI, then case should also be affected. That prediction is borne out by evidence reported by Loeb and Leonard (1991), who found that English-speaking children with SLI showed difficulty with case marking on pronouns, relative to a language-equivalent control group. Similarly, Clahsen (1992) reports problems with case-marking for German-speaking children with SLI.

It must be noted that this account of agreement-marking limitations differs in some important ways from Clahsen’s model of a deficit Control Agreement Principle (cf. Clahsen, 1992), in that his model predicts difficulty with determiners and adjectives, a prediction which, according to his report,holds for German-speaking children with SLI. On the Spec, head interpretation as sketched above, determiners are thought to be a Head, head relation. In the evidence presented here for English-speaking children with SLI, the agreement checking between determiners and plurals is not problematic (although there is evidence that determiners may be more likely to be omitted by these children, but this may be for reasons other than agreement). Under the Spec, head account, these differences could be resolved if it proves to be the case that the determiners for which agreement marking is difficult for German-speaking children with SLI are located in Spec rather than in the head of DP. That possibility remains to be seen.

All things considered, the Spec, head account offers a reasonably plausible way to capture the empirical evidence from English-speaking children with SLI (i.e., that the same surface form [-s], carries agreement, but this agreement marking plays out differently within the NP and the VP, so that the condition of SLI involves selective deficits with the latter but not the former). There are, however, other possible perspectives with regard to -s agreement marking that also have high potential value for interpretation of SLI.

**Optional Infinitives**

Working within the linguistic framework laid out above, Wexler (1992) has proposed that omitted -s for third person contexts, which young, typically developing English-speaking children tend to do, can be regarded as an optional use of the infinitival form. Because in English the infinitival form of the verb is the bare stem also used in simple present tense for all but third person, infinitival forms are not clearly distinguishable from finite (i.e., tense-marked) verb forms. Given the sparse surface morphology of English, much of the evidence in support of this hypothesis comes from other languages in which infinitival forms are more evident, such as French and German. What is relevant here is that the hypothesis claims that there is an initial period in which typically developing children optionally add -s to mark agreement, and that this period is resolved when children master tense marking. When youngsters say, *he go*, it is interpreted as a selection of the default form of the verb, the infinitival form. The choice of the infinitive is considered optional, on this view, because the children do not understand tense, which in English would be, evident by incomplete or inaccurate marking of past tense in utterances such as *he walk*, which are likely to appear as *he walk*.

On this view, then, several new directions emerge for accounts of SLI (see Rice & Wexler, 1993, for an elaborated discussion of this model). One
consequence is that the notion of "delayed language" takes on a more specific interpretation. Within an Optional Infinitive model, the finding that children with SLI have selective difficulty with -s agreement could be because they remain longer in a period in which the bare stems (i.e., infinitival forms) are regarded as optional, a period that other children pass through at an earlier MLU level. The findings reported above for the SLI group, then, could be viewed as a simple delay in the acquisition of plurals, at least within the determiner + plural context (i.e., with underlying representations similar to that of children at equivalent MLU levels). However, the acquisition of agreement demonstrates a not-so-simple delay, in which the expected period of optionality extends far beyond that demonstrated by unaffected individuals.

Two other important predictions for the grammar of children with SLI follow from the Optional Infinitive account. One is that the period of optional agreement marking for the children with SLI will be contemporaneous with problems with tense marking (a prediction borne out for children with SLI, cf. Leonard et al., 1992). A second prediction is that the onset of agreement mastery will be preceded by the acquisition of tense marking. This is a rather strong prediction, in that it posits a direct relation between two morphemes that have different surface forms and mark different grammatical functions that are nevertheless linked in the grammatical system. Furthermore, the correct way to test the prediction is to evaluate the relative levels of acquisition of the morphemes for individual children. The relevant evidence, then, is to be drawn from observations of individuals, where considerable variability is known to occur (cf. Lahey et al., 1992).

In evidence collected in our laboratory, we find support for this prediction. In an elicitation task, children produced regular past tense (e.g., walked), and third person singular agreement (e.g., walks). There were 20 children in each of three groups: SLI, language-equivalent (MLU), and age-equivalent (CA). The analysis included children who demonstrated at least five obligatory contexts for both grammatical forms. After application of this criterion, 19 children in the SLI group remained, 12 in the MLU group, and 22 in the CA group. Of the SLI group, 11 children showed floor level performance on both morphemes, 2 showed equivalent performances on both, 5 demonstrated the predicted better performance on tense marking, whereas 1 demonstrated better performance on agreement marking. For the MLU group, the number of children in parallel categories was as follows: four for mastery on both, two for floor level on both, four children demonstrated the predicted difference, and two demonstrated the nonpredicted difference. For the CA group, 18 children were at mastery level for both, 1 child was at equivalent but not mastery for both morphemes, 1 demonstrated the predicted difference, and 2 the nonpredicted difference. Assuming that joint mastery, joint floor effects, and equivalent performance are consistent with the predicted pattern, as well as cases where both morphemes are at intermediate levels and tense is more accurately marked (by more than 10 percentage points) than agreement, 18 of the SLI children conformed to the pattern, as did 10 of the MLU group and 20 of the CA group. What this suggests is that at least this aspect of the grammatical system of children with SLI (i.e., the interrelation of tense and agreement) follows the same general principles that characterize the language acquisition of children without SLI, but the particular mechanisms that activate tense marking may be more vulnerable for the affected children.

Re-evaluation of the Competing Models of Morphological Deficits

How well do the models outlined in Table 1 account for the evidence presented above, for the plural and agreement morphemes of English-speaking children with SLI? The key empirical predictions target the comparison between children with SLI and their language-equivalent peers, where a lower performance on the part of the children with SLI can be viewed as a difficulty not fully accounted for by a delayed acquisition onset and, therefore, as presumptive evidence of potential deficits in an underlying linguistic acquisition mechanism. The predicted outcomes posited by the models are only partially met. For the Language Delay model, the predicted competence with plurals is observed (although the observed difference in plural contexts is not accounted for), but this account does not hold for agreement. For the Surface Account, the picture is reversed: the predicted problems with plurals are not evident, although the predicted agreement problem is confirmed. For the Missing Agreement account, the difficulty with verbal agreement is as predicted, but the apparent difference in plural marking within the NP (between determiner + noun contexts and quantifier + nouns) is unforeseen. The Missing Feature account's postulation of missing number marking, which in turn is responsible for missing agreement marking, is jeopardized by evidence that the children with SLI control number marking.

In order to illuminate more of the underlying grammar of children with SLI, a model was described in which morphemes are viewed as maximal projections of phrase structures, as functional (i.e., nonlexical) categories. In this model, ways in which plurals share properties with - s agreement are apparent, as well as ways in which the configurational properties differ. This led to the formulation of a Spec, head account, which also—and accurately—predicts problems with case marking for children with SLI.

A second model within a functional categories perspective was introduced, that of Optional Infinitives. This model provides an elaborated account of the observed missing agreement marking that brings the added advantages of accurately predicting problems with tense marking, and in specifying a crucial antecedent condition for mastery of agreement (i.e., mastery of tense).

It is much too early to predict the final fate of these new models of the grammatical limitations of individuals affected with SLI. The linguistic formulations are new, many of the particulars remain to be worked out, and the
specific details are complex. What is clear, however, even at these early stages of inquiry, is the need to refine further the rather broadly drawn explanations of SLI, such as those embodied by a “delayed” versus “deficit” dichotomy. What is of primary interest is how to characterize the underlying language acquisition mechanisms and the representations of the grammar of SLI. Emerging evidence from detailed linguistic observations suggests that the story is likely to be rather more complicated, and more interesting, than a simple either/or choice would allow.

FUTURE RESEARCH GUIDELINES

If we are to come to understand the nature of language impairment, we can conclude from the previous discussion that we must arrive at a judicious mix of careful empirical documentation of the relevant phenomena, in particular, the ways in which the linguistic forms and structures of individuals with SLI differ from the expected ones, and devise theoretically motivated tests of predicted outcomes. In particular, it is essential that a well-grounded model of language serve as a guide to the formulation of testable hypotheses.

If there is to be continued momentum in our understanding of the morphological deficits of SLI, we must find ways to maintain high empirical standards, at the same time that we move toward more refined theoretical models. In the interest of formulating sound research guidelines, the following suggestions are offered:

1. The linguistic competencies of individuals with SLI must be documented in careful empirical detail. Although such details are accumulating in the literature, many, many more remain to be identified and documented. Our research efforts are doomed to failure if we overlook crucial distinctions.

2. We can benefit from continued use of the comparative group design, in which a language-equivalent group serves as a normative control. This is because this design generates valuable indices of central tendencies and individual variability, which are absolutely essential for the formulation of empirically sound generalizations that are likely to be reliable.

3. At the same time, group analyses alone are not sufficient. Detailed linguistic analyses must be carried out at the level of individual grammars, and predicted outcomes must be verifiable in individual linguistic profiles. In this age of morpheme-by-morpheme computer-generated calculations of mean percent correct in obligatory contexts, it must be pointed out that such summary figures can be misleading. The example here is that plural marking is more complex than just NUM marking. The vulnerable aspects of plural marking, if they exist for SLI grammars, may be at the level of agreement relations, which are thought to be located in the morphosyntax, not at the level of feature-marking on individual words. In a similar manner, counts of correct occurrences of the use of auxiliary BE forms summed across all contexts can obscure very important differences in how they are used by children with SLI (cf. Hadley, 1993).

4. Linguistic models that predict relations among morphemes and syntax have the potential for revealing what is spared and what is affected in the grammar of people with SLI. A primary advantage of such models, as demonstrated here, is the ability to generate specific questions that align with the symptomatology of SLI, questions that are testable and can, thereby, contribute to the evaluation of competing explanations.

5. It is important to continue to explore the differentiation between processing mechanisms (cf. Johnston, chap. 7, this volume; Leonard, chap. 6, this volume) and underlying mental representations of grammar, insofar as these are conceptually distinct sources of potential dysfunction.

6. In modern inquiry it is essential to consider language-specific aspects of SLI, or, conversely, the linguistic universals manifest or missing in SLI (cf. Clahsen, 1992; Leonard, chap. 6, this volume).

7. Finally, there must be a way to connect the observed areas of linguistic difficulty with the emerging reports of familial aggregation of affected individuals. An obvious advantage of the functional categories account outlined here is that, for independent reasons, adherents of this view argue that there are universal configurations of morphosyntax, which are part of the innate endowment of the human language capacity. If there is, in fact, an inherited language capacity, it is plausible that certain mechanisms or structures could be vulnerable for individuals with SLI. Such a claim has the admirable virtue of linking the surface symptomology of SLI with the underlying etiology. The significance of this claim calls for full evaluation.

CLINICAL IMPLICATIONS

By now, some readers might be wondering if the usefulness of these analyses and observations is limited to the conclusion that scientists spend too much time poring over transcripts. Much of this inquiry, however, is motivated by the conviction that the research efforts will culminate in clinically significant outcomes. These are apparent when we consider the following three areas of clinical endeavor.

Identification

The identification of individuals with SLI remains a vexing clinical issue. The standard assessment batteries are not particularly sensitive to targeted areas of grammatical vulnerability, such as agreement marking, as is evident in documented cases where a child can score within normative range and yet demonstrate clinically significant problems (Scheule & Rice, in preparation). For this reason alone it is essential that the morphemes or structures likely to be vulnerable in SLI grammars be identified and incorporated into assessment
batteries. A further reason becomes apparent when we consider the possibility that there may be an inherited component to SLI. In order to evaluate this possibility, accurate ways must be available to identify affected individuals. Morphosyntax is a promising area to search for a possible grammatical phenotype (cf. Tomblin & Buckwalter, chap. 2, and Crago & Gopnik, chap. 3, this volume).

Assessment

The preceding remarks highlight the use of assessment to diagnose the existence of SLI. Another function is to identify possible treatment goals and to evaluate progress in intervention. For these purposes, it is essential that the particulars of the grammar be described, and that it be understood how various surface structures may be linked in underlying representations. For example, plural -s can be thought of as a matter of matching real-world information about numbers of things to the word ending. In this case, one would look for a child’s ability to say “balls” and not “ball” when shown a picture of three balls. However, if plurals are thought of as also involving agreement relations, then one would want to know if the child could mark NUM in several kinds of linguistic frames, such as “this ball” and “two balls.” It could prove to be important to evaluate number marking in the determiner + noun contexts separately from the quantifier + noun contexts. It may be premature to conclude, for example, that treatment is complete (or needed) if only the first, but not the second, context is examined. (It is, of course, vitally important to determine a child’s ability to produce the final sibilants to rule out possible phonological problems that can contribute to what may appear to be a morphological problem.)

Treatment

A necessary part of intervention planning is to identify appropriate therapy goals. Among the dimensions to be considered are phonology, lexical acquisition, social uses of language, and morphosyntax. It would be a mistake, from the viewpoint developed here, to regard grammatical morphemes as a small part of the grammar that can be easily ignored. Instead, the little functions of the grammar act as essential linguistic operators that serve a central function in the grammar. It may well turn out that the case that other surface symptomatology is to some extent secondary to these little operators. For example, morphology can serve as valuable cues to lexical acquisition (cf. Rice et al., 1993). A second example is that children unable to demonstrate grammatical flexibility also have fewer resources with which to carry out the fine-tunings necessary for successful discourse with their peers. Thus, grammatical development may be an essential concomitant for the development of the lexicon and social uses of language.

Another important clinical decision is the determination of the order in which to treat linguistic problems. Extrapolating again from the plurals and agreement marking discussed above, if a clinician wishes to target the omission of final -s plurals and agreement, the findings suggest that plurals are the target more likely to yield to intervention than is agreement marking. Working with a similar logic, if a child demonstrates limited verbal agreement, according to the Optional Infinitive account, it is likely that he or she will also demonstrate problems with the marking of regular past tense, and that the most appropriate way to approach remediation of the missing agreement is to work first on the tense marking.

Although there is certainly a nontrivial amount of speculation involved in such clinical projections, it is also clear that the study of the morphosyntax of children with SLI does have considerable potential clinical value, ranging from a better understanding of the nature of the underlying problems, to predicted etiological factors, to the details of what to assess and how to plan intervention. Clinicians should not expect the full story to be available immediately, because such investigations require years of effort. There is encouragement to be found, however, in recent advances, many of which are reported in this volume.

REFERENCES


