BUILDING THE CASE FOR IMPAIRMENT IN LINGUISTIC REPRESENTATION

Martha B. Crago
McGill University

Shanley E. M. Allen
Max-Planck-Institut für Psycholinguistik

Causal explanations for the morphological vulnerability observed in specific language impairment (SLI) have attributed the problem to (a) the lack of phonological salience of morphological inflections (Leonard, 1988, 1989), to (b) differential typologies of languages with sparse and complex morphology (Dromi, Leonard, & Shtelman, 1993; Leonard, Bortolini, Caselli, McGregor, & Sbabadini, 1992; Lindner & Johnston, 1992), as well as to (c) various deficiencies in the underlying grammar, including a featureless grammar (Gopnik 1990a, 1990b) and an impairment in rule construction (Gopnik, in press-a, in press-b), (d) the extended use of infinitives for inflected forms (Rice, 1993, 1994; Rice & Wexler, 1993), and to (e) problems in agreement checking relationships that differentially affect agreement across the grammar (Rice, 1993, 1994).

In this chapter, these various explanatory hypotheses for SLI are described and related to data on SLI in Inuktut. None of the five hypotheses can fully account for the Inuktut findings. In light of this, the overall enterprise of building the case for impairment in linguistic representation will be discussed with linguistic theory as well as with information from the literature on agrammatism in aphasia.

CHARACTERISTICS OF INUKTUT

Inuktut is the language of some 25,000 Inuit in northern Canada and is part of the Eskimo-Aleut family extending across the circumpolar regions from Siberia to Greenland. It exhibits a high degree of polysynthesis with prolific verbal and
nominal inflections. This means that a nominal or verbal root is followed by 
from zero to eight morphemes corresponding to the Indo-European independent 
verbs, auxiliaries, deverbals, denominals, adverbials, adjectives, and so on; then, 
an obligatory inflectional suffix; and finally optional enditics. In addition, there 
are over 1,000 verb- and noun-internal productive morphemes that serve as 
nominalizers, verbalizers, valency-changers, and modifiers.

Nominal inflection represents eight cases and three numbers, and the pos-
sessive paradigm encompasses four persons and three numbers. The following 
example shows how nominal elements may include a variety of modifiers suf-
fixed to the root:

(1) Quttukallakutakatiaqapimmuit. 
quit-4uq-kallaq-kutaaq-tsaq-apik-mut 
be.funny-NOM-DIM+talk-nice-handsome-ALL.SG
'To a nice tall handsome cute funny person.'

Verbal inflection agrees with both subject and object for four persons, three 
numbers, and 10 verbal modalities. Verbal elements typically show a greater 
degree of polysynthesis, as in this example:

(2) Annuaarsialukatulikpaalumijuaq. 
anuruaaq-sima-lukat-slil-paulaikut-si-mjuq 
clothe-PERF-unusually-well-very-be-also-PAR.3sS
'She also often dresses up very unusually.'

Inuitut also has an ergative case marking system, SOXV word order, and 
ellipsis of both subject and object. Furthermore, Inuitut has no uninflected 
infinitival form.

In northern Quebec, Inuktitut is spoken by 95% of the population (Doras, 
1986). It is used on a routine, almost exclusive, basis by people of all ages in a 
number of the communities in this region.

DESCRIPTION OF THE STUDY

This study focused on one monolingual Inuk girl aged 5:4. This child, LE, lived 
within a settlement of approximately 350 people, 1,000 miles north of Montreal.
Inuitut was the exclusive language of her everyday life. LE was selected for 
his case study from among several subjects on the basis of her Inuit parents', 
surrounded by Inuit teachers', the special education consultants', and healthcare workers' 
reports, one of the author's clinical impressions, and the clarity of her disorder.
LE's clinical profile was congruent with the usual criteria for SLI (see Table 10.1). 
Despite a difficult start in her first adoptive family where she did not remain, 
his child was judged to be normal socially and emotionally with no frank signs

of neurological impairment, and was considered by virtue of her play and school 
achievement (she was in kindergarten at the time of the study) to be intellectu-
ally at the level of her age-matched peers. LE had hearing within the normal 
limits despite the fact that she had recurrent otitis media in the first year of her 
life. However, 25% of all children in northern Quebec have also had chronic otitis 
media (Julien, Baxter, Crago, Ilecki, & Therrien, 1987). The number and severity 
of LE's episodes of otitis media were equivalent to those experienced by these 
peers whose language is not considered to be impaired. Of interest in the study 
is the fact that this child was a member of a large extended family in which 
there are more than three first-degree relatives with SLI spread over three 
generations, including a maternal uncle and three cousins.

No language tests are presently available for providing normative data in 
Inuitut. Instead, a nonstandardized procedure was used to determine the 
nature and extent of LE's language abilities. LE was taped in her home where 
she was engaged in a free play situation with a chronologically age-matched 
normally developing friend who was four days older than LE. The session lasted 
approximately 1 1/2 hours and was taped in its entirety by one of the authors 
of this paper. Of this hour and a half, two sections of approximately 20 minutes in 
length were selected for transcription based on the audibility of the utterances 
and representativeness of the overall sample. A sample matched for mean length 
of utterance (MLU) of similar length and taped in similar circumstances was 
taken from data videotaped for a separate study on the acquisition of Inuitut 
In normally developing Inuit children (Allen, 1994). MLUs for data presented in 
this chapter were based on counts of productivity used morphemes. Frozen 
forms (e.g., Merry Christmas) and portemanteau morphemes (i.e., morphemes 
that encode more than one thing) were counted as only one morpeme. Addition-
ally, nominals, some of which were composed of more than one morpeme were, 
nevertheless, counted as single morphemes. This was done because the 
children did not show full productivity of the various components that made 
up such synthesized lexical items.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>LE (SLI)</th>
<th>Language (MLU)</th>
<th>Age (CA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>5:4</td>
<td>2:1</td>
<td>5:4</td>
</tr>
<tr>
<td>Intelligence</td>
<td>normal</td>
<td>normal</td>
<td>normal</td>
</tr>
<tr>
<td>Hearing</td>
<td>normal</td>
<td>normal</td>
<td>normal</td>
</tr>
<tr>
<td>Neurological Indicators</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>Social-emotional status</td>
<td>normal</td>
<td>normal</td>
<td>normal</td>
</tr>
<tr>
<td>MLU</td>
<td>2.48</td>
<td>2.27</td>
<td>4.28</td>
</tr>
<tr>
<td>Utterances*</td>
<td>261</td>
<td>200</td>
<td>386</td>
</tr>
</tbody>
</table>

*Total utterances in 34 minutes (for SLI and CA only).
Data from LE, from an MLU-matched normal, and from her age-matched normal friend were then transcribed by native speakers. Reliability was established by consensus verification between both the transcriber and a native Inuktitut-speaking colleague who was an expert in Inuktitut grammar and Inuktitut child language, and the two authors of this paper. All data were then entered into a computerized database following the CHAT conventions of the CHILDES project (MacWhinney & Snow, 1990) and were coded morphologically. The findings reported in this chapter are based on the first 200 utterances of each of the three children. Self-repetitions, exact imitations of others, exclamations, and routines were not included in the 200 utterances (see Appendix).

**LEXICON**

LE's lexicon was considerably less developed than her age-matched friend (see Table 10.2). It also differed somewhat from her MLU match. Although LE's type-token ratio for noun and verb roots was not very different from her MLU match, her age-matched playmate, on the other hand, had almost twice as many actual types and tokens of verb roots. The type-token ratio for all morphological units, including both inflections and roots, was quite similar for all three of the children. However, again, the age-matched friend had approximately twice as many actual types and tokens of morphemes as LE did. LE also showed two behaviors that neither her age match nor her MLU match showed. She experienced a number of word-finding difficulties evidenced by frequent use of *um* throughout sentences, and by making multiple attempts at different lexical items in her search for the right word or by attempting to imitate a word just spoken by her friend. Although these types of difficulties occur in normal speakers for a variety of extralinguistic reasons, lexical problems have been described as characteristic of children with developmental language impairment (Rescorla, 1989). LE also had an abnormally high frequency of the all purpose word, *imaitumik*.

**TABLE 10.2**

<table>
<thead>
<tr>
<th>Vocabulary class</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLI</td>
</tr>
<tr>
<td>General vocabulary*</td>
<td>151/496</td>
</tr>
<tr>
<td></td>
<td>(304)</td>
</tr>
<tr>
<td>Verb roots</td>
<td>22/45</td>
</tr>
<tr>
<td></td>
<td>(.489)</td>
</tr>
<tr>
<td>Noun roots</td>
<td>27/56</td>
</tr>
<tr>
<td></td>
<td>(.487)</td>
</tr>
<tr>
<td><em>imaitumik</em> ('thing like this')</td>
<td>12</td>
</tr>
</tbody>
</table>

*General vocabulary includes roots and inflections in all utterances.

**IMPAIRMENT IN LINGUISTIC REPRESENTATION**

*imaitumik*, meaning 'thing' or 'one like this' when she was unable to find the correct lexical item as in the following examples:

(3) *una au au uumunga au imaitumik*
una au au um-munga au imaitumik
this one-ABS SG um um this one-ALL SG um one like this
'this one um um with this one um one like this'

(4) *aulla aullangami imaitumik*
aulla aullaq-nguaq-MI imaitumik
leave leave-pretend-MI one like this
'leave pretend to leave one like this'

(5) *qinmiratu qinmirra qulli imaitumik*
qinmiq-ga lu qinmiq-ga vut-li imaitumik
dog-my and dog-my our-and one like this
'and my dog, my dog, and our one like this'

Furthermore, in Inuktitut, limitations in the lexicon can represent either, or both, a lack of lexical items and a lack of mastery of synthesizing devices used to handle the morphological complexity necessary to construct certain lexical items. (See examples (1) and (2) in the previous section of this chapter for illustrations of such devices.)

**GRAMMATICAL MORPHOLOGY**

**General Characteristics of LE’s Grammatical Morphology**

In several categories of grammatical morphology for which frequency counts were made, LE performed quite differently than her age match (see Table 10.3 and the Appendix). She had strikingly fewer tokens of verbal inflections that

**TABLE 10.3**

<table>
<thead>
<tr>
<th>Grammatical morphology</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLI</td>
</tr>
<tr>
<td>Verbal inflections</td>
<td>32</td>
</tr>
<tr>
<td>Verbal modifiers</td>
<td>30</td>
</tr>
<tr>
<td>Verbalizers</td>
<td>5</td>
</tr>
<tr>
<td>Nominal inflections</td>
<td>46</td>
</tr>
<tr>
<td>Nominalizers</td>
<td>4</td>
</tr>
<tr>
<td>Passives</td>
<td>0</td>
</tr>
</tbody>
</table>

*See Appendix for list of all morphemes used by the three children.
mark person, number, and modality. LE also had fewer tokens of verb-verb affixes, those morphemes that mark causative, passive and adverbials, and she used fewer verbizers with which to change nouns into verbs. These kinds of morphemes are verb and noun internal. Despite such differences with her age-matched friend, LE’s performance in these same grammatical categories was not much different than her MLU match if we consider only the absolute number of tokens. Nominal inflections and nominalizers showed a different pattern. LE had fewer instances of them than either her age or MLU match. It is interesting to note that LE and her MLU match had more nominal inflections than verbal inflections. The age-matched child had the reverse, that is, more verbal than nominal inflections.

Allen and Crago (in press) have previously documented the early and frequent use of passives in very young Inuit children. Normally developing 2- and 3-year-old Inuit children productively used 2.8 passives per hour in comparison with 0.4 passives per hour used by American English-speaking children of the same age (Pinkner, Lebeaux, & Frost, 1987). The passive in Inuktitut is signaled by the use of the single syllable jaatu, which never occurs in a final position. Comparisons across the three children in this study showed that the 2-year-old MLU match used two passive constructions in his 200 utterances, and the 3-year-old age match used nine in her 200 utterances. LE, on the other hand, used no passives in her 200 utterances or, for that matter, in her entire 1.5 hours of taped spontaneous speech. The lack of passives in LE’s language was clearly unusual for Inuit children of either her age or MLU (Allen & Crago, in press).

**Omitted Inflections**

To explore LE’s use of verbal inflections more fully, potential grammatical contexts for the use of inflections on verbs and locatives were identified. In Inuktitut, there are various optional ways that a verbal root can be followed. For instance, a word beginning with a verbal root can either take a verbal inflection immediately following the root or it can be passivized or nominalized or have a variety of other affixes added before the final inflection. Without knowing the speaker’s intent, it is difficult to determine what obligatory form an utterance should take. For this reason, the term potential rather than obligatory has been used to refer to contexts for the use of particular verbal inflections. However, this does not mean that verbal inflections are optional. The optional element is what is added to the root in addition to the verbal inflection. LE used verbal inflections correctly in 46% of the potential contexts that were identified (see Table 10.4). This was less than her MLU match and greatly less than her age match whose inflections were correct nearly 100% of the time. LE’s correct inflections included correct use of person and number. It is important to note, however, that spontaneous naturalistic elicitations, as opposed to experimentally designed elicitations, allow the speaker not to use certain grammatical forms that may be difficult.

**Verbal Omissions.** Ten of LE’s incorrect representations of inflection consisted of complete omission of the inflection. These omissions included person and number inflections that were sometimes multisyllabic, such as -nana (CSV.1sS) or -junga (PAR.1sS), and sometimes stressed, as in the interrogative form. LE’s MLU and age match omitted many fewer inflectional endings than she did.

**Locative Omissions.** The Inuktitut locative system is quite complex, having a variety of somewhat subtle distinctions of location in space relative to the speaker and different forms of reference for dynamic and static elements. Locatives require a verbalizer and then a verbal inflection in certain obligatory pragramatic and semantic contexts, but not in all contexts. For this reason, two separate counts of locative contexts were made, those in which inflections were clearly obligatory and those in which they were optional. LE had more omissions of obligatory inflectional endings on locatives than either her age or MLU match. The following is an example of this sort of omission:

(5) LE: maanii
    ma-an
    here-LOC
    'here'

which contrasts with correct constructions used by her age match.

(7) CA: maaniiituq
    ma-an+H-juq
    here-LOC-be-PAR.3sS
    'it is here'
and

(8) CA: maunngaruk
    ma-nga-aq-qi
    here-ALL-go-IMP.2s.3sO
    'put it here'

LE's use of the bare stem locative in obligatory contexts is highly irregular in Inuktitut.

Additional Irregularities in Grammatical Morphology

Two additional irregularities in LE's use of inflections were most surprising and noticeable to our Inuit colleagues. They were LE's use of the inflection -mi and her use of overt pronouns.

-Mi Insertions. On 10 different occasions, LE used the inflection -mi in a highly irregular way. She inserted -mi as a filler inflection on verbs and locatives where it does not normally occur. The inflection -mi is most frequently used on nouns as the singular locative ending ('in'), the singular modals case ending, and occasionally on verbs as an internal morpheme meaning ('also'), but it can never appear on the ends of verbs or locatives as it does in LE's language. Examples of her irregular use of -mi and comparisons of correct use by her CA match are as follows:

(9) LE: ummaal pi- sininnguami
    u-mmaal pi- sinik-nga-aq-MI
    this one.ERG.SG and pi sleep-pretend-MI
    'how about this pi- pretend to sleep -MI'
    CA: innaa sinislnguami
    imaak sinik-nga-aq
    like this sleep-PRES-PAR.1sS
    'I'm sleeping like this'
(10) LE: unali maonini
    u-na-il ma-an-MI
    this one.ERG.SG and here-LOC-MI
    'and this one right here -MI'
    CA: unali maoniniq
    u-na-il ma-an-it-juq
    this one.ERG.SG and here-LOC-be-PAR.3sS
    'and this one is here'

The use of overt pronouns is so unusual at any age in normally developing Inuit children's language acquisition that it flabbergasted our Inuit colleagues and made a big enough impression on LE's family members that they affectionately teased her by calling her the nickname *luvit-uvangaraapik* meaning 'adorable little you-me' or by mimicking the sentences in which she used overt pronouns.

Her use of overt pronouns left bare verb stems. LE's use of the bare verb stem in this situation, as well as her use of the bare locative stem, essentially contradicted the basically polysynthetic nature of her language and was highly irregular in a pro-drop language, such as Inuktitut.

Outstanding Properties of LE's Language

In summary, then, this particular child's language problems were manifested in the following ways:

1. She had a restricted lexicon with evidence of word-finding difficulties.
2. Her grammatical morphology included (a) a paucity of verbal inflections on both verbs and locatives, (b) the irregular insertion of the largely nominal inflection -mi in the final position on verbs and locatives, (c) the irregular use of overt pronouns, (d) the existence of bare verbal and locative stems, and (e) a lack of passive constructions.

3. On the other hand, LE showed excellent interational skills at play with her friend.

In conclusion, this description of a single child has been made with full awareness that specific language impairment has considerable heterogeneity in its expression (Korkman & Haakkenen-Riha, 1994; Lahey, 1988).

BUILDING THE CASE WITH LINGUISTIC THEORY

In this section of the chapter, the Inuktitut data will be related to various explanatory hypotheses and linguistic theories pertinent to specific language impairment.

Surface Hypothesis

Leonard in his surface hypothesis (Leonard, 1988, 1989) claimed that individuals with SLI have difficulties with grammatical morphology that are directly related to the phonological salience of the particular morpheme or morpheme in question. Leonard defined phonological salience in terms of relative stress, relative position within the word or utterance, relative vowel duration, and relative vulnerability to syllable or consonant deletion in production. He claimed that morphemes that are low in phonological salience are more vulnerable to difficulty for SLI subjects, but morphemes that are high in phonological salience are less vulnerable.

The language learning of normally developing English-speaking children reflected difficulty with these unsalient morphemes in terms of the children’s relative tardiness in the acquisition sequence (deVilliers & deVilliers, 1985). English-speaking SLI children seemed to have even more difficulty with these morphemes as compared to unimpaired children. However, Leonard and his colleagues claimed in their crosslinguistic research that individuals with SLI experience significantly less difficulty with morphological inflections in languages in which the morphological elements are more phonologically salient.

In Inuktitut, verbal and nominal agreement morphemes are all word final (with the exception of those followed by occasional enclitics) and can be monosyllabic (CV or CVC), bisyllabic (CVCV, CVCCV, CCVCV, CVCCVC), or trisyllabic (CVCCVC), but are never purely consonantal. Utterance-final syllables are often lengthened, particularly in questions. Word-final consonant deletion is quite common in Inuktitut, but deletion of word-final inflectional units is limited to a constrained set of situations in colloquial speech.

Results from the production data in this case study are not consistent with the surface hypothesis. LE omitted more of what might be called salient morphological inflections, ones that are multisyllabic and stressed, than her MLU match did. She also had no instances of consonant-only deletions, with all omissions being complete inflectional units. Furthermore, her use of overt pronouns and the insertion of an irregular inflection like -mi are not congruent with this explanation because LE added the morpheme -mi rather than dropping it as the surface hypothesis would predict.

Sparse Morphology Hypothesis

The sparse morphology hypothesis (Dromi, Leonard, & Shteynman, 1993; Leonard et al., 1992; Lindner & Johnston, 1992) was based on the idea that children pay most attention in their language-learning process to the structural mechanisms that convey the most useful information. These mechanisms include grammatical morphology, word order, and animacy among others. Forms that have the most communicative relevance will be acquired first, with others following in more or less descending order (Lindner & Johnston, 1992; MacWhinney, Bates, & Kiegl, 1984). Thus, both unimpaired and impaired children learning languages in which grammatical morphology carries relatively little information are later in learning or have more difficulty with this morphology (Brown, 1973; Leonard et al., 1992) whereas children learning languages, such as Italian in which grammatical morphology plays an important role, are relatively earlier and more proficient in their learning of the morphology (Hyams, 1986; Leonard et al., 1992).

Inuktitut is a language in which word order, being variable, conveys relatively little information. Animacy also plays little role. Grammatical morphology, however, is extremely prolific and plays a large role in determining structural relationships in Inuktitut.

In LE’s production data, her utterances differed from those of both her MLU match and her CA match in her omissions of inflections of various kinds, a number of which result in bare stem forms that are grammatical in Inuktitut. These results cannot be accounted for by the sparse morphology hypothesis.

Missing Features and Impaired Morphological Rule Construction Hypothesis

Missing Features. In the missing features hypothesis, Gopnik (1990a, 1990b) claimed that SLI grammar is unusual in that it is missing the notion of obligatory marking of grammatical features. This theory also claims that such grammatical features are not represented underlyingly in Universal Grammar in conjunction with the rule-governed behavior of unimpaired speakers. These features include
number, gender, animacy, mass/count, tense, and aspect. This claim does not entail that grammatical features will never be marked but, rather, that their marking will be perceived as totally optional by SLI individuals. Thus, marked forms will be interspersed with unmarked forms in their speech, and they will not be reliable in judging the absence of these morphemes in grammaticality judgment tasks. This theory was perhaps wrongly named and might have been more accurately represented as a theory of missing markings.

Inuitutit has a large number of grammatical features that must obligatorily be marked morphologically. Thus, it is a candidate language in which such a hypothesis may be observed.

Production data from LE showed a pattern of optional use of grammatical features in that the same verbal inflection appears in some obligatory contexts and not in others. Thus, although this hypothesis seems to be descriptively adequate, it is not sufficient to predict or explain deficits in LE’s grammar, such as -mi insertion, use of overt pronouns, and lexical searching.

**Impaired Morphological Rules.** Gopnik’s more recent hypothesis (Gopnik, 1994), the missing rule hypothesis, stated that the ability to construct implicit rules is impaired in individuals with SLI. This hypothesis postulated that such individuals are able to compensate for this kind of deficit by learning the forms in question as unanalyzed lexical items and by using explicitly learned rules. This prediction meant that individuals with SLI will not recognize that inflectional markings are obligatory and that they will have problems with producing the correctly inflected forms of nonsense words. These difficulties should be reflected in their online processing. Furthermore, Gopnik’s hypothesis predicted that characteristic errors in the misapplication of explicit rules will occur. For instance, forms that encode conceptually tangible information, such as plural, will be easy to learn lexically, but forms that mark less conceptually tangible information, like agreement, will be much more difficult to learn. It is, therefore, hypothesized that when the semantic information carried by these morphological markers is not obligatorily represented, individuals with SLI are likely to use explicit words to carry the important semantic meanings. In this way, the missing rule hypothesis would account for LE’s use of overt pronouns to mark person, her pattern of lexical searching, and her omission of obligatory inflections on both nouns and verbs. It does not, however, account for her -mi insertion.

**Optional Infinitive Hypothesis**

The optional infinitive hypothesis (Rice, 1993, 1994; Rice & Wexler, 1993) was developed by Wexler (1992; this volume) to explain normal first language acquisition. It arises out of the observation that very young children typically pass through a stage in which verbal inflection is not marked consistently (Pierce, 1992; Poeppel & Wexler, 1993; Verrips & Weissenborn, 1992). This is linked to a related set of phenomena, including placement of negation and presence of overt subjects in the utterance. Wexler claimed that these children pass through a period in which they do not recognize the obligatoriness of verbal inflection and optionally permit the presence of infinitive forms in place of finite inflected forms. Wexler links this behavior with these children’s lack of awareness that formal features are required for the expression of tense. Because they do not recognize the difference between finite and nonfinite tense, children consider both these verbal forms interchangeable. The crucial point here is that children are not neglecting to mark verbal inflection and, thus, leaving a bare root but, rather, they are substituting an infinitive form in place of a finite form. Because in English the bare root and the infinitive are homophones, Wexler provided data from French, German, Dutch, Swedish, Danish, and Norwegian that show the infinitive and inflected forms being interchanged by children. He then showed how a similar analysis, using the same tests, easily extends to English. Depending on the language involved, children tend to pass out of this stage by about 2;6, once they realize the features of tense and, thus, realize the obligatoriness of reflecting tense in verbal inflection.

Rice (this volume) and Rice & Wexler (1993) have adapted this analysis as an explanation for difficulty with tense marking in SLI individuals. Their idea was that the optional infinitives stage in these individuals extends significantly beyond the normal range for acquisition. Individuals with SLI, then, continue to use infinitival and inflected forms optionally well into childhood.

Two problems seem evident for the optional infinitive hypothesis in relationship to Inuktitut. First, tense is not implicated in the Inuktitut verbal inflection system, as argued in some detail in Shaer (1990). This is supported by at least two pieces of evidence. First, Fortescue (1984), among others, has pointed out that “[u]nmarked [for tense] indicative verb forms may be interpreted as either past or present . . . depending on the stem and the context” (p. 272). Thus, it does not seem that the feature [+/- tense] is obligatorily represented within the inflection. Second, the representation of tense or, rather, time on the verbal stem is completely independent of the presence of person and number in the inflection. The stem is represented by verbal adverbs, some even interpreted as verbs, which are affixed to the verb stem. Because Inuktitut verbal inflection is not tied to tense, any hypothesis of unpaired or impaired acquisition based on the role of the feature [+/- tense] within the grammar cannot apply to the acquisition of Inuktitut verbal inflection.

Second, and probably closely tied to the first reason, Inuktitut has no infitive form. Inuktitut does have a gerundive form that appears in both intransitive and transitive conjugations with inflection only for object, but it does not have a clear infinitival form. Thus, there is no possibility for Inuit children to go through a stage of optional infinitives, because there is no infinitive. This means that there are two possibilities. Either children would optionally produce a bare root, or they would produce a citation form, such as third person singular, in
place of the correctly inflected form. Bare roots are ungrammatical in adult Inuit.

In the spontaneous speech of both LE and normally developing Inuit children (Crago, Allen, & Hough-Eyman, in press), the bare root was sometimes produced in place of a correctly inflected form. The normally developing Inuit children did this primarily at the one-word stage. At the two-word stage, their utterances were already considerably more inflected than those of English-speaking children at a similar stage of language development. Preliminary analyses of normally developing Inuit children's data do show some substitutions of incorrect inflections for correct inflections. These are likely to represent performance errors because the substitution pattern seems to be random, rather than showing consistent replacement of a variety of inflections with one citation form. In the impaired data, however, no cases of substitution were observed apart from the incorrect use of the -mi inflection on verbal stems.

The resulting SLI pattern of omission of inflection (see Table 10.4), resulting in ungrammatical bare roots, also seems somewhat surprising in light of recent crosslinguistic research from agrammatism that claims that inflectional substitution is always observed in cases in which omission would produce an ungrammatical form (Menn & Obler, 1990). Obviously, the present Inuit data sample is small and restricted to only one subject. However, preliminary findings point to the need for further research into this hypothesis in languages, such as Inuit, that handle tense and inflection differently from the Romance and Germanic languages addressed by Wexler. It is important to note that the Inuit findings do not directly contradict the optional infinitives hypothesis. Simply put, this hypothesis cannot be the full explanation across all languages because certain languages do not have the infinitive form.

Differential Agreement Checking Relationships Hypothesis

The differential agreement checking hypothesis (Rice, 1993, 1994; Rice & Wexler, 1993) is based on the differing types of agreement relationships and methods of representing and checking them in current versions of the Principles and Parameters approach (Chomsky, 1995). Basically, two types of agreement-checking relationships are currently expounded within Principles and Parameters literature. The first is a SPEC-HEAD relationship. A typical verbal clause is generated as in the tree in Fig. 10.1. The subject is base-generated in SPEC, VP and subsequently moved to SPEC, AGR-S. The object is base-generated in NP, VP and subsequently moved to SPEC, AGR-O. The verb, fully inflected, is base-generated in V, VP and moved sequentially through all the heads up the tree. In each head position, it checks the features in its inflection with the relevant features of the element in SPEC related to that head. If the checking reveals a mismatch, the derivation crashes, and the sentence is not uttered. If the checking reveals a

match, the verb moves up to the next head. Because the checking of features occurs between items in a SPEC and in a head, this form of checking is known as SPEC-HEAD agreement. It is generally assumed that SPEC-HEAD agreement is invoked for verbal agreement and for agreement between quantifiers and nouns (Bittner, 1994; Branigan, 1992; Johns, 1992; Murasugi, 1992).

The second form of checking is known as HEAD-HEAD agreement. Consider the tree in Fig. 10.2. In this situation, it is assumed that the primary head, here the noun, is base-generated fully inflected. Additionally, the relevant features are marked in the head positions of the respective phrases up the tree. In this case, the entire NP moves up through the SPECs of the respective phrases. In each position, the head N checks its features against those of the respective head of the phrase. If the check reveals a mismatch, the construction crashes and is not uttered. If the check reveals a match, the NP moves to the next SPEC. Because checking in this system is between two heads, it is referred to as HEAD-HEAD agreement. It is generally assumed that HEAD-HEAD agreement is invoked for agreement in the nominal system (e.g., Bittner, 1992; Travis, 1992; Valois, 1991).
Rice (1993, 1994) had applied this notion to explain the parts of the grammar at risk for SLI individuals. Rice derived her evidence from the observation that English-speaking individuals with SLI perform much better on determiner-noun agreement than on either quantifier-noun agreement or verb-noun agreement (Oetting & Rice, 1993; Rice, 1993, 1994; Rice & Oetting, 1993). This is quite consistent with the different patterns of agreement checking, because the former is checked by HEAD-HEAD agreement and the latter two by SPEC-HEAD agreement. Thus, the claim is that SLI subjects have particular difficulty with SPEC-HEAD agreement relationships.

Rice's differential agreement checking hypothesis is most intriguing in that it represents a creative approach to the explanation of SLI within Chomsky's Minimalist Program (Chomsky, 1992). However, one must beware that these theories of agreement are relatively new, still hotly debated within the theory, and not even wholly accepted by their proponents. In addition, it is not yet clear how these configurations work out across languages, and it is not yet clear which phrasal categories appear in which languages. For instance, in some languages, negation is treated as a phrasal category and, in others, solely as a head without a phrasal projection (de Freitas, 1993). There are currently at least four ideas as to the construction of Inuktitut within the Minimalist Program (Bittner, 1994; Bobaljik, 1992; Johns, 1992; Murasugi, 1992), only one of which uses the notion of agreement checking in the way that Rice does. So, although an agreement relationship analysis seems an interesting explanation for English data, it is not clear that it can be directly applied crosslinguistically at this early stage. A further caution is posed by new analyses of Rice and Wexler (in progress) reported elsewhere in this volume. In these analyses, there is evidence that SLI children do show agreement checking in the VP as well as in the be and do systems of English. This evidence suggests that the apparent difficulty with the English third person singular present tense marker, -s, may be attributable to the tense feature it carries instead of to agreement.

Putting these theoretical and empirical issues aside, there are a variety of issues in Inuktitut that would be interesting to address in association with Rice's hypothesis. First, Inuktitut does not have overt determiners, such as articles or demonstratives. Although it would not be surprising for there to be agreement features in the head of DP position, the agreement between these and the NP cannot be checked in transcripts because they are not overtly represented. Second, nominal ellipsis in Inuktitut for both subjects and objects is extremely common. This makes it difficult to check for noun-verb agreement in the transcripts in other than a discourse sense. Third, case is a very important feature of Inuktitut although it is not in English. Thus, a theory of agreement marking that would serve crosslinguistically must include reference to case agreement. Because case is presumed to be checked within the verbal paradigm in a SPEC-HEAD configuration, we would predict substantial difficulty with case marking on behalf of SLI children. Fourth, Inuktitut is an ergative language, different than the accusative languages that have been addressed so far in SLI literature. It is quite likely that the agreement marking in ergative languages is mediated somewhat differently than in accusative languages, and it would be important to address this. Fifth, Inuktitut reflects on the verb for both subject and object, unlike the subject-only agreement present in the languages in which SLI has been studied so far. Therefore, it would be interesting to see if these two agreements were somehow dissociated in SLI production in Inuktitut, something that has not been attested to by the present data. Despite the fact that the differential agreement hypothesis does not yet account for these varying aspects of grammar related to Inuktitut, it appears to have promise for capturing certain essential features of SLI.

Summary

In this section of the chapter, we focus on various theoretical analyses of SLI data in light of linguistic theory and with reference to Inuktitut data. The primary implication, resulting from this discussion, concerns the importance of continu-
In the field of SLI research, crosslinguistic work has been undertaken primarily in the area of phonological and stress saliency by Leonard and his colleagues (1992) in their work on Italian and Hebrew, with most interesting results. Discussion in this section of our chapter has alluded to some of the interesting issues in crosslinguistic SLI research that can be addressed in terms of morphological and syntactic concerns across languages, and to the potential significance of such research, as has been seen in the work of Chomsky (1986) in German, Dalalakis (1994) in Greek, Fukuda and Fukuda (1994) in Japanese, and the forthcoming work of Rice and LeNormand in French. Work in languages of increasingly diverse structures, such as Inuktitut, will continue to aid in fitting together pieces of the puzzle of specific language impairment and provide evidence for theories of normal language as well.

BUILDING THE CASE WITH INFORMATION FROM RESEARCH ON AGRAMMATISM

In the previous section of this chapter, the various hypotheses and linguistic theories used to explain deficits in the grammatical morphology of individuals with SLI were reviewed. There is an uncanny resemblance between them and certain hypotheses and theories that have been used to explore the nature of agrammatism in aphasia. There are a number of similarities as well as certain differences between the way that the case for problems in linguistic representation has been built for agrammatism and the present efforts to build such a case for specific language impairment.

In the 1970s, Goodglass conducted research into his version of the surface hypothesis by investigating the relationship of phonological, stress, and other prosodic patterns with difficulties in morphology. He described what he referred to as a new concept, that of saliency. According to his research (Goodglass, 1973), patterns of stress predicted, among other things, deletion of unstressed initial function words. However, he also noted as early as 1958 (Goodglass & Berkof, 1960; Goodglass & Hunt, 1958) that performance with the same phonological form, namely /s/, varied according to its grammatical role. In specific, he found that individuals with agrammatism had more difficulty with the possessive -s and the third person singular -s than they did with the plural -s. A parallel finding for children with SLI has been recently reported by Rice and Oetting (1993).

Researchers into agrammatism have also pursued crosslinguistic investigations into languages with more complex morphology than English (Bates & Wulfeck, 1985). Such studies in Hebrew (Druck & Marshall, 1991; Grodzinsky, 1986) and Italian (Miceli & Mazzauchi, 1980; Miceli, Silveri, Romani, & Caramazza, 1983) were less motivated by questions of how different linguistic typologies related to a surface theory of morphological impairment than they have been in SLI research. Instead these studies were motivated by questions of how omissions of verbal inflections related to the optional infinitive. In fact, agrammatic findings for Hebrew and Italian are quite interesting in view of the work of Leonard and his colleagues (Dromi et al., 1983; Leonard et al., 1992) on those same languages and this present work on Inuktitut. The findings for agrammatism show patterns of substitutions rather than omissions. In other words, fully inflected forms were used, but used incorrectly for the syntactic context, in somewhat the same way that LE used the -mi form. Such findings underline the importance of reporting the nature of errors in crosslinguistic studies. The Italian agrammatic studies also show a dissociation between the use of bound and free morphemes.

Parallel to efforts in SLI agrammatism research has attempted to explain the nature of the morphological deficit from within a grammatical framework, including a government-binding (GB) framework. This work by Grodzinsky (1984) centered around issues of antecedent-trace relationships.

Given the parallelism of these explanations for agrammatism and SLI it is informative to track other issues and debates that have emerged in research on agrammatism that have relevance to building the case for impairment in linguistic representation. For instance, the heterogeneity of performance by individuals with agrammatism has led to claims that no single unitary account can predict the nature of this disorder. This, in turn, has led Caramazza and his colleagues (Badecker & Caramazza, 1985; Caramazza, 1986; McCloskey & Caramazza, 1988) to espouse the importance of the case study method. Use of this method was motivated, in part, by the early elaboration of criteria for the classical syndromes of Broca’s and Wernicke’s aphasia. Such criteria have since become targets for findings from individuals that do not fit into them. In SLI, where criteria have been largely exclusionary and less polarized into specific syndromes, there has been less motivation to find cases that are misfits to the overall category. However, an important query for research into the genetic bases of language impairment is whether the nature of the neurological deficits underlying the language impairment will have a more uniform effect than has been shown for acquired lesions.

Other research into agrammatism has explored issues associated with heterogeneity of performance, issues that we have just begun to touch on in SLI research. One of these is the notion of adaptation or compensating strategies. Research and theory in this area (Byng, 1982; Gandour, Marshall, & Windsor, 1988; Kolk & Van Grunsven, 1985) have been inconclusive, but emphasize the importance of analyz-
principled way (e.g., Waters, Rochon, & Caplan, 1992) and group tendencies explored through more varied statistical approaches to the data analysis. Case studies, for their part, need to include converging and ample evidence. Finally, both individual variation and symptom complexes should be reflected in phenotypic profiles. In short, there is a case for including not only other languages and normal acquisition theory into studies of SLI, but also for including issues from adult impairment literature into our collective thought processes and research on the genetic basis for language.

LIST OF ABBREVIATIONS

Nominal Case
ABL ablative
ABS absolutive
ALL allative
EQU equals
ERG ergative
LOC locative
MOD modalis
VIA viais

Nominal Inflection (e.g. ERG.SG)
SG singular
DU dual
PL plural

Possessed Nominal Inflection (e.g. ERG.ISag)
1 first person possessor
2 second person possessor
3 third person possessor (disjunct with referent in main clause)
4 fourth person possessor (co-referent with referent in main clause)
S singular possessor
P plural possessor
sg singular possessum
pl plural possessum

Verbal Modality
CND conditional
CSV causative
CTM contemporative
ICM incontemporative
IMP imperative (including optative)
IND indicative
INT interrogative

Summary

As investigations of SLI continue, it is important that research includes converging information from comprehension, grammaticality judgements, and real-time tasks. Both for the purposes of crosslinguistic investigation and for understanding adaptation strategies, studies also need to include error analysis. Furthermore, the heterogeneity of the disorder can be represented in both case studies and by reporting individual data within group studies. Individual variation in well-selected subjects can also be accounted for in a theoretically
### APPENDIX

#### Grammatical Morphemes Used

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## APPENDIX
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<td><em>merely</em></td>
<td></td>
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<tr>
<td>-otaq</td>
<td><em>very</em></td>
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### Denominal Morphemes

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Toward a Genetics of Language

Edited by

Mabel L. Rice
University of Kansas