# The dissociation between grammar and pragmatics: Evidence from English SLI

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*IATL 19*
*Ben-Gurion University of the Negev, Beer Sheva*
*June, 2003*

## 1. Introduction

Traditionally, Specific Language Impairment, or SLI, is considered a disorder that affects language, but no other cognitive function, hence the term: **Specific** Language Impairment. Many researchers nowadays agree that the disorder can be even more specific. That is, the deficiencies are restricted to the grammar, while other components of language, such as the lexicon or the pragmatic system, remain mostly unimpaired. This subgroup is referred to as GRAMMATICAL-SLI.

One of the reasons to study Specific Language Impairment (SLI) in children is to gain insight in language organization and language development (Leonard, 1998, among others). An important hypothesis regarding these two related issues has been proposed by Fodor (1983) and Chomsky (1986), namely the Modularity Hypothesis, as informally described in (1):

(1) *Modularity Hypothesis* (Fodor, 1983; Chomsky, 1986)
The view of cognition in general, and language, in particular, as arising from a complex interaction of various cognitive domains and further, that these domains are autonomous in the sense that they are governed by distinct principles.

This description suggests that we can distinguish two types of modularity, as in (2):

(2) A. modularity of cognition (with language being one of the modules);
B. modularity of language.

Results of SLI studies, showing that impairment can be isolated to language alone, provide support for a Modularity Hypothesis corresponding to A. As for the one in B, the question arises as to what modules language itself consists of. We take a Chomskyan view of language as a starting point, and assume the modules of language to be as in (3):

(3) *Modules of Language*

I. Lexicon
II. Computational System: Grammar: - morphosyntax
- semantics
- phonology
Processor/Parser
III. Pragmatic System

In this paper we provide support for the hypothesis that the deficits of children with SLI are restricted to the Computational System. We do this by showing that, unlike younger normally developing children, children with SLI do not display errors caused by the lack of certain pragmatic principles. However, they do make similar grammatical errors. These findings contribute to the hypothesis that the Computational System and the Pragmatic System are distinct modules.

We compare the spontaneous language production of English speaking children with SLI with data from younger English speaking normally developing children with a similar Mean Length of Utterance (MLU), and from normally developing children of the same age. The topic of investigation is DP, in particular, articles. The reason for this choice is that articles have both grammatical and pragmatic properties, providing precisely the appropriate domain for our research questions.

In order to examine a grammatical property of articles we chose "article drop", and to examine a pragmatic property we chose "overgeneration of *the*". We elaborate on these two notions in the next section.

## 2. Background

### *2.1 Article drop in normal child English*

As is well-known, young children often drop articles. For English, this has been noted at least since Brown (1973). As shown in Table 1, Schaeffer (1999) reports that in an experimental setting, English-acquiring children produce around 10% article drop between the age of 2 and 3. By the age of 3, they no longer drop articles.

Table 1: *Article drop in normal child English* (from Schaeffer, 1999)

| **Age** | **Definite article drop** | **Indefinite article drop** |
|---|---|---|
| **2** | **8%** (4/52) | **10%** (3/30) |
| **3** | 1% (1/94) | 2% (1/60) |
| **4** | 0% (0/32) | 0% (0/22) |
| **5** | 0% (0/14) | 0% (0/9) |
| **Adults** | 0% (0/275) | 0% (0/163) |

Inspired by Chierchia et al. (2000), we argue that the correct overt use of articles is a **grammatical** phenomenon. In (adult) English, count nouns enter the computation as predicates, whereas mass nouns enter the computation as arguments. In order to occupy argument positions predicative nouns must be accompanied by an article, as in, for example, *The cat is beautiful*. Mass nouns can occupy argument positions without modifying them with an article, as in, for example, *Water is refreshing*. In other words, in adult English, articles reflect argument-hood, but argument-hood is not always expressed by articles.

The task for children, then, is as in (4):

(4) *Acquisition of argument-hood*
(i) map the semantic feature "predicate-hood" to its correct morpho-syntactic counterpart;
(ii) map the semantic feature "argument-hood" to its correct morpho-syntactic counterpart.

As for predicate-hood, the child receives clear, unambiguous evidence from the input: predicate-hood can be expressed through common nouns only (and not by article+noun clusters). On the other hand, the evidence for argument-hood is ambiguous: argument-hood can be expressed through bare nouns, but also through article+noun clusters. We argue that missing articles result from a mis-mapping between the semantic property 'argumenthood' and its syntactic counterpart (noun, or article+noun). Misanalyzing predicative nouns (for example, *cat*) as argumental results in non-adultlike bare nouns.

Assuming that article drop results from a mis-mapping between syntax and semantics, and adopting the model of language in (3) it follows that article drop in child language is a GRAMMATICAL phenomenon.

### *2.2 Overgeneration of* 'the'

Let us now turn to the phenomenon of overgeneration of the definite article *the.* Since Maratsos (1974), researchers of child language have reported that young children acquiring languages that distinguish between definite and indefinite articles sometimes use the definite article in a context in which adults would use an indefinite article. However, overgeneration in the other direction (using an indefinite instead of a definite article) is rarely attested. The overgeneration of a definite article often leads to a communication breakdown, as is illustrated in (5):

(5) Sarah: Where's the black tape? (Brown, 1973:341)
Mother: What black tape?

Obviously, the referent for the nominal expression *the black tape* had not been introduced in the discourse, which explains the mother's confusion.

In addition to article drop, Schaeffer (1999) also tested overgeneration of *the* in the same English-acquiring children. The results in Table 2 show that 2-year olds overgenerate *the* 16% of the time, but that 3-year olds behave adultlike.

Table 2: *Overgeneration of* the (from Schaeffer, 1999)

| **Age** | **'the' in indefinite contexts** |
|---|---|
| **2** | **16%** (14/89) |
| **3** | 4% (6/135) |
| **4** | 4% (2/52) |
| **5** | 0% (0/18) |
| **Adults** | 4% (13/345) |

Following Schaeffer (1999), and Schaeffer and Matthewson (2002), we attribute the phenomenon of *the* overgeneration to the lack of a pragmatic concept, namely the Concept of Non-Shared Assumptions, as stated in (6):

(6) *Concept of Non-Shared Assumptions (pragmatic)*
(Schaeffer, 1999; Schaeffer & Matthewson, 2002)

Speaker and hearer assumptions are always independent.

Lacking the Concept of Non-Shared Assumptions causes the child to attribute her own knowledge to the hearer. Since definite articles denote familiarity of the noun's referent to both speaker and hearer, it follows that children overgenerate the definite article: they use it when the referent is familiar to the speaker, i.e. themselves, and the hearer (this is adultlike), but also when the referent is familiar only to the speaker, i.e. themselves (this

is non-adultlike). By the age of 3, normally developing children have usually acquired the Concept of Non-Shared Assumptions.

We conclude from this analysis that overgeneration of *the* is a PRAGMATIC phenomenon.

Now that we have laid out our basic assumptions concerning the grammatical and pragmatic properties of DP, let us turn to the hypotheses and predictions regarding SLI.

## 3. Hypotheses and predictions

As we hinted at in the introduction, we adopt the hypothesis from previous research on SLI (see, for example, Leonard, 1998) that SLI implies impairments in certain areas of the Computational System only, and therefore not in pragmatics. This is formulated in (7):

(7) *Hypothesis 1*
SLI implies deficiencies in the Computational System, but not in pragmatics.

More specifically, we hypothesize that children with SLI older than 3 have the pragmatic Concept of Non-Shared Assumptions, just like their normally developing age mates. This is formulated in (8):

(8) *Hypothesis 2*
Children with SLI older than 3 have the Concept of Non-Shared Assumptions (just like their normally developing age mates).

If article drop is a grammatical phenomenon, we predict that children with SLI may produce errors in this area, similar to younger normally developing English speaking children. This prediction is formulated in (9):

(9) *Prediction 1*
English speaking children with SLI drop articles.

Furthermore, if older English speaking children with SLI have the pragmatic Concept of Non-Shared Assumptions, it is predicted that they will not use *the* in contexts in which adults would use *a*. This prediction is stated in (10):

(10) *Prediction 2*
English children with SLI older than 3 do not overgenerate *the*.

## 4. Methods

In order to test our predictions, we investigated the spontaneous speech of 14 English speaking children with SLI. These data are part of the "San Diego Longitudinal Study" and were kindly made available to us by Susan Curtiss (Tallal, Curtiss and Kaplan, 1988).

The children with SLI were between the ages of 3;11 and 4;10 (average age 4;05) and a Mean Length of Utterance range from 2.0 to 5.1 (average MLU 3.8).
The children with SLI were individually matched on both MLU and age, rendering an MLU control group with an average age of 3;0 (36.571 months), and an age control group with an average MLU of 6.3. Details regarding the individual subjects' gender, age and Mean Length of Utterance are provided in Table 3 and Table 4:

Table 3: *Children with SLI (N=14) and their MLU controls (N=14)*

| **SLI** | | | | **MLU-CONTROLS** | | | |
|---|---|---|---|---|---|---|---|
| **ID** | **Gender** | **MLU** | **Age** | **ID** | **Gender** | **MLU** | **Age** |
| **82** | M | 2.018 | 3.11 | **308** | F | 3.000 | 3.01 |
| **130** | M | 2.317 | 4.02 | **318** | F | 3.018 | 2.11 |
| **100** | M | 2.382 | 4.08 | **324** | M | 3.218 | 3.04 |
| **191** | F | 3.164 | 4.02 | **306** | M | 3.431 | 3.00 |
| **177** | M | 3.176 | 4.02 | **333** | M | 3.458 | 2.10 |
| **188** | M | 3.859 | 4.04 | **320** | F | 3.729 | 2.11 |
| **94** | M | 4.034 | 4.09 | **301** | F | 3.868 | 2.09 |
| **149** | M | 4.115 | 4.05 | **319** | F | 3.904 | 2.11 |
| **192** | M | 4.143 | 4.07 | **316** | F | 3.968 | 3.00 |
| **99** | M | 4.721 | ?4? | **304** | M | 4.000 | 3.06 |
| **146** | F | 4.759 | 4.09 | **322** | M | 4.160 | 3.07 |
| **68** | M | 4.883 | 4.02 | **321** | F | 4.451 | 3.0 |
| **133** | F | 4.940 | 4.05 | **311** | M | 4.785 | 2.11 |
| **80** | F | 5.068 | 4.10 | **305** | F | 4.798 | 2.11 |
| **Average** | | **3.827** | **4;04 years** | **Average** | | **3.842** | **3;0** |

Table 4: *Children with SLI (N=14) and their age controls (N=14)*

| **SLI** | | | | **AGE-CONTROLS** | | | |
|---|---|---|---|---|---|---|---|
| **ID** | **Gender** | **MLU** | **Age** | **ID** | **Gender** | **MLU** | **Age** |
| **82** | M | 2.018 | 3.11 | **301** | F | 6.078 | 3.11 |
| **99** | M | 4.721 | ?4? | **311** | M | 4.931 | 4.00 |
| **130** | M | 2.317 | 4.02 | **325** | F | 6.209 | 4.00 |
| **191** | F | 3.164 | 4.02 | **305** | F | 6.170 | 4.01 |
| **177** | M | 3.176 | 4.02 | **306** | M | 4.545 | 4.01 |
| **68** | M | 4.883 | 4.02 | **308** | F | 5.147 | 4.01 |
| **188** | M | 3.859 | 4.04 | **335** | F | 10.093 | 4.02 |
| **149** | M | 4.115 | 4.05 | **304** | M | 4.980 | 4.06 |
| **133** | F | 4.940 | 4.05 | **319** | F | 7.093 | 4.07 |
| **192** | M | 4.143 | 4.07 | **320** | F | 6.472 | 4.07 |
| **100** | M | 2.382 | 4.08 | **321** | F | 10.470 | 4.07 |
| **94** | M | 4.034 | 4.09 | **322** | M | 5.650 | 4.07 |
| **146** | F | 4.759 | 4.09 | **324** | M | 5.856 | 4.07 |
| **80** | F | 5.068 | 4.10 | **318** | F | 3.953 | 4.08 |
| **Average** | | **3.827** | **4;04 years** | **Average** | | **6.320** | **4;03 years** |

In (11) – (12) we list the utterances used for the coding and analysis of the data.

(11) *Utterances used for analysis of article drop*
Utterances containing obligatory environments for overt articles in sentences/phrases (isolated/naming contexts were excluded)

(12) *Utterances used for analysis of* the *overgeneration*
Utterances containing obligatory environments for indefinite articles.

Furthermore, we would like to point out that the coders and analyzers of all transcripts are native speakers of American English.

## 5. Results and discussion

### 5.1 Article drop and *the* overgeneration

The results show that, just like the younger normal children, the children with SLI produce quite a few instances of article drop. This is shown in Table 5:

Table 5: *Proportions of article drop*

| | SLI | N-MLU | N-AGE | N-2-year olds (Schaeffer, 1999) |
|---|---|---|---|---|
| article drop in sentences/phrases | (14/105) **13%** | (14/166) **8%** | (7/455) **1%** | (7/82) **9%** |

As we see in the second column of Table 5, the children with SLI drop articles 13% of the time. The MLU controls perform slightly better, but drop articles too, at a rate of 8%. This is similar to the rates of article drop reported by Schaeffer (1999), as we can see in the last column. The penultimate column indicates that normally developing age mates no longer drop articles.

In contrast to the grammatical errors, English speaking children with SLI older than 3 do not overgenerate the definite article *the.* In other words, they correctly produce indefinite articles in indefinite contexts. This is shown in Table 6:

Table 6: *Proportions of* the *overgeneration*

| | SLI | N-MLU | N-AGE | N-2-year olds (Schaeffer, 1999) |
|---|---|---|---|---|
| *The* overgeneration in indefinite contexts | (0/70) **0%** | (0/102) **0%** | (0/271) **0%** | (14/89) **16%** |

The percentages in Table 6 indicate that just like both their MLU and their age controls, the children with SLI never overgenerate the definite article *the* in indefinite contexts. Recall that this is in contrast with the behavior of normally developing children who are

**younger** than 3;0: as we saw in Table 2, 2-year old normally developing English-acquiring children overgenerate *the* at a rate of 16%. Thus, with respect to the pragmatic use of articles, children with SLI older than 3 behave in no way differently from normally developing children older than 3 (in this case their MLU controls), but they do differ from 2-year olds.

The results just presented show that the predictions formulated in (9) and (10) are borne out, as is summarized in (13):

(13) *Summary of results*
- a) Similar to MLU-matched controls, but unlike age-matched controls, 4 year old English speaking children with SLI drop articles.
- b) Similar to both MLU and age-matched controls, 4 year old English speaking children with SLI are adultlike with respect to the pragmatic use of definite and indefinite articles.

### 5.2 Agreement and Case

In order to ensure that the rates of article drop produced by the children with SLI are not coincidental, but rather, are caused by a true impairment in their grammar, we also investigated some other, well-established, grammatical phenomena, namely subject-verb agreement (or finiteness), and subject Case (Rice & Wexler, 1996; Wexler, Schuetze & Rice, 1998, among others).

Naturally, our predictions regarding these phenomena are similar to our prediction with respect to article drop, as is stated in (14) and (15):

(14) *Prediction 3*
English speaking children with SLI make errors with respect to subject-verb agreement/finiteness

(15) *Prediction 4*
English speaking children with SLI make errors with respect to subject Case

We used exactly the same transcripts as for the DP phenomena, and analyzed utterances such as the ones described in (16) for subject-verb agreement (or finiteness), and the ones in (17) for subject Case:

(16) *Utterances used for analysis of subject-verb agreement/finiteness*
All utterances containing:
a) 3rd person singular main verbs;
b) 3rd person singular auxiliary verbs *DO* and *HAVE*;
c) 3rd person singular modals
d) copular and auxiliary forms of *BE* for all persons (except for (semi-)frozen expressions, such as *there's/there are, that's it, that's all*...)

(17) *Utterances used for analysis of Subject Case*
All utterances containing a combination of a verb and a subject pronoun displaying overt (NOM/ACC/GEN) Case

What do the results show us?

Table 7: *Proportion of errors in subject-verb agreement / finiteness*

| | SLI | N-MLU | N-AGE |
|---|---|---|---|
| Main verbs – bare stem | (34/75) **45%** | (18/63) **30%** | (16/158) **10%** |
| Copulas | (22/83) **27%** | (7/62) **11%** | (3/268) **1%** |
| Auxiliaries | (13/47) **28%** | (13/41) **32%** | (4/110) **4%** |
| Modals | (4/10) **40%** | (0/0) | (2/11) **18%** |
| **Total** | **(73/215) 34%** | **(38/166) 23%** | **(25/547) 5%** |

At the bottom of the second column of Table 7 we see that the children with SLI produce 34% errors with respect to subject-verb agreement, or finiteness. The majority of these errors consist of omission of the 3rd person singular –s in main verbs and modals, and of omission of copulas and auxiliaries. In the bottom cell of the penultimate column we can see that this error percentage is comparable to that of the MLU controls (23%), but radically different from that of the age controls (5%). This finding is consistent with other

agreement studies on children with SLI, for example, Rice & Wexler (1996). Comparing this result to the article drop result in Table 5, we see that they parallel each other: the children with SLI perform badly on both phenomena, the MLU controls are slightly better, but also make errors, whereas the age controls behave adultlike. This reinforces the hypothesis that children with SLI are impaired in their **grammar.**

Let us now turn to the results on subject Case. Table 8 shows that the children with SLI produce 13% non-Nominative Case on subject pronouns, as opposed to both their MLU- and their age-matched controls who virtually produce no subject Case errors.

Table 8: *Proportions of non-Nominative Case on subject pronouns*

| | **SLI** | **N-MLU** | **N-AGE** |
|---|---|---|---|
| Non-nominative Case | (29/216) **13%** | (7/253) **3%** | (2/824) **0%** |

Notice that our MLU controls perform much better (and not just slightly better, as in the other grammatical cases) than the children with SLI on subject Case. This is not surprising if we take the age of the MLU controls into consideration: most of them are older than 3, which is the age that non-NOM Case errors usually disappear. Studies on subject Case in young, normally developing, English acquiring children (for example, Rispoli, 1994, Vainikka, 1994; Schuetze, 1997; Wexler, Schuetze and Rice, 1998) report higher percentages of non-Nominative Case on subject pronouns in the language of children younger than 3. Rispoli (1994) finds 9% non-Nominative subjects in the 12 normally developing children between age 1;0-3;0 that he studied. Furthermore, Schuetze (1997) reports that Nina, a normally developing English-acquiring child, produces 22% non-Nominative 1st and 3rd person singular subjects between the ages of 2;0 and 2;6.

More importantly, the fact that the children with SLI whom we studied show substantial error rates with regard to subject-verb agreement/finiteness and subject Case

as well, provides evidence for the hypothesis that the phenomenon of article drop in the same children is no coincidence, but due to a grammatical impairment.

Returning now to our hypothesized dissociation between grammar and pragmatics in children with SLI, our results on DP, subject-verb agreement, and subject Case render the suggestions in (18):

(18) *Suggestions*
a) Grammatically, 4-year old children with SLI make errors comparable to younger normally developing children, indicating that they are in the same grammar developmental stage;
b) 4-year old children with SLI do NOT lack the pragmatic Concept of Non-Shared Assumptions, contrary to younger normally developing children, but similar to normally developing children of the same age and older;
c) in children with SLI, pragmatic principles develop normally as a function of age, rather than as a function of grammar developmental stage.

Thus, our predictions are borne out, providing support for our two hypotheses, repeated in (19) and (20).

(19) *Hypothesis 1*
Children with SLI have deficiencies in the Computational System, but not in pragmatics.

(20) *Hypothesis 2*
Children with SLI older than 3 have the Concept of Non-Shared Assumptions.

## 6. Conclusion

To sum up, in this study we have shown how a modular model of language such as the one described in (3) can guide research in the field of SLI. Distinguishing Pragmatics from Grammar allows us to tease apart DP properties that are grammatical - such as article drop - on the one hand, and properties driven by pragmatics - such as overgeneration of the definite article *the* - on the other hand, and therefore to investigate

them separately. The differences in results regarding the two types of DP properties in children with SLI are explained by the hypothesis that children with SLI are impaired grammatically, but not pragmatically. Thus, the findings of this study of English children with SLI provide support for a model of language as in (3).

Concluding, we have shown how theories of the organization of language and syntactic theory are useful guides in the research of Specific Language Impairment, and vice versa, how results of SLI studies can refine and support such theories.

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