An Asymmetric Impairment in Japanese Complex Verbs in Specific Language Impairment

Shinji Fukuda and Suzy E. Fukuda

Eight Japanese children with specific language impairment (SLI), eight age-matched and eight younger children with normal language development were tested with an elicited production task which involved two different kinds of morphologically complex verbs. More specifically, the verbs of focus in this study were lexical inchoatives and lexical causatives, in contrast with syntactic passives and syntactic causatives. As the names indicate, the former two are assumed to be generated within the domain of the lexicon while the latter two are assumed to be generated outside the domain of the lexicon. The obtained data revealed that the children with SLI experienced great difficulty forming the lexicon-external complex verbs, but performed relatively well on the lexicon-internal complex verbs while the performance of the age-matched and younger children with normal language development exhibited no such clear asymmetry. These results suggest that the deficit of SLI severely affects the ability to construct morphological rules that are generated outside the domain of the lexicon whereas their lexical processes remain relatively unaffected.

Keywords: specific language impairment (SLI), Japanese complex verbs, syntax-lexicon interface, morphological rules, declarative memory

1.0 Introduction

A disorder in children’s language development, commonly referred to as specific language impairment (SLI), is a clinically well known phenomenon. Three fundamentally different hypotheses have been advanced in the literature to account for the etiology of the disorder, namely a cognitive hypothesis, an auditory-articulatory hypothesis, and a linguistic hypothesis. The cognitive hypothesis proposes that SLI is the result of a general cognitive deficit, such as an inability to process information not restricted to language (Johnston, 1991, 1997), or an overall inability in spatial and temporal sequencing (Eisenson, 1966, 1972). The auditory-articulatory hypothesis, on the other hand, attributes the impairment to either deficits in temporal acoustic analysis (Talal & Piercy, 1975, 1978), deficits in the perception of certain morphological endings which are not salient (Leonard, 1989; Leonard, Bortolini, Caselli, McGregor, & Sabbadini, 1992), or to functional articulation disorders (Fletcher, 1990). The linguistic hypothesis, which will be examined in this paper, proposes that the disorder selectively affects the ability to acquire certain aspects of the underlying grammar (Clahsen, 1989, 1991; Gopnik, 1994, 1999; Rice, Wexler, & Cleave, 1995).

Although many previous studies have focused on the performance of children with SLI on inflectional morphology (e.g., Clahsen, 1989, 1991; Loeb & Leonard, 1991; Gopnik, 1994, 1999; Rice, Wexler, & Cleave, 1995; Gopnik & Goad, 1997; among others) there is some evidence that this deficit affects a broader range of grammar in morphology, syntax, and phonology. For in-
stance, it has been reported that children with SLI have difficulties with reversible passives (van der Lely, 1994) and prosodic phonology (Piggott & Kessler Robb, 1999). The goal of this paper is to investigate whether or not this deficit affects different kinds of morphological processes than inflection. The present study focuses on morphologically complex verbs in Japanese. An elicited production task was conducted which involved two kinds of morphological processes: one which is generated within the domain of the lexicon, and another which is generated outside the domain of the lexicon. The data obtained reveal that the deficit in SLI does affect some aspects of these morphological processes, especially the latter type of morphological process which cannot be handled by lexicalization.

2.0 Background on SLI

Specific language impairment (SLI) has been characterized as a congenital deficit of the normal course of language development in the absence of any accompanying condition, which could account for the language problems, such as mental retardation, autism, hearing impairment, or any obvious neurological anomalies (Bloom & Lahey, 1978; Wyke, 1978; Zangwill, 1978). In addition to SLI, a large number of different diagnostic terms have also been used to denote this disorder in the literature, such as ‘congenital aphasia’, ‘developmental dysphasia’, ‘language delay’, ‘developmental language impairment’, ‘receptive/expressive language disorder’ and ‘language learning disability’, to name just a few (see Leonard, 1998; for a good review of the historical changes of the various diagnostic terms). Although SLI is the most commonly adopted term in recent studies\(^1\), the affected children are still given different diagnostic labels. The criteria used to diagnose SLI also vary slightly among researchers and clinicians. In order to distinguish SLI from other types of language problems, exclusionary criteria are usually used, as we shall see in (11) in section 5.1. It is often pointed out, therefore, that the children who meet such criteria may not constitute a homogeneous population. As a matter of fact, since there are considerably conflicting findings among different studies, it is generally assumed that subgroups exist among children with SLI. Nevertheless, it has been widely reported that there is a subgroup of SLI which exhibits fairly consistent language breakdown patterns. These children, often referred to as children with grammatical SLI, have been reported to exhibit particular difficulties with grammatical elements.

As summarized in the following sub-sections, there is accumulating empirical evidence from recent studies which suggests that at least some subset(s) of SLI is/are genetic in origin. There is now further evidence which suggests that neurological anomalies are also involved in this disorder. Therefore, it is likely that some gene(s) is/are associated with abnormal neurological development that affects certain aspects of the normal course of language development.

2.1 Linguistic Properties of SLI

Linguistic investigations of this disorder have been extensively conducted over the past decade. The most common problem of children with SLI reported in the literature, as previously mentioned, is their inability to acquire certain grammatical properties that govern inflectional morphology. It has been widely observed that English-speaking children with SLI have significant difficulty reliably formulating morphological rules for inflection. For instance, they often omit grammatical suffixes in obligatory contexts, as exemplified below.

(1) a. TENSE -past tense: walk-ed
-Last night we arrive. (Gopnik, 1990)
-John wash the dishes yesterday.
(Rice, Wexler, & Cleave, 1995)
b. NUMBER -plural: book-s
   -two motor boat
     (Crystal, Fletcher, & Garman, 1976)
   -two arena (Gopnik, 1990)

c. ASPECT -progressive: be+walk-ing
   -Dad taking camera.
     (Trantham & Pederson, 1976)
   -Man is fall down. (Crystal, 1987)

d. AGREEMENT -third person, singular: walk-s
   -One machine clean all the arena.
     (Eisenson, 1984)
   -He stay there. (Eyer & Leonard, 1995)

e. COMPARISON: bright-er
   -This box is big, but that box is even big.
   -This line is straight, but that line is even straight. (Dalalakis, 1994)

The above descriptions do not imply, however, that these children never produce correct inflected forms. They do produce inflected forms, but do not use them consistently where such forms are required.

Cross-linguistic studies of SLI also reveal that children with SLI exhibit particular problems with grammatical elements. For example, Clahsen (1989, 1991) found that German-speaking children with SLI experienced great difficulty consistently manipulating grammatical suffixes such as Agreement and Case while Leonard et al. (1992) reported that Italian-speaking children with SLI also exhibited significant problems in consistently producing functional elements such as Determiner and clitics.

### 2.2 Genetic Evidence for SLI

Over the past several years, there has been converging evidence from familial studies, twin studies, and epidemiological studies which has shown that SLI aggregates in families. These facts have had geneticists world-wide searching for a genetic factor or factors that correlates with this inability to acquire language normally. A brief overview of such data is provided below.

Familial studies such as that of Samples & Lane (1985) reported that 6 siblings, ranging in age from 11:9 to 5:2, in a single family exhibited specific language learning disorders. Similarly, Gopnik & Crago (1991) studied a 36 member three-generation family of which 16 members were diagnosed as language-impaired. In addition, twin studies have reported an increased concordance in monozygotic, as compared to dizygotic twins, suggesting that this disorder is likely to be heritable. In particular, Lewis & Thompson (1992) studied 57 pairs of twins and found concordance rates of 86% for monozygotic twins, and 46% for dizygotic twins, whereas Bishop (1992) studied 61 pairs of twins, and found concordance rates of 67% for monozygotic twins, and 32% for digyztic twins. Lastly, a number of epidemiological studies have also been conducted. Tallal, Ross, & Curtiss (1989) studied 112 four year-olds (62 language-impaired and 50 controls), and found highly significant differences in the incidences of reports of positive family histories for first-degree relatives between the families of language-impaired, and the control children. Tomblin (1989) conducted a larger study of 203 seven to nine year-olds (51 language-impaired and 152 controls), and also found a pattern of familial aggregation. After showing that the data from his study did not provide support for the environment as a principal mechanism, he concluded that it is possible that one or several paths exist between genetic characteristics, neural development and/or function. More recently, van der Lely & Stollwerck (1996) reported that over 75% of children with SLI have one or more first-degree relatives with a history of language problems.

### 2.3 Neurological Manifestations of SLI

According to the diagnostic criteria for SLI, individuals with the disorder ought not have any apparent neurological anomalies. However, as noted above, there have been some reports which suggest that, at least, some individuals with SLI do appear to exhibit some neurolog-
ical abnormalities, which specifically affect the normal course of language development.

Cohen, Campbell, & Yaghmai (1989) reported an atypical symmetry of the planum temporale in a 7 year-old girl with expressive language disorder. In subsequent studies, Jernigan, Hesselink, Sowell, & Tallal (1991) observed neuroanatomical abnormalities in children with SLI. Asymmetries in the inferoanterior and superoposterior cerebral regions in the MRIs of 20 children with SLI (average age of 9) were noted. The hemispheric volumes of these children indicated that their left posterior perisylvian region was also significantly reduced. MRI studies of Plante, Swisher, Vance, & Rapcsak (1991) also identified significant ($p < .01$) atypical perisylvian asymmetries in the MRIs of 6 out of 8 boys (aged 4 to 9) diagnosed with SLI. Their left perisylvian was the same size as that of controls, but crucially their right perisylvian was significantly larger than the left ($p < .01$). In the general population, the right perisylvian is found to be smaller than the left. More recently, Kabani, MacDonald, Evans, & Gopnik (1997) conducted a neuroanatomical study of five families with SLI with MRI scans of brain volumes. Their results revealed profound generalized cortical atrophy in both the left and the right hemispheres in the anterior region of the frontal and temporal lobes in 80% of the adult individuals with SLI. The most significant difference was located in the sylvian fissure and the interhemispheric fissure. In conclusion, in light of such neuroanatomical findings, Gallagher & Watkin (1997) compared in vivo brain development of four fetuses from 24 to 32 weeks of gestation, one of whom exhibited a positive family history of SLI and three controls. The results of RHR-HD ultrasonographic imaging revealed limited growth in the inferior anterior and inferior medial regions of the left hemisphere in the fetus with the positive family history of SLI compared with the controls. They concluded that such findings suggest that fetuses with a positive family history of SLI experience a prenatal alternation that results in developmental differences in numerous regions of the brain associated with language.

3.0 Linguistic Assumptions

3.1 Syntax-lexicon Interface

In this experimental study, we will adopt the following assumptions from the theory of Distributed Morphology (DM) which have been proposed in Halle & Marantz (1993). Syntactic hierarchical structure, which is composed of atomic elements such as Caus$^2$, Root, Tense, Asp, Neg, Det, and so on, is present all the way down, as illustrated below in (2a). Syntactic terminal nodes contain no phonological content from the outset of derivation$^3$. Phonological expressions, which are called Vocabulary Items, are supplied only after all syntactic operations such as Merge and Move are completed$^4$. Such expressions may not be fully specified for the syntactic positions into which they are inserted. Some unspecified Vocabulary Items may be inserted into different positions where a more specific form is not available. For instance, since the English verb, spin, is not specified for causativity, it can be inserted into either the CAUS or INCH head position.

— (2) —

Unlike the theory of Lectures on Government and Binding (LGB) proposed in Chomsky (1981) which assumes that syntactic structure is projected directly from the lexicon, in this model of grammar, the syntactic computational system and the lexicon are not in a complementary dis-

$^2$ The following abbreviations are used in this paper: NOM (Nominative Case); ACC (Accusative Case); DAT (Dative Case); INCH (Inchoative); CAUS (Causative); PASS (Passive); PCAUS (productive Causative); TENSE (Tense); ASP (Aspect); NEG (Negation); and DET (Determiner).

$^3$ In order to assist the readers in visually comprehending the phrasal structure, the phonological form of the lexical items have been inserted under each terminal node in the configuration in (2a).

$^4$ Merge refers to a combinatorial operation of two items, and Move refers to the movement of a constituent from one syntactic position to another syntactic position. Such operations have been proposed in the Minimalist Program (Chomsky, 1995).
(2) Kazuo-ga koma-o mawa-s-u.
Kazuo-NOM top-ACC spin-CAUS-TENSE
"Kazuo spins the top."

a. Larsonian and DM/Minimalist-type phrase structure

```
  vP
   \   /
   NP   v'
   \   /
      Kazuo
```

b. LGB-type phrase structure

```
  VP
   \   /
   NP   v'
   \   /
      Kazuo
        \   /
        NP   v
          \   /
            koma
          \   /
            mawa
```

Distribution, but rather overlap in the lower positions of the syntactic hierarchical structure\(^5\). Therefore, the fundamental difference between the two theories is that, in the LGB framework, syntax only manipulates internally complex words which are derived in the lexicon, whereas in the DM approach, complex words are derived syntactically, thus the lexicon has no computational system which creates complex words.

Recent studies have attempted to locate the boundary which determines the domain of the lexicon. These have assumed that the lexicon can only be used to supply phonological and semantic information which may or may not have some idiosyncratic properties. For example, Harley (1995) and Travis (1999) argue that the Event-related syntactic projection, which we label as the Event phrase (EP), plays a crucial role in determining such a boundary, as illustrated below (see also Marantz, 1997; for related discussion).

(3) (Travis, 1999)

```
  Syntax
    \   /
    PCAUS EP
      \   /
      Boundary
        \   /
        Lexicon
          \   /
          E'
            \   /
            CAUS AspP
              \   /
              Asp
                \   /
                Theme v'
                  \   /
                  BE/BECOME XP
```

Therefore, this theory predicts that complex verbs which are formed within one event projection can be lexicalized while complex verbs which are formed across two Event projections cannot be lexicalized. For example, since the Japanese productive causative suffix, sase, is generally, associated with a doubly layered Event structure, as shown in (4b), it must be stored as a separate item from its verb stem (see also Miyagawa, 1998; for more relevant discussion).

(4) a. Lexicalization takes place

```
  EP
    \   /
    v-V \   /
    \   V-V \   /
    Lexicalization
```

b. Lexicalization blocked

```
  EP
    \   /
    V-V \   /
    V-sase \   /
    x Lexicalization
```
3.2 Two Kinds of Morphological Processes

As previously discussed, the adopted morphological theory in this paper assumes that complex words are derived syntactically. Therefore, the lexicon has no computational system which creates complex words, and it may be used only to supply idiosyncratic phonological and/or semantic content for combined atomic elements in certain domains. Different processes may be involved in the formation of complex words which are generated in the different domains of the syntactic hierarchy. The characteristics of complex words which are generated within and outside of the domain of the lexicon are summarized below.

(5) Summary of the Two Kinds of Morphological Processes

a. Morphology within the domain of the lexicon
   - may not be productive
   - phonological form of combined atomic elements may be stored together
   - may exhibit idiosyncratic semantic and/or phonological information

b. Morphology outside the domain of the lexicon
   - productive
   - phonological form of each atomic element is stored as a separate item
   - do not exhibit idiosyncratic semantic and/or phonological information

3.3 Lexical Inchoatives and Lexical Causatives in Japanese

Unlike English, in Japanese, lexical inchoatives alternate with their causative counterparts by overt morphology, as exemplified below.

(6) a. Lexical Inchoatives:
   Inchoative morpheme \( \cdot -r \) (among others)
   \( \text{Koma-ga mawa-r-u} \).
   Top-NOM spin-INCH-TENSE
   “The top spins.”

b. Lexical Causatives:
   Causative morpheme \( \cdot -a \) (among others)
   \( \text{Kazu-o-ga koma-o mawa-a-u} \).
   Kazuo-NOM top-ACC spin-CAUS-TENSE
   “Kazu spins the top.”

As can be seen above, the inchoative verb is derived by attaching the inchoative suffix, \( r \), to the root, whereas the lexical causative verb is derived by attaching the causative suffix, \( s \), to the root. Some more examples of the morphological inchoative/causative alternations in Japanese are shown below (cited from Shibatani, 1990).

It has been pointed out in the literature that inchoative verbs exhibit both unergative-like and unaccusative-like characteristics (see Miyagawa, 1989; Tsujimura, 1990; and Matsuoka, 1999; for relevant discussion). It has been assumed that unergatives, such as \( \text{laugh} \) and \( \text{dance} \), are associated with only an external argument (mostly Causer), whereas unaccusatives, such as \( \text{arrive} \) and \( \text{appear} \), are associated with only an internal argument (mostly Theme). Although the details of the structure of inchoatives are still controversial, in this study, we adopt the structure in (7a) which captures the dual characteristics of inchoatives (Matsuoka, 1999, slightly modified).

(7) —

As can be seen above, the structure of lexical inchoatives is parallel to that of lexical causatives (see Nishiyama, 1997 for related discussion). Both structures have a double VP structure whose upper VP is headed by a light verb\(^6\) such as the causative suffix, \( s \), and the inchoative suffix, \( r \). The difference is that, in the structure of lexical inchoatives, the Specifier position

---

6) The term, “light verb”, is used to refer to verbs which have little semantic content, in contrast to verbs which have specific and concrete meanings (e.g., \( \text{kick, eat, read} \)). The term, “functor predicate”, is also used in the literature to denote roughly the same kind of verbs (c.f., Ritter & Rosen, 1993). It should be noted, however, that although light verbs share a lot of similar properties with other functional elements, they differ in their ability to assign a Theta-role. These light verbs may assign a Theta-role to an argument in its Specifier position whereas other functional elements such as Tense and Aspect do not.
Table 1 Lexical Inchoative/Causative Alternations

<table>
<thead>
<tr>
<th>Pattern A</th>
<th>Inchoative</th>
<th>Causative</th>
</tr>
</thead>
<tbody>
<tr>
<td>-ar-</td>
<td>-e-</td>
<td>-e-</td>
</tr>
<tr>
<td>ag-ar-u</td>
<td>'rise'</td>
<td>ag-e-ru</td>
</tr>
<tr>
<td>atsum-ar-u</td>
<td>'gather'</td>
<td>atsum-e-ru</td>
</tr>
<tr>
<td>tam-ar-u</td>
<td>'accumulate'</td>
<td>tam-e-ru</td>
</tr>
<tr>
<td>tom-ar-u</td>
<td>'stop'</td>
<td>tom-e-ru</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pattern B</th>
<th>-φ-</th>
<th>-e-</th>
</tr>
</thead>
<tbody>
<tr>
<td>ak-u</td>
<td>'open'</td>
<td>ak-e-ru</td>
</tr>
<tr>
<td>itam-u</td>
<td>'be damaged'</td>
<td>itam-e-ru</td>
</tr>
<tr>
<td>ir-u</td>
<td>'enter'</td>
<td>ir-e-ru</td>
</tr>
<tr>
<td>ukab-u</td>
<td>'float'</td>
<td>ukab-e-ru</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pattern C</th>
<th>-e-</th>
<th>-as-</th>
</tr>
</thead>
<tbody>
<tr>
<td>ar-e-ru</td>
<td>'be ruined'</td>
<td>ar-as-u</td>
</tr>
<tr>
<td>okur-e-ru</td>
<td>'be late'</td>
<td>okur-as-u</td>
</tr>
<tr>
<td>ta(y)-e-ru</td>
<td>'be extinct'</td>
<td>tay-as-u</td>
</tr>
<tr>
<td>ko(y)-e-ru</td>
<td>'become fat'</td>
<td>koy-as-u</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pattern D</th>
<th>-φ-</th>
<th>-as-</th>
</tr>
</thead>
<tbody>
<tr>
<td>a(w)-u</td>
<td>'meet'</td>
<td>aw-as-u</td>
</tr>
<tr>
<td>kusar-u</td>
<td>'spoil'</td>
<td>kusar-as-u</td>
</tr>
<tr>
<td>nak-u</td>
<td>'cry'</td>
<td>nak-as-u</td>
</tr>
<tr>
<td>wak-u</td>
<td>'boil'</td>
<td>wak-as-u</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pattern E</th>
<th>-e-</th>
<th>-φ-</th>
</tr>
</thead>
<tbody>
<tr>
<td>or-e-ru</td>
<td>'be broken'</td>
<td>or-u</td>
</tr>
<tr>
<td>ur-e-ru</td>
<td>'be sold'</td>
<td>ur-u</td>
</tr>
<tr>
<td>sak-e-ru</td>
<td>'split'</td>
<td>sak-u</td>
</tr>
<tr>
<td>hag-e-ru</td>
<td>'tear off'</td>
<td>hag-u</td>
</tr>
</tbody>
</table>

(7) a. Lexical Inchoatives

b. Lexical Causatives

sition of the lower VP is filled with a non-overt pronoun, PRO, which is co-indexed with the NP in the Specifier of the upper vP whereas, in the structure of lexical causatives, both specifier positions are occupied by an overt NP (for further discussion on the underlying structure of lexical causatives, see Hale & Keyser, 1993).

With regard to the morphological processes, as illustrated in (7), the root generated in the lower VP moves up to the higher head position within the domain of the lexicon in both structures. Therefore, these complexes may exhibit some lexical properties such as idiosyncratic semantic and phonological information.
(8) **Syntactic Passives:** Productive passive morpheme -(r)are-
   a. **Yamamoto-san-ga Kazuko-san-ni os-are-ta.**
   Yamamoto-Mr.-NOM Kazuko-Ms.-DAT push-PASS-TENSE
   “Mr. Yamamoto got pushed by Ms. Kazuko.”

   b. **Takako-ga Kazuo-ni saifu-o nusum-are-ta.**
   Takako-NOM Kazuo-DAT wallet-ACC steal-PASS-TENSE
   “Takako got affected by the event that Kazuo stole her wallet.”

(9) **Syntactic Causatives:** Productive causative morpheme -(s)ase-
   **Kazuo-ga Takako-o butai-e ag-ar-ase-ta.**
   Kazuo-NOM Takako-ACC stage-to rise-INCH-PCAUS-PAST
   “Kazuo caused Takako to rise onto the stage.”

3.4 **Syntactic Passives and Syntactic Causatives in Japanese**

Unlike English, Japanese has three kinds of verbal passive constructions, namely direct passives, indirect passives, and possessive passives. Examples of direct passives and possessive passives are provided in (8a) and (8b), respectively. The indirect passive construction is not discussed here since it is not included in this experimental study. In both direct and possessive passive constructions, as can be observed below, the passive predicate is formed by attaching the productive passive suffix, *are*, to the stem. — (8) —

Two different types of analyses have been proposed for Japanese passives in the literature. One type of account, which is the so-called uniform account, assumes that all types of passives involve complementation, and that the subject is an external argument of the passive morpheme, *are* (Kuroda, 1979; Kitagawa & Kuroda, 1992; Hoshi, 1994). The other type of account, which is the so-called non-uniform account, assumes that direct passives involve no complementation, and that the subject is derived by NP-movement within a simple sentence, as in be-passives in English, whereas other types of passives may involve complementation (Kuno, 1973; Terada, 1990; Kubo, 1990). In this study, we adopt the former account which is now more widely accepted.

We now turn to the causative construction in Japanese whose causative predicate is formed by suffixing the productive causative morpheme, *ase*, to the stem, as can be seen in the following example. — (9) —

There are semantic differences between the two kinds of causatives. The lexical causatives are generally used to express a one-event-type causation in which the Causer physically acts on the Causant/Theme in a direct manner to carry out the caused event while the syntactic causatives usually denote a two-event-type causation in which the Causer indirectly makes the Causant carry out the caused event by assisting the Causant, or giving orders permission to the Causant.

The structures of syntactic causatives and passives are provided below. — (10) —

As can be seen above, both structures have a biclausal configuration whose matrix clause is headed by a light verb such as the productive causative suffix, *ase* and the productive passive suffix, *are*. The difference is that the structure of direct passives contains a non-overt pronoun, PRO, in the embedded clause (Hoshi, 1994) while that of causatives contains only overt NPs in the embedded clause. In the case of possessive passives, we simply assume that a non-overt genitive pronoun is present within the embedded clause, and is co-indexed with the matrix subject. Aside
from these differences, the structure of passives is parallel to that of causatives.

Regarding the morphological processes, these complex verbs are all assumed to be formed by verb movement (Inoue, 1989; Terada, 1990), and, more importantly, the productive causative and passive morphemes are both generated outside the domain of the lexicon, as illustrated above in (10).

4.0 Research Questions

Do Japanese-speaking children with SLI experience difficulty with a particular kind of morphological process? If yes, [i] which kind, and [ii] what is their underlying problem for that kind of morphological process?

5.0 Experiment

In order to investigate the research questions of this study, an experimental linguistic test was designed and administered to Japanese-speaking children with SLI. More specifically, with this test, we investigated their performance on the two kinds of Japanese complex verbs which are associated with a light verb: [i] those which are generated within the domain of the lexicon (lexical inchoatives and lexical causatives), and [ii] those which are generated outside the domain of the lexicon (syntactic passives and syntactic causatives).

5.1 Subjects

Eight children with SLI, eight age-matched and eight younger children with normal language development were examined with an elicited production task. All the children were monolingual speakers of Japanese who had grown up in Japan throughout their lives. The children with SLI consisted of five males and three females, ranging in age from 7;1 to 12;1. They were selected by speech-language pathologists from a pool of subjects independently diagnosed as having expressive and receptive language disorder from elementary schools and speech-language therapy institutes in Aichi, Gifu, and Kanagawa prefectures, Japan, according to the criteria below.

(11) Diagnostic Criteria for SLI

1. WISC-R/III performance IQ of 85 or better (or the equivalent)
2. normal hearing acuity
3. no motor handicaps or oral structural impairments
4. not autistic (as defined by DSM III-R/IV)
5. no history of recurrent Otitis Media
6. no known neurological disorders
7. no prominent socio-emotional problems

The criteria for selection are the same as those of Tallal, Townsend, Curtiss, and Wulfeck (1991), which are perhaps the most standardly used to diagnose SLI in recent studies.

In addition to the children with SLI, eight age-matched and eight younger children with normal language development were also tested to serve as controls. The age-matched children consisted of two male and six females, ranging in age from 7;3 to 12;0, whereas the younger children consisted of six males and two females, ranging in age from 4;5 to 6;3. These children were selected from elementary schools and kindergartens in Aichi and Gifu prefectures, Japan.

(12) Subjects
Group A: 8 Japanese-speaking children with specific language impairment ranging in age from 7;1 to 12;1
Group B: 8 Japanese-speaking children with normal language development ranging in age from 7;3 to 12;0
Group C: 8 Japanese-speaking children with normal language development ranging in age from 4;5 to 6;3

5.2 Method
5.2.1 Design and Materials
A sentence completion test, a kind of elicited production task, was conducted in this study. In the test, the subjects were requested to complete the incomplete sentences by providing the appropriate complex verb. Each stimulus was composed of a picture and an incomplete corresponding sentence which described the event represented in the picture. People, animals, and objects in the pictures were all labeled with the Japanese characters, hiragana. Some examples of stimuli pictures are provided below. — (13) —

In the corresponding sentences, all nouns and roots of the target complex verbs in sentence-final position were present7) while all suffixes, including inflectional morphemes such as Tense and Aspect, had been omitted, as exemplified below. — (14) —

The reason that the root was present in the stimuli sentences was in order to avoid multiple possible responses from the children. As a result, the children could not select verbs which did not exhibit the desired morphological alternation of the experiment.

The target complex verbs were composed of the four types of morphologically complex verbs previously described, as shown below.

(15) Types of Target Complex Verbs
30 Lexical Inchoatives
30 Lexical Causatives
30 Syntactic Passives
30 Syntactic Causatives
15 Fillers

There were 30 sentences for each type of target complex verb. Among the 30 passive sentences, there were 20 direct passive sentences (e.g., Yamamoto-san-ga Kazuko-san-ni os-are-ta. “Mr. Yamamoto got pushed by Kazuko.”) and 10 possessive passive sentences (e.g., Takako-ga Kazuo-ni saifu-o nusum-are-ta. “Takako got affected by the event that a thief stole her wallet.”). Among the 30 sentences of syntactic causatives, 10 sentences contained an embedded clause which was associated with an intransitive verb (e.g., Takako-ga Emi-chan-ni gurando-o hasir-ase-ta. “Takako made Emi run on the track.”) while the other 20 sentences contained an embedded clause which was associated with a transitive verb (e.g., Takako-ga Kazuo-ni hon-o

7) When the verb root ends with a consonant, the final consonant has been omitted (e.g., hashir-'run' → hashi) since Japanese does not allow consonant final words to surface except those ending in /N/ such as hon 'book'.
(13) Examples of Stimuli Pictures ([ ] = Target Answer)

a. Lexical Inchoatives
   \[ mawaru \text{-}u \text{ 'spin-\textsc{INCH-}\textsc{TENSE}'} \]

b. Lexical Causatives
   \[ mawas\text{-}u \text{ 'spin-\textsc{CAUS-}\textsc{TENSE}'} \]

c. Syntactic Passives
   \[ os\text{-}are\text{-}ru \text{ 'push-\textsc{PASS-}\textsc{TENSE}'} \]

d. Syntactic Causatives
   \[ hasirase\text{-}ru \text{ 'run-\textsc{PCAUS-}\textsc{TENSE}'} \]

\( yomaseru. \) "Takako made Kazuo read a book."

In addition, fifteen filler stimuli, which were a mixture of various types of complex verbs, were also included.

5.2.2 Procedure

The children were tested individually in a quiet small room at their respective elementary schools or at their home by two investigators. The child was seated across from the two investigators at a small desk. Prior to the test, one investigator explained to the child the respective instructions of the task, and went through a few practice stimuli sentences with the child to ensure that the child understood the task. The same investigator presented the stimuli sentences to the child and recorded the responses from the child, while the other investigator audio-recorded the entire experimental session for further verification.

During the test session, along with the corresponding pictures, the stimuli sentences were presented to the child both visually and aurally to ensure that the child did not fail to understand the stimuli sentences. The child was then requested to complete the sentences by providing the appropriate complex verb orally. In other
Example of stimulus sentence, corresponding to the above pictures.

a. Lexical Inchoative

Koma-ga mawa-__________________________.
Top-NOM spin-__________________________.
"The top spins."
The target answer: mawa-ru (spin-INCH-TENSE)

b. Lexical Causative

Takashi-kun-ga koma-o mawa-
Takashi-NOM top-ACC spin-
"Takashi spins the top."
The target answer: mawa-s-u [spin-CAUS-TENSE]

c. Syntactic Passive

Yamamoto-san-ga Kazuko-san-ni os-__________________________.
Yamamoto-Mr.-NOM Kazuko-Ms.-DAT push-__________________________.
"Mr. Yamamoto got pushed by Kazuko"
The target answer: os-are-ta (push-PASS-TENSE)

d. Syntactic Causative

Takako-san-ga Emi-chan-ni gurando-o hashi(r)__________________________.
Takako-Ms.-NOM Emi-DAT track-ACC run-__________________________.
"Takako is making Emi run on the track."
The target answer: hashi(r)-ase-ru (run-PCAUS-TENSE)

words, the child was required to produce a morphologically complex verb by adding the omitted suffixes to the verb root, according to the event represented in the picture and the remainder of the sentence. The stimuli were presented in the same pseudo-randomized order to all the children.

5.3 Results

Scoring was based on the forms in which the child produced the target morphologically complex verb. Since the focus of this experiment was to investigate their performance on morphological processes which are associated with a light verb, all inflectional forms with Tense and/or Aspect were accepted. The means correct of the three groups of children on the four types of complex verbs as between factors in order to see if there were overall effects. In brief, the results from the MANOVA reveal a main effect:

8) There were cases in which the child did not produce the target answer, though the response was somewhat acceptable in that it described the event expressed in the corresponding picture. For instance, some children produced a passive form for the stimulus whose target answer was an inchoative form although the cause of the event was not present in the corresponding picture. There were also cases in which some children produced a complex verb which was formed with the verb, morau ‘receive’ for the stimulus whose target answer was a passive form (e.g., os-are-ta → ose-te-morau-ta), suggesting that the children interpreted the matrix subject as a Beneficiary rather than as an Affectee. The numbers of such responses were very small, as can be seen in individual scores in Tables 3-5 in the Appendix.

9) Individual results have been collapsed into group means, as is standard practice in SLI research. Homogeneity is assumed, but that is not meant to deny the existence of variation in the performance of the children with SLI. See Tables 3-5 for more information.

10) The three ANOVA assumptions were met: normality, homogeneity of variance and independence of observations.
Table 2  The means correct (out of 30 items per variable)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Lexical Inchoatives</th>
<th>Lexical Causatives</th>
<th>Syntactic Passives</th>
<th>Syntactic Causatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children with SLI</td>
<td>24.6</td>
<td>22.9</td>
<td>7.0</td>
<td>7.9</td>
</tr>
<tr>
<td>Age-matched children</td>
<td>28.6</td>
<td>26.8</td>
<td>27.1</td>
<td>28.0</td>
</tr>
<tr>
<td>Younger children</td>
<td>24.0</td>
<td>23.0</td>
<td>17.4</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Figure 1  The results of the sentence completion test

\( F(2, 21) = 19.93, p < .001 \). Thus, the group differences across the four types of complex verbs were significant. The results also reveal an interaction effect: \( F(3, 63) = 42.85, p < .001 \). Thus, the three groups are behaving significantly differently with the four types of complex verbs. The latter significance found served as justification to conduct univariate analyses of variance (ANOVAs) on the four types of complex verbs to further examine the source of the significance.

An ANOVA for each of the four types of complex verbs by group was conducted. The results from the ANOVAs again reveal significant differences among the performance of the three groups of children on the lexical inchoatives \( F(2, 21) = 8.28, p < .002 \), the syntactic passives \( F(2, 21) = 29.60, p < .001 \) and on the syntactic causatives \( F(2, 21) = 23.95, p < .001 \). However no significant difference was found among the three groups of children on the lexical causatives.

Lastly, in order to determine where exactly the significant differences lie on the ANOVAs, Post-hoc Tukey tests were conducted. On the syntactic passives, significant differences were found among all three groups of children. More specifically, the Tukey tests revealed significance between the children with SLI and the age-matched children \( p < .001 \), the age-matched children and the younger children \( p < .005 \), and between the children with SLI and the younger children \( p < .003 \). On the syntactic causatives, significant differences were demonstrated between both the children with SLI and the age-matched children \( p < .001 \), and the children with SLI and the younger children \( p < .001 \). The performance between the age-matched and the younger children was found to be not significant on these complex verbs. In addition, on the lexical inchoatives, they demonstrated significant differences between the children with SLI and the age-matched children \( p < .02 \), as well as between the age-matched and the younger children \( p < .004 \). No significant difference was revealed between the children with SLI and the younger children on this type of complex verb. There was no significant difference among any groups of children on the lexical causatives.
To summarize this section, the results show that the children with SLI performed relatively well with lexical inchoatives and causatives, comparable to the younger children, but experienced great difficulty forming syntactic passives and causatives. In contrast, the results show that the age-matched children with normal language development performed quite well on all types of complex verbs while the younger children performed relatively well on lexical inchoatives, lexical causatives, and syntactic causatives, but experienced some difficulty forming syntactic passives.

6.0 Discussion

The results from this experimental study show that the Japanese-speaking children with SLI experienced great difficulty forming morphologically complex verbs which are generated outside the domain of the lexicon while they performed much better producing morphologically complex verbs which are generated within the domain of the lexicon. In contrast, the age-matched children did not exhibit such an asymmetric performance. They performed well on both kinds of complex verbs. Similarly, the younger children did not show such a clear asymmetric performance between the two kinds of complex verbs either. They performed relatively well on the lexical inchoatives, lexical causatives, and syntactic causatives while some of the younger children exhibited a particular problem forming the complex verbs with the passive suffix.

The poor performance found in the children with SLI in forming complex verbs with the productive causative suffix, sase, and the passive suffix, rare, suggest that the children with SLI appear to be unable to construct morphological rules which rely heavily on linguistic representations. More specifically, we argue that since these

11) As addressed in section 2, it is widely believed that children with SLI are a heterogeneous population. Needless to say, therefore, the description of the deficit in this study is likely to represent only a subgroup of Japanese-speaking children with SLI, not all Japanese-speaking children with SLI.

children appear unable to build normal linguistic representations, they cannot form the lexicon-external complex verbs which require concatenation of separately stored items in the syntax proper.

Regarding the lexical inchoatives, we found that the children with SLI performed much better with these verbs than they did on the lexicon-external complex verbs, but not as well as their age-matched children. Regarding the lexical causatives, they also performed much better with these verbs than they did on the lexical-external complexes. Although there was not a quantitative difference in their performance from their age-matched peers, we found a qualitative difference in their performance. A detailed error analysis revealed that most errors made by the children with SLI were omission errors or substitution errors (e.g., tok-e-ta for tok-asi-ta) while most errors made by the age-matched children were overregularization errors (e.g., tok-e-sase-ta for tok-asi-ta) which had been also documented in Ito (1990) (see Fukuda & Fukuda, in press; for more details).

The relatively good performance found in the children with SLI on the lexicon-internal complex verbs illustrates that, using declarative memory, they appear to be able to memorize these morphologically complex forms as unanalyzed single constituents (see Paradis & Gopnik, 1997; for related discussion). We assume that although they may have representational problems, they can store these complex verbs along with the information about the numbers of arguments which such verbs take, as exemplified below.

(16) a. Lexical Inchoative:
   [NP1: Theme, V: mawaru ‘spin\textsubscript{INTR}’]
   b. Lexical Causative: NP:Casurer
   [NP2: Theme, V: mawaru ‘spin\textsubscript{TRAN}’]

These results are consistent with the findings that children with SLI show much better performance on non-productive (irregular) morphological processes such as Tense marking (e.g.,
'go'/'went'), than they do on productive (regular) morphological processes (e.g., 'wash'/'washed'), but not as good as their age-matched peers (Ullman & Gopnik, 1994). These results are also consistent with the findings that the deficit of SLI does not affect Theta-role assignment of simple sentences (i.e., sentences which do not involve phrasal movement or an embedded clause), suggesting that their argument structures are unimpaired (Gopnik, 1999; van der Lely, 1998; Gopnik & Crago, 1991).

We further suggest that children with SLI are capable of producing some frequently used lexicon-external complex verbs in a similar manner to the way they use lexical inchoatives and causatives. We assume that, as a compensatory strategy, they may be able to use memorization of these lexicon-external complexes in the following manner.

(17) a. Syntactic Passive:
   NP1: Affectee [NP2: Causer, V: *tatakareru*]
      'got punched'
   b. Syntactic Causative:
      NP1: Causer [NP2: Causee, V: *tatuseru*]
      'make-stand'

Indeed, most of the children with SLI, especially the older children (S6, S7, and S8) produced some lexicon-external complex verbs, as can be seen in Table 3 in the Appendix. However, unlike their age-matched peers, they are unable to consistently produce appropriate lexicon-external complexes because the frequency of such complex verbs is not sufficient for memorization.

An alternative analysis for the performance of these older children with SLI could be that the nature of their linguistic problems is quite different from that of other children. Although homogeneity is assumed among our children, since the adopted criteria for SLI is exclusionary, there is always a risk that some children, whose language development has been simply delayed, have been included. It is well documented in the literature that although children with SLI generally have persistent language difficulties, some children grow out of their language problems as they age. Rice & Wexler (1996), for instance, investigated Tense marking in English-speaking children with SLI, and reported that, by the age of about 6, approximately half of their children made substantial progress toward normal performance whereas others made very little progress. Since that the older children with SLI in this study are all over the age of 11, and their scores on the lexicon-external complex verbs are still as low as those of the 5 year olds with normal language development or even lower, it is highly unlikely that the linguistic problems of the older children with SLI are a consequence of a simple language delay. Therefore, as was previously proposed, we instead assume that these children are producing the lexicon-external complex verbs in quite a different manner from children with normal language development.

In addition to the performance of the children with SLI, another interesting observation found in this study is that some of the younger children with normal language development exhibited particular difficulty forming complex verbs with the productive passive suffix, *rare*, while they performed relatively well producing complex verbs with the productive causative suffix, *sase*. Previous studies have also reported this asymmetry. Morikawa (1997) and Shirai, Miyata, Naka, & Sakazaki (to appear) reported that the acquisition of the productive causative verb is relatively early. Their studies on reported that Japanese children appear to acquire the productive use of the suffix, *sase*, some time during the age of 4, although their usage may be restricted to certain semantic contexts. In contrast, Minami (1999), Sugisaki (1999), and Harada & Furuta (1998) reported that the acquisition of passives in Japanese is relatively late. Although there are contradictory reports regarding the acquisition order of the different kinds of passive constructions, namely direct, possessive and indirect passives, Japanese children appear to acquire the former two kinds, which are the focus
of this present study, around the age of 6 or later. As illustrated below, the late acquisition of these passives is usually attributed to the particular syntactic operation of NP-movement in which the underlying object moves to the subject position (see Borer & Wexler, 1987; for relevant discussion).

(18)

\[
\text{[[Kazu\text{\text{-}h\text{\text{-}g\text{\text{-}}}a} \quad \text{[Takako-ni t\text{\text{-}}} as\text{\text{-}]}ta]}\]
\]

Kazu\text{\text{-}o} NOM Takako DAT push-PASS-PAST

“Kazu\text{\text{-}o} was pushed t\text{\text{-}}i by Takako.”

However, according to the uniform analysis of the Japanese passive construction, which we have adopted in this study, the difficulty that the Japanese young children have with the passive construction could be explained in terms of the licensing of the non-overt argument in the embedded clause. In other words, some of the younger children are perhaps experiencing difficulty identifying the co-indexation of the non-overt elements across the two domains, as shown below.

(19)

\[
\text{[[Kazu\text{\text{-}h\text{\text{-}g\text{\text{-}}}a} \quad \text{[Takako-ni PRO\text{\text{-}}} as\text{\text{-}]}ta]}\]
\]

Kazu\text{\text{-}o} NOM Takako DAT push-PASS-PAST

“Kazu\text{\text{-}o} got affected by the event that Takako pushed him\text{\text{-}i}.”

Note that either analysis requires appropriate linguistic representations to identify the non-overt element in the embedded clause. This suggests that the difficulties that the children with SLI experience with the syntactic passive construction is not only because it involves a morphological process, but also because the licensing of the non-overt argument in the embedded clause would cause them difficulty due to their representational problems.

It also should be noted that, as can be seen in Table 5 in the Appendix, there was relatively large variation among the children. For instance, the 5;3-year-old child (Y2) and the 5;5-year-old child (Y5) showed great difficulty on the syntactic passives while the 4;5-year-old child (Y1) scored one of the highest scores (80% correct) among the children. Considering that an elicited production task is one of the most difficult tasks for young children, compared to other linguistic tests such as an imitation task or a comprehension task, the acquisition of passives in Japanese may not be aslate as previously thought.

In this paper, we explored the Linguistic Hypothesis which assumes that the language problems with SLI are due to an inability to construct an appropriate underlying grammar. However, whether or not the underlying deficit in SLI is specific to language only is still a controversial question. Although, by definition, children with SLI are in the normal range or above in standardized non-verbal tests of intelligence, detailed investigations of other cognitive abilities of children with SLI reveals that some children do exhibit other cognitive problems as well. Johnston (1997) reported, for example, that certain information-processing capacities are limited in children with SLI. She suggests that this processing deficit might be affecting their language development. Nevertheless, it is not clear whether their processing limitation is the cause of their linguistic problems, or simply these problems are co-occurring in some children. In order to examine the possibility that SLI is a consequence of a more general cognitive deficit, it would be necessary to show how a particular kind of cognitive deficit could affect certain aspects of language, and at the same time spare certain other aspects of language. As far as we are aware, however, no such account has been put forward.

Some researchers have also argued that these children have a more general cognitive deficit, and their language problems are a secondary effect of this cognitive deficit (Vargha-Khadem, Watkins, Alcock, Fletcher, & Passingham, 1995). It is correct that there are children, who have language problems, who also have lower scores on standardized non-verbal tests of intelligence. Recent studies, however, have shown that there is
no correlation between their cognitive problems and their linguistic problems (Conti-Ramsden & Botting, 2000; Gopnik, 1999; van der Lely, 1997; Bishop 1994; among others). These studies reported that there are children with SLI, whose non-verbal IQ scores are quite high while there are also children, whose non-verbal IQ scores are below the normal range, but have no language problems, suggesting that a general cognitive deficit is not the cause of the linguistic problems of SLI. Gopnik (1999, p.15), therefore, concluded that "it is likely to be the case that the genetic disorder that is associated with this language problem is pleiotropic and has other consequences in some individuals in addition to its effect on language".

7.0 Implications

In the previous section, with respect to the underlying impairment of SLI, we suggested the possibility that it could be the result of their inability to build normal linguistic representations. More specifically, we argued that the computational procedures which subserve symbolic rules for morphology that are generated outside the domain of the lexicon are severely affected in SLI because these rules rely heavily on linguistic representations. In contrast, the results reveal that morphological processes that are generated in the domain of the lexicon remain relatively unaffected in SLI. We suggested that although these children may be unable to build appropriate linguistic representations for these, using their declarative memory they can access these complex forms which are assumed to be stored as unanalyzed constituents in the lexicon. This contrast implies that although the two kinds of morphological complex verbs may be derived by the same syntactic operations such as Move and Merge of atomic elements, they may be processed by neurofunctionally distinct systems at a certain level.

These findings also suggest that the problems underlying SLI are not limited to a specific phrasal category such as the Tense phrase (Rice, Wexler, & Cleave 1995), nor only to functional categories (Guilfoyle, Allen, & Moss, 1991; Eyer & Leonard, 1995; Leonard, 1995). The impairment seems to be rather spread out across a wider range of syntactic categories. They further suggest that the problems underlying SLI are not restricted solely to inflectional morphology, but also to syntax. In recent studies, there has been further evidence to support such a claim. Gopnik (1999), and van der Lely (1994), for example, reported that English-speaking children with SLI have problems comprehending sentences with non-canonical word order such as passive sentences (e.g., *The girl* is *pushed* *by* the *boy*) and sentences with relative clauses (e.g., *It’s the girl, who the boy pushes*). With various kinds of syntactic tests, van der Lely (1997, 1998) also extensively investigated the syntactic competence of a child, who showed problems with inflectional morphology, typical manifestations of grammatical SLI, in his spontaneous speech. She found that the child exhibited syntactic problems in assigning reference to pronouns and anaphors (e.g., *Mowgli says Baloo Bears, is ticking himself*), in comprehending questions with *wh*-movement from the object position (e.g., *Who did Mrs. Peacock see* *in* the *lounge*?), and in producing PP-embedded sentences (e.g., *NP The cat [pp with the blue blanket] is jumping on the bed*).

From these findings, she concluded that syntactic computation is also severely impaired in children with SLI. Our findings suggest that children with SLI have difficulties not only with phrasal movement (i.e., NP-movement and *wh*-movement), but also with head-movement (i.e., verb-movement). They further imply that their syntactic problems and their difficulties constructing morphological rules for inflections may be attributed to the same underlying deficit if we assume that inflectional morphology also involves syntactic head-movement, as proposed in contemporary linguistic theory.
The adopted analysis also predicts a very specific performance for children with SLI. For instance, it predicts that children with SLI will experience great difficulty with passives in higher syntax (e.g., verbal passives), while they should experience less difficulty with passives in lower syntax (e.g., stative passives). It also predicts that children with SLI will exhibit great difficulty with NP-movement in higher syntax (e.g., scrambling), while they should have less difficulties with NP-movement in lower syntax (e.g., dative shift). The investigation of these phenomena remains to be conducted in future research of SLI.

Acknowledgements

We are grateful to Lisa Travis, Michel Paradis, Lydia White, Myrna Gopnik, Kazuko Harada, Hiroko Hagiwara, and the anonymous reviewers of this journal for their insightful comments and suggestions. Special thanks are also due to Yuriko Oshima-Takane for her helpful comments on the experimental methodology, and to Michael Hoover for his assistance in the statistical analysis. We wish to thank all of the participants of the study, and the speech-language pathologists for both their collaboration and the use of their facilities for testing. This research was supported by a Government of Canada Award to the first author, grants from the Japanese Ministry of Education, Grant-in-Aid for Scientific Research on Priority Areas (#09207103 and #10114102) to the second author, and in part by a joint grant from the Social Sciences and Humanities Research Council of Canada, and the Medical Research Council of Canada (#SP-12754) to Myrna Gopnik for which we are truly grateful.

References


Press.


Tomblin, J. B. (1989). Familial concentration of


(Received 20 Nov. 2000)

(Accepted 15 Jan. 2001)

Shinji Fukuda

Shinji Fukuda obtained his B.A. in English Language and Literature from Chukyo University, Nagoya, Japan in 1987. He is currently conducting his Ph.D research in Linguistics at McGill University, Montreal, Canada. His primary research interests are in the acquisition of syntactic and morphological properties in Japanese children with normal language development and with specific language impairment, and its neurological implications.

Suzy E. Fukuda

Suzy E. Fukuda obtained her B.A. in French and International Area Studies from the University of Vermont, Burlington, U.S.A. in 1985, and her M.A. in French Language and Literature from McGill University, Montreal, Canada in 1996. She is currently conducting her Ph.D research in Linguistics at McGill University. She also taught at Nagoya University of Commerce and Business Administration, Nagoya, Japan, from 1996 to 1999, and is presently teaching at Aoyama Gakuin University, Tokyo, Japan. The areas of her specialization are the morphological and phonological properties of specific language impairment in Japanese.
### APPENDIX

**Table 3** Individual Scores for Children with SLI (Out of 30 items)

<table>
<thead>
<tr>
<th>Subjects (Age, Sex)</th>
<th>Lexical Inchoatives</th>
<th>Lexical Causatives</th>
<th>Syntactic Passives</th>
<th>Syntactic Causatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1 (7;1, M)</td>
<td>T=21</td>
<td>T=18</td>
<td>T=1</td>
<td>T=0</td>
</tr>
<tr>
<td>S2 (7;4, M)</td>
<td>T=28 (A=1)</td>
<td>T=19</td>
<td>T=2</td>
<td>T=3</td>
</tr>
<tr>
<td>S3 (7;10, M)</td>
<td>T=19</td>
<td>T=13</td>
<td>T=0</td>
<td>T=0</td>
</tr>
<tr>
<td>S4 (8;5, F)</td>
<td>T=24</td>
<td>T=26</td>
<td>T=7 (A=2)</td>
<td>T=3</td>
</tr>
<tr>
<td>S5 (8;8, F)</td>
<td>T=27</td>
<td>T=26</td>
<td>T=6</td>
<td>T=4</td>
</tr>
<tr>
<td>S6 (11;3, M)</td>
<td>T=24</td>
<td>T=26</td>
<td>T=18</td>
<td>T=11</td>
</tr>
<tr>
<td>S7 (11;8, F)</td>
<td>T=29</td>
<td>T=29</td>
<td>T=11 (A=1)</td>
<td>T=24</td>
</tr>
<tr>
<td>S8 (12;1, M)</td>
<td>T=25 (A=1)</td>
<td>T=26</td>
<td>T=11 (A=2)</td>
<td>T=18</td>
</tr>
<tr>
<td>Mean</td>
<td>24.6</td>
<td>22.9</td>
<td>7.0</td>
<td>7.9</td>
</tr>
</tbody>
</table>

*T=Target answer, A=Not target answer, but acceptable response

**Table 4** Individual Scores for Age-matched Children (Out of 30 items)

<table>
<thead>
<tr>
<th>Subjects (Age, Sex)</th>
<th>Lexical Inchoatives</th>
<th>Lexical Causatives</th>
<th>Syntactic Passives</th>
<th>Syntactic Causatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1 (7;3, F)</td>
<td>T=28</td>
<td>T=28</td>
<td>T=23 (A=2)</td>
<td>T=27</td>
</tr>
<tr>
<td>A2 (7;5, M)</td>
<td>T=29 (A=1)</td>
<td>T=24</td>
<td>T=29</td>
<td>T=29</td>
</tr>
<tr>
<td>A3 (7;5, F)</td>
<td>T=30</td>
<td>T=29</td>
<td>T=28 (A=1)</td>
<td>T=27</td>
</tr>
<tr>
<td>A4 (8;8, F)</td>
<td>T=30</td>
<td>T=23</td>
<td>T=25</td>
<td>T=27</td>
</tr>
<tr>
<td>A5 (10;9, F)</td>
<td>T=30</td>
<td>T=28</td>
<td>T=27</td>
<td>T=30</td>
</tr>
<tr>
<td>A6 (11;0, F)</td>
<td>T=26 (A=2)</td>
<td>T=28</td>
<td>T=26</td>
<td>T=29 (A=1)</td>
</tr>
<tr>
<td>A7 (11;1, F)</td>
<td>T=26 (A=2)</td>
<td>T=26</td>
<td>T=30</td>
<td>T=27 (A=2)</td>
</tr>
<tr>
<td>A8 (12;0, M)</td>
<td>T=30</td>
<td>T=28</td>
<td>T=29</td>
<td>T=28 (A=1)</td>
</tr>
<tr>
<td>Mean</td>
<td>28.6</td>
<td>26.8</td>
<td>27.1</td>
<td>28.0</td>
</tr>
</tbody>
</table>

*T=Target answer, A=Not target answer, but acceptable response

**Table 5** Individual Scores for Younger Children (Out of 30 items)

<table>
<thead>
<tr>
<th>Subjects (Age, Sex)</th>
<th>Lexical Inchoatives</th>
<th>Lexical Causatives</th>
<th>Syntactic Passives</th>
<th>Syntactic Causatives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Y1 (4;5, M)</td>
<td>T=23 (A=2)</td>
<td>T=23</td>
<td>T=24</td>
<td>T=24 (A=3)</td>
</tr>
<tr>
<td>Y2 (5;3, M)</td>
<td>T=22</td>
<td>T=19</td>
<td>T=10</td>
<td>T=16</td>
</tr>
<tr>
<td>Y3 (5;3, F)</td>
<td>T=24 (A=2)</td>
<td>T=26</td>
<td>T=18</td>
<td>T=27</td>
</tr>
<tr>
<td>Y4 (5;3, F)</td>
<td>T=23</td>
<td>T=22</td>
<td>T=12 (A=1)</td>
<td>T=20 (A=2)</td>
</tr>
<tr>
<td>Y5 (5;5, M)</td>
<td>T=22</td>
<td>T=19</td>
<td>T=10</td>
<td>T=14</td>
</tr>
<tr>
<td>Y6 (5;10, M)</td>
<td>T=26</td>
<td>T=26</td>
<td>T=25</td>
<td>T=27</td>
</tr>
<tr>
<td>Y7 (5;11, M)</td>
<td>T=25</td>
<td>T=21</td>
<td>T=17</td>
<td>T=25</td>
</tr>
<tr>
<td>Y8 (6;3, M)</td>
<td>T=27</td>
<td>T=28</td>
<td>T=23</td>
<td>T=27</td>
</tr>
<tr>
<td>Mean</td>
<td>24.0</td>
<td>23.0</td>
<td>17.4</td>
<td>22.5</td>
</tr>
</tbody>
</table>

*T=Target answer, A=Not target answer, but acceptable response