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Trends in Specific Language Impairment: A Linguistic Perspective

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Abstract : A disorder in children's language development known as specific language impairment is a well documented phenomena. A wide variety of linguistic accounts have been advanced in the literature to explain its etiology. The aim of this paper is to characterize some of the major accounts by examining their hypotheses of the sources and manifestations of the disorder. The accounts that are examined in this paper are the Agreement deficit account, the structure-building deficit account, the extended optional infinitives account, the representational deficit for dependent relations account, and the missing feature / implicit rule deficit account. The data that have been used to support each account and the logic used to provide this support will be analyzed in order to evaluate the validity of each account. The strengths and weaknesses of each account will be identified. Evidence from a wide range of data is shown to demonstrate that the deficit of specific language impairment is a language-specific problem, manifested in the underlying grammar. Through an examination of each account, the implicit rule deficit account is argued to be the most adequate account of the disorder.

Key words : specific language impairment, grammatical deficit, inflectional morphology, etiology

1. Introduction

Specific language impairment has been characterized as a congenital disorder of the normal course of language development in the absence of general cognitive disabilities, such as mental retardation, auditory impairment, autism, or any obvious neurological, psychological, or physical disorder that could account for the language deficit (Leonard, 1997, 2003; de Villers, 2003). In the literature, the terms 'developmental dysphasia', 'developmental language disorder (DLD)', and 'language-based learning disability' have been widely used to

roughly refer to the same condition. For clarity of presentation, 'specific language impairment' (henceforth 'SLI') is the term adopted in this paper to describe this impairment.

It is widely believed that SLI is a disorder with a heterogeneous classification. Several researchers have indicated that SLI is a syndrome of abnormal language development affecting differing aspects of speech and language (Aram, Morris, & Hall, 1993; Rapin, 1996; Conti-Ramsden, Crutchley, & Botting, 1997). The diagnosis of SLI is generally based on the fact that the language of the affected children develops late, and differs from normally -developing language, not on the linguistic properties of the SLI language itself. Therefore, a specific description of the disorder may not hold for all of the subtypes of SLI.

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Nevertheless, it can still be argued that there exist several language difficulties common to all children with SLI. Inconsistent use of grammatical morphemes such as the past tense, ‘-ed’, the third person singular, ‘-s’, and the plural, ‘-s’, is one of the most apparent problems reported in the literature (Gopnik, 1994; Rice, Wexler, & Cleave, 1995; Leonard, 1997; Goad, 1998; among others). Although children with SLI have problems with most inflectional affixes, the error rate varies among the inflectional affixes. For example, children with SLI are reported to produce progressive aspect, ‘-ing’, at a higher rate (Crystal, 1987).

These problems and more have been accounted for by a diversity of etiological perspectives. In order to determine the underlying nature of SLI, five different types of linguistic accounts have been proposed: the Agreement deficit account, the structure-building deficit account, the extended optional infinitives account, the representational deficit for dependent relations account, and the missing feature / implicit rule deficit account.

2. The Linguistic Account

The language impairment of SLI has been considered to be more of an epiphenomenon of a more general cognitive or peripheral processing problem. The linguistic account proposes that the deficit which results in SLI is language-specific caused by an impairment to a particular part of the language module. Therefore, it provides a very detailed account of the language impairment, aiming to explain all of the diverse errors characteristic of children with SLI.

More precisely, linguistic accounts of SLI propose that the cause of SLI is a disorder in the language module that constrains the

construction of grammars from the incoming linguistic data. It doesn’t just assume that grammar is rule-governed. The linguistic account goes further and provides specific constraints on the content of these rules. It constructs a model specifying a hierarchy of constraints at different levels of the grammar predicting that one part of the grammar may be selectively impaired.

All that operates within the linguistic module must be described in detail in order for this to be a valid account of this disorder. It must also be shown that the deficits of children with SLI can be accounted for in terms of these specific grammatical variables.

The impairment is postulated to be either an inability to construct a particular type of underlying abstract rule in the grammar or a delayed maturation of certain rules or categories of the grammar. Therefore, all instances of these kinds of rules are impaired independent of the surface form of the rule (Gopnik, 1990). Unfortunately, linguists disagree on the exact nature of this impaired underlying rule. It has been argued that it is Agreement (Clahsen, 1989, 1991), that it is structure-building (Guilfoyle & Noonan, 1988; Radford, 1990; Rice, 1992), that it is finiteness marking, such as Tense and Agreement, in matrix clauses (Rice, Wexler, & Cleave, 1995; Rice & Wexler, 1996; Rice, Wexler, & Hershberger, 1998), that it is the syntactic representation for grammatical dependent relations (van der Lely, 1996; 1998; van der Lely & Stollwerck, 1997; van der Lely & Battell, 2003), and that it is syntactico-semantic feature marking (Gopnik, 1990b; Gopnik & Crago, 1991). These specific kinds of rules are impaired resulting in a wide variety of surface errors “in morphological marking, in the occurrence of determiners, in progressive tense representation,

and in pronoun deletion, in all manifestations of language” (Gopnik, 1990b: p. 145).

2.1. The Agreement Deficit Account

Clahsen (1989) studied grammatical errors produced by German-speaking children with SLI, and argued that “dysphasic children (he refers to ‘SLI’ as ‘developmental dysphasia’) have problems in establishing grammatical Agreement relations. His interpretation of Agreement is much larger than the general definition of Agreement in linguistic theory. That is, ‘structural relations between two elements in which one element asymmetrically controls the other’ (Clahsen, 1989: p. 916). He predicted a lack of Agreement between Number and Gender with nouns and their corresponding adjectives and articles in the noun phrase, namely that between the Case-marked noun and the verb.

To investigate these predictions, Clahsen (1991) analyzed two sets of data: spontaneous speech samples from 10 children with SLI and spontaneous speech samples and elicitation data from 20 children with SLI studied longitudinally over a period of one year. All the children were German-speaking monolinguals. He examined properties of syntax and inflectional morphology such as word order, constituent structure, negation, question formation, Case marking, verb morphology, and plural morphology.

His results indeed supported his account: Gender and Number Agreement in the noun phrase were often incorrect, and subject-verb Agreement caused great difficulty. The children used full noun phrases and pronouns appropriately in head-final position as required in German. However, within the noun phrases, they had problems with determiners. In addition, they had problems with the use

of correct Gender and Number markings. Concerning verbal elements the children with SLI used simple verbs, prefix verbs and modals. Few cases of auxiliaries and copulas were found. The proportion of deleted verbal elements decreased over time. The data showed they had numerous problems with the use of Case markings required in German. The children with SLI had only a ‘binary Case system’ with Nominative Case and either Accusative or Dative Case. There were no instances of Case Agreement between the various elements of the noun phrase. It was subject-verb Agreement that caused the most problems for the children with SLI on all levels of lexical representation. The children used uninflected stem forms, infinitive forms and the suffix ‘-t’, as regular verb forms. However, some kinds of verb morphology (e.g., rules for participles) were unimpaired. Lastly, the children with SLI showed evidence of difficulty with word order, placing the verb in the final position SOV, and not the second position SVO.

Clahsen concluded that children with SLI had problems mainly in the areas of inflectional morphology and with grammatical function words. Therefore, he claimed that the focus of the deficit in SLI was clearly in grammatical Agreement.

2.2. The Structure-Building Deficit Account

The Structure-Building Deficit account (Guilfoyle & Noonan, 1988; Radford, 1990; Rice, 1992) makes a distinction between what are called functional categories and what are called lexical categories. Lexical categories include nouns, verbs, adjectives, and prepositions. These categories contain a great amount of semantic information and little or no grammatical information. Functional categories

include inflections (Infl), determiners (Det), complementizers (Comp), and Case. In contrast to lexical categories, these categories contain a great amount of grammatical information and little or no semantic information. Verb movement is linked to the development of functional categories. In German, word order is argued to be SOV until Infl develops and only after the development of Infl can word order be expected to change to V2 or SVO. The development of the Nominative Case on the subject also follows the development of Infl.

The structure-building account makes several assumptions about language acquisition. Functional categories are hypothesized to emerge later than lexical categories in the course of normal language development. The emergence of functional categories is determined largely by a maturational schedule. Although there are individual differences among children, only lexical categories emerge around the age of 20 months, and functional categories emerge around the age of 24 months in English (Radford, 1990). Saliency in the language of input plays a role in determining the timing of the appearance of functional categories in different languages. Therefore, for example, in languages where the functional categories occur syllabically or carry more meaning for the language, such categories would be expected to develop earlier. In German, for instance, where Case marking is more salient than in English, it develops earlier.

Relative to SLI, this hypothesis predicts that the nature of the disorder is one of delayed maturation of the grammar as a whole or of the construction of some of its underlying rules or categories. The lexical stage, for example, is argued to be prolonged and the grammar to resemble telegraphic speech with problems

of determiner and Agreement and little or no inflection. However, thematic structures presumably remain intact. Variability is expected among children with SLI with the grammar having 'fossilized' at any point in the acquisition sequence. One would not expect to see the development of the complementizer without the development of past tense marking.

Rice (1992) tested this account by examining 81 spontaneous speech samples from English-speaking pre-school children with SLI. She compared these with 92 spontaneous speech samples from language-matched children with normal language development. Her results supported the predictions of the hypothesis. There was great variability within her pool of 81 children with SLI; some showed great difficulty with the use of determiners and Agreement marking on the nouns: they took the form of namely with the Number marking on the nouns: bare stems with omitted affixes, whereas some showed no problems at all. Verb Agreement, however, was a problem for all the children with SLI. Verbs were hardly ever marked for inflection. Primarily the children used bare stem forms. Thematic roles posed no particular problems for either group, as expected.

Rice concluded that the functional category model allowed us to see that there are some interesting morphosyntactic differences in their performance. Subject-verb Agreement is located in a Spec-Head configuration, which as the data indicate, seems to mature later than the determiner-noun relationship which involves a Head-Head configuration. Difficulties with Agreement relations, which children with SLI have, may be regarded as having more to do with the delayed maturation of certain functional categories than the complete lack of their presence. An advantage of the structure-

building hypothesis, she claims is “that it identifies particular questions and at the same time places them in a much broader picture than that of localized, individual morphemes” (Rice, 1992: p. 19).

2.3. The Extended Optional Infinitives Account

According to Wexler (1994), at young ages, children go through a period of time when they often use infinitival forms of matrix verbs where a finite form is required. He named this period the Optional Infinitive (henceforth ‘OI’) stage of language development. He assumes that children in the OI stage do not yet realize that it is obligatory to mark finiteness such as Tense and Agreement in matrix clauses. He argues that children with normal language development also go through this stage; however, they acquire the correct use of finite forms around 5 years of age.

Rice, Wexler, & Cleave (1995), Rice & Wexler (1996), and Rice, Wexler, & Hershberger (1998) argue that children with SLI go through an Extended Optional Infinitive (henceforth ‘EOI’) stage in which the period of the OI stage is extended. What they claim with the EOI hypothesis is that children with SLI remain in an OI stage for a longer period of time, compared to children with normal language development. As a result, children with SLI occasionally produce bare stem forms in matrix clauses. In other words, English-speaking children with SLI sometimes produce uninflected verbs without a required suffix such as the past tense ‘-ed’ and the third person singular ‘-s’ in obligatory contexts because they are in an EOI stage. They further argue that the omissions of the auxiliary ‘do’ and the copula ‘be’ in obligatory contexts are also a result of their inability to realize that finiteness marking is obligatory in

matrix clauses. They conclude that the use of incorrect verb forms by children with SLI is no different from the use of such forms by younger children with normal language development.

2.4. The Representational Deficit for Dependent Relations Account

The Representational Deficit for Dependent Relations (henceforth ‘RDDR’) account proposes that the deficit behind at least a subtype of SLI is in the syntactic computational system (van der Lely, 1998). The subtype of SLI that she refers to is the so-called Grammatical SLI (G-SLI). More specifically, by adopting the Minimalist framework (Chomsky, 1995), the RDDR account argues that the language problems of children with G-SLI are due to an optional movement operation (i.e., Move) in syntactic derivation.

Over the years, van der Lely and her colleagues investigated the grammatical competence of children with G-SLI using a wide variety of language tasks. The children with G-SLI exhibited a significant delay in grammatical development. In addition to inflectional morphology (e.g., the 3rd person, singular, ‘-s’, and the past tense, ‘-ed’) which are the most typical problems with children with SLI, children with G-SLI have great difficulties forming syntactically complex structures involving embedded phrases (e.g., when PP is embedded in the NP, “[_{NP} *The cat* [_{PP} *with the blue blanket*]] *is jumping on the bed.*”), Binding Principles (Chomsky, 1981) such as identifying the antecedent of anaphoric reflexives (e.g., ‘*himself*’/‘*herself*’) and pronouns (e.g., ‘*him*’/‘*her*’), comprehension of reversible passive sentences (e.g., “*The boy is washed by the girl*”), and production of object *wh*-questions (e.g., “*Who did Mrs. Peacock see in the lounge?*”) (van

der Lely, 1996; 1998; van der Lely & Stollwerck, 1997; van der Lely & Battell, 2003).

The RDDR account argues that the impairment of inflectional morphology is a result of optional head-to-head movement. To be more precise, the impairment of Tense is due to optional V to T movement while the impairment of Agreement is due to optional V to Agr movement. It also elegantly explains the syntactic deficits which children with G-SLI exhibit. For example, the problematic comprehension of reversible passive sentences can be accounted for by optional NP-movement to A-position (i.e., Spec of TP) whereas the problematic production of object *wh*-questions can be accounted for by optional movement of the *wh*-operator to A-bar-position (i.e., Spec of CP).

2.5. The Missing Feature / Implicit Rule Deficit Account

The missing feature account was a preliminary hypothesis proposed by Gopnik (1990b) to describe the language of a single boy with SLI. In its original form, which has since been changed, thus the dual name, it stated that, at least, three kinds of information, other than phonological information, must be provided in the lexicon: a) grammatical class specifications, b) syntactico-semantic features, and c) specific semantic information.

Gopnik predicted that the grammatical characteristics typical of SLI were the result of a grammar without syntactico-semantic features (e.g., Tense, Number, Person, etc.) in the lexicon. To avoid confusion, it should be noted that what she refers to as 'syntactico-semantic features' are generally referred to as 'grammatical features' or 'morpho-syntactic features' in linguistic theory. There was no

accompanying deficit in knowledge about the cognitive categories of the world because these categories are represented as part of the semantic specification of the word. The level of grammatical classes in the syntax was intact. The absence of these syntactico-semantic features meant that the rules in morphology usually triggered by these features were not available; lexical devices had to be used to convey certain meanings.

This missing feature account explained some of the phenomena of SLI since there clearly is a difference between the semantic holdings of children with SLI and their morphological production. For instance, they tend to express the past by using adverbials, instead of using the appropriate morphological inflection on the verb. Children with SLI also produce forms that have surface properties of the plural, but they do not reliably use the plural to refer to more than one object in the world or in Agreement with the determiner. They produce plurals, in other words, but such plurals do not always exhibit Number Agreement in the noun phrase between the determiner and the noun or between the numeral quantifier and the noun (e.g., '*two arena*') (Gopnik, 1990b). Therefore, feature marking theory confounded two phenomena that had to be distinguished from one another.

In light of that conflation and in response to further evidence, the missing feature account has evolved into an implicit rule deficit model based on a theory of learnability called the dual mechanism hypothesis (Pinker & Prince, 1988; Pinker, 1991, 1997). The dual mechanism model incorporates both a computational component, which contains specific innate rules and representations, and an associative memory system with certain properties of

connectionist models. The claim is that regular (e.g., 'wash'/'wash-ed') and irregular (e.g., 'break'/'broke') inflectional systems are learned through different modes of acquisition: namely, regular verbs through the application of a procedural rule, add '-ed', and irregular verbs through analogical learning devices within an associative network.

In the implicit rule deficit account, therefore, Gopnik (1992) argues that children with SLI are unable to reliably formulate implicit grammatical rules for certain properties such as Tense and Number. She hypothesizes that children with SLI can learn individual words such as 'walked' and 'books' as unanalyzed wholes by means of this association network stored in declarative memory, but cannot generalize from these individual instances to construct modularized procedural symbolic rules that would operate on an abstract category, for example, a rule for constructing regular past tense: Stem + Past Tense → Lexical Stem + '-ed' (Gopnik, 1992).

Children with SLI are believed to learn the correct morphological forms of regular nouns and verbs the same way children with normal language development learn those of irregular nouns and verbs. Gopnik further argues that they have even a more profound problem in that they do not have the abstract grammatical category of Tense at all, which clearly explains their problems with verbal inflection though they do have the semantic notion of 'pastness'.

In order to test her hypothesis and provide an accurate account of the underlying grammar of the individuals with SLI, Gopnik (1992; 1994), and Gopnik & Grago (1991) examined a wide range of both spoken and written production and comprehension data. It was collected over a period of two and a half years from thirty members of a three-generation family, sixteen

of whom had been diagnosed with SLI: the family known as the 'KE family'. It consisted of administered tests, such as grammaticality judgement tasks, grammaticality rating tasks, auditory comprehension tests and various production tasks as well as spontaneous speech samples.

The results from several different tests converge to support the hypothesis that for both nouns and verbs these individuals cannot construct implicit rules that govern morphological Agreement. They did show evidence of being able to learn some of these properties of language by memorizing them as unanalyzed single lexical items and constructing association networks stored in declarative memory. In grammaticality judgement tasks of morphological features, their performance was no better than chance level. Their ability to correct feature errors was significantly poorer than that of the individuals with normal language development. In an auditory comprehension task of singular vs plural, there was no significant difference between the responses of the individuals with SLI and those with normal language development. In a Wug-test, administered to test the hypothesis that the individuals with SLI lexicalize 's'-marked forms, and do not generate them from a pluralization rule, there again was a significant difference between the individuals with SLI and those with normal language development (Gopnik, 1992).

The most striking difference in performance between the individuals with SLI and those with normal language development was in their rating of the stem form for both regular and irregular verbs. The individuals with SLI, unlike those with normal language development, did not judge that a stem form in a temporally past sentence was ungrammatical. They did not

appear to have dichotomous ratings for verb forms. In their spontaneous speech, as well, they often produced a stem form in a temporally past context. In contrast, they never produced a past tense form in a present context. Data from correction tests showed that they are unsure of the form that a verb should have. Gopnik (1992; 1994) argues that these results clearly demonstrate that the individuals with SLI cannot reliably ‘manipulate Tense marking’ on verbs to produce sentences that are grammaticality correct with respect to Tense.

Gopnik argues all of this verb data is consistent with a model in which Tense is not an obligatory category in the grammar of the individuals with SLI. However, there is evidence that they somehow have acquired the knowledge of the correct form for past tense verbs since they sometimes use them correctly in their spontaneous speech. An analysis of longitudinal writing data revealed that they were learning the past tense forms of regular verbs one at a time (Gopnik 1992).

Gopnik (1992; 1994) concludes that this linguistically-principled analysis of the data demonstrates that individuals with SLI lack the ability to construct implicit symbolic rules in their grammar. Only by using declarative memory, by constructing association networks can individuals with SLI learn some properties of language.

3. Examination of the Linguistic Accounts

The five linguistic accounts, presented above, have all provided detailed linguistic accounts, to differing degrees, of the actual language deficit of SLI in terms of language modularity. The data confirms that the linguistic accounts, postulating that a part (or some parts) of the

underlying grammar is selectively impaired, can account for all the errors characteristic of the disorder. The linguistic accounts, however, still do have some limitations.

3.1. Examination of the Agreement Deficit Account

The data of German-speaking children with SLI in Clahsen’s studies appears to support the Agreement deficit account. However, his account cannot account for the English data. For example, as previously stated, one of the most typical errors, which English-speaking children with SLI make, is Tense marking. They often produce a bare stem form in the past context, as exemplified by “*My dad wash the dishes last night.*” The form of the verb, ‘wash’ needs to be matched with the temporal adverb ‘*last night*’, but it is not the case that the temporal adverb determines the form of the verb. The past tense form is also required because the event expressed by the sentence happened in the past. Therefore, Tense marking errors by English-speaking children with SLI cannot be explained by the Agreement deficit account. In addition, the Agreement deficit account cannot account for the different patterns of learning of the past tense of regular and irregular verbs.

Furthermore, there has been a report of some evidence which further refutes the Agreement deficit account. Rice & Oetting (1993) studied spontaneous language samples of 81 children with SLI, who had less problems with Agreement within the noun phrase (agr) such as ‘*two cup-s*’, but numerous problems with cross-clausal Agreement between the noun and the verb (Agr) such as “*she run-s.*”. Their results demonstrate that Agreement wasn’t a unitary phenomenon across the grammar. Perhaps, it can be expanded, however, to account for the

lack of Agreement across phrases. It should be also noted that the Agreement deficit account cannot explain the optionality of inflectional errors. If children with SLI lack competence in grammatical Agreement relations, they should never produce the third person singular form. It has been well-documented that they do in fact produce third person singular forms, but cannot use such forms consistently.

3.2. Examination of the Structure-Building Deficit Account

In contrast to the Agreement deficit account, the structure-building account seems to be able to account for a much broader range of the problems of English-speaking children with SLI, such as problems with past tense marking, plural marking, subject-verb Agreement, and determiners.

However, there are some problems with the structural-building account. Similar to the Agreement deficit account, this account cannot explain the optionality of inflectional errors. If certain functional categories have not yet emerged, such functional categories should never appear in children's utterances. Gopnik's data clearly demonstrates counterexamples. The maturational hypothesis was primarily proposed to account for development that occurs in children with normal language development at very young ages. However, observing mainly mature grammars, her morphosyntactic investigations reveal that all inflected forms are present, but not used consistently (Gopnik 1990b, 1992).

Furthermore, there is German data that shows both for children with SLI and for those with normal language development that verb movement can be found to occur before the development of Infl (Clahsen, 1991). This

observation is the exact opposite of what the maturational hypothesis predicts.

3.3. Examination of the Extended Optional Infinitives account

The Extended Optional Infinitives account is, perhaps, the least plausible account of SLI. The most outstanding problem with this proposal is the small range of language difficulties it provides an account for. This account can only explain the incorrect use of bare stem forms of the verb in matrix clauses where inflected forms are required. It may also be able to explain the omissions of the auxiliary 'do' and the copula 'be' in matrix clauses. However, as has been noted, the language difficulties children with SLI experience are much greater. As we have observed in previous sections, English-speaking children with SLI also experience difficulty with general plural marking (Goad, 1998), as well as numeral quantifier-noun Agreement (Rice & Oetting, 1993), and determiner-noun Agreement in German (Clahsen, 1989, 1991). Case marking has also been reported to be problematic for English-speaking children with SLI (Radford, 2005), German-speaking children with SLI (Clahsen, 1989, 1991), and Japanese-speaking children with SLI (Fukuda, Fukuda, & Ito, 2007). In addition, German-speaking children with SLI also appear to experience difficulty with Gender Agreement in noun phrases, while Japanese-speaking children with SLI experience difficulty with complex verb formation (Fukuda & Fukuda, 2001a, 2001b). Furthermore, English-speaking children with SLI also make errors with animacy, the mass/count distinction of nouns, pronoun deletion, and derivational morphology (Gopnik, 1990b, 1999). Apparently, the EOI account cannot account for any of these

characteristics.

There is another serious problem with the EOI account. If this account is correct, sooner or later, children with SLI should eventually grow out of the OI stage. However, this doesn't seem to be the case. It has been reported that language difficulties of SLI persist, at least, for decades (Stothard, Snowling, Bishop, Chipchase, & Kaplan, 1998; Johnson, Beitchman, Young, Escobar, Atkinson, Wilson, Brownlie, Douglas, Taback, & Lam, 1999), if not throughout their entire lives (Gopnik, 1990a; Gopnik & Crago, 1991).

3.4. Examination of the Representational Deficit for Dependent Relations Account

The optional syntactic movement proposed in the RDDR account is able to explain the optionality of language performance which children with G-SLI do exhibit. With respect to inflectional morphology, it is well-known that it is not the case that children with SLI always omit inflectional affixes. They do produce correct inflected forms, but sometimes omit inflectional affixes, resulting in ungrammatical sentences. In other words, they cannot consistently form correct inflected forms. With respect to the comprehension of reversible passive sentences and the production of object *wh*-questions, it is not the case that they never understand reversible passive sentences nor never produce object *wh*-questions. They sometimes understand reversible passive sentences, and sometimes produce object *wh*-questions. However, their level of competence is always much lower than that of age-matched children with normal language development. Such inconsistent performance of children with G-SLI can be accounted for by optional syntactic movement.

The RDDR account, however, appears to have some problems explaining some manifestations of children with SLI. It is well-documented that children with SLI incorrectly omit most, if not all, inflectional affixes in obligatory contexts, but omit different inflectional affixes at different degrees. For example, in English they omit the past tense '-ed' and the third person singular '-s' more frequently than the progressive aspect marker '-ing' and the plural '-s'. If the RDDR account is correct, this means that head-to-head movement takes place at different degrees. It is not clear at all what would trigger such a different frequency of syntactic movement. It would also be hard to explain the difference in error rates between regular and irregular past-tense verbs with optional head-to-head movement. In addition, the omission of independent function words such as the determiner (e.g., 'a', 'an', and 'the') and the omission of the auxiliary verb 'be' in progressive contexts would remain unaccounted for by optional head-to-head movement because such movement isn't required in such constructions.

Furthermore, it is argued that the lack of complex NPs such as an NP with an embedded PP (e.g., 'The cat with the blue blanket') in the utterances of children with G-SLI is due to the fact that they can only build simple structures which involve basic local dependencies (roughly one step embedding), and not more complex long dependencies (van der Lely & Stollwerck, 1997; van der Lely, 1998). It should be noted, however, although this explanation is indeed a syntactic representational problem, no syntactic movement is involved.

As previously stated, children with G-SLI have problems with Binding Principles. For example, in the sentence "Mowgli says Baloo Bear is ticking himself." children with G-SLI sometimes

accepted ‘*Mowgli*’ as well as ‘*Baloo Bear*’ as the antecedent of the anaphoric reflexive ‘*himself*’ which is a violation of Principle A in Binding Theory (van der Lely & Stollwerck, 1997; van der Lely, 1998). van der Lely (1998) argues that this problem is caused by optional A-movement. It is not clear to us, however, how the violation of Principle A in Binding Theory is related to A-movement.

3.5. Examination of the Missing Feature / Implicit Rule Deficit Account

The missing feature / implicit rule deficit account can explain the inconsistent use of inflected forms, which English-speaking children with SLI exhibit, such as Tense, Aspect, Agreement, and Number marking. It also can explain the omission of independent function words such as the determiner in English, as well as errors with Case marking in diverse languages (Clahsen, 1989, 1991; Radford, 2005; Fukuda, Fukuda, & Ito, 2007).

In addition, this account can provide an adequate explanation for the difference in error rates between regular and irregular past-tense verbs. There have been some reports which show that children with SLI perform better with irregular verbs than regular verbs with regard to Tense marking (Gopnik, 1994; Ullman & Gopnik, 1999). If children with SLI indeed memorize past tense forms of regular verbs as unanalyzed wholes by means of this association network stored in declarative memory, as Gopnik argues, we should find a strong frequency effect for both regular and irregular past tense forms, which was not found in children with normal language development. That is exactly what we find (Ullman & Gopnik, 1999; van der Lely & Ullman, 2001).

Nevertheless it is not clear how to explain

the different error rate we find with different inflectional morphology with this account. As previously stated, children with SLI incorrectly omit the past tense ‘-ed’ and the third person singular ‘-s’ more frequently than the progressive aspect marker ‘-ing’ and the plural ‘-s’. One possible answer would be that children with SLI produce inflected forms by using explicit knowledge in the similar manner that second language learners learn grammatical rules of foreign languages in formal language classes (Paradis & Gopnik; 1997). For example, they can produce past tense forms using explicit knowledge like “Add an ‘-ed’ to verbs in which the event happened in the past.”, or “Add an ‘-s’ to nouns in which there are more than two items.” In order to use such explicit knowledge, semantic notion plays an important role. This would explain their poor performance with the third person singular ‘-s’ since it has absolutely zero semantic value. The notion of Tense seems more abstract than that of Number because the latter is visually recognizable while the former is not. This might explain why children with SLI perform better with Number marking than with Tense marking. However, what remains unsolved with such an explanation is the difference in performance between Tense and Aspect marking. The semantic values of Tense and Aspect are both relatively abstract, but as previously noted, children with SLI experience more trouble with the former when compared to the latter.

As the examination in this subsection demonstrates, overall, the missing feature / implicit rule deficit account can provide an adequate explanation for the morphosyntactic problems of children with SLI. One might wonder, however, whether or not this account can also explain the syntactic problems of

children with SLI. Gopnik herself reports that children with SLI experience difficulties with syntax such as with the comprehension of passive sentences (Gopnik, 1999). Recall that Gopnik's main claim is that children with SLI are unable to reliably formulate implicit grammatical rules, so that her claim may be applicable to syntactic rules as well. Nevertheless, since she has not provided a detailed explanation about how her account could explain the syntactic problems of children with SLI, we are unable to examine her claims, and must leave them for further research.

4. Conclusion

None of the linguistic accounts, presented in this paper, claimed to be able to predict and substantiate the full range of impaired linguistic properties of children with SLI. Some more than others, however, appear to have succeeded in doing so.

The extended optional infinitives account could only explain a very limited amount of the impaired linguistic properties of children with SLI. More specifically, it only could explain their problems with past tense marking and third person singular Agreement marking. The agreement deficit account had a similar problem. This account also could only explain particular impaired linguistic properties of children with SLI. It correctly predicted their problems with Agreement within noun phrases and cross-phrasal noun-verb Agreement, as well as problems with Case marking. However, it could not account for their problems with past tense marking and plural marking in English. It could not explain the omissions of independent function words such as determiners in English either. In addition, it had difficulty accounting for

the optionality of inflectional errors of children with SLI. In contrast to the two accounts above, the structure-building deficit account could explain a larger range of impaired linguistic properties of children with SLI. This account could explain their problems with past tense marking, progressive aspect marking, third person singular Agreement marking, and plural marking. It also could explain the omissions of independent function words. However, this account completely failed to explain the optionality of inflectional errors of children with SLI. The representational deficit for dependent relations account assumed that problems of children with SLI are caused by optional movement in the syntactic computational system. This account could explain the optionality of inflectional errors of children with SLI, but at the same time it could not explain the omissions of independent function words since they do not require syntactic movement. This account also had difficulty explaining the different error rate with different inflectional morphology. Nevertheless, the biggest advantage of this account was the fact that it could explain most of the syntactic difficulties which children with SLI exhibit. However, it is not clear how the violation of Binding Principles could be accounted for by optional syntactic movement. As we have previously seen, the missing feature / implicit rule deficit account provided the most adequate explanation for the morphosyntactic problems of children with SLI. This account could explain all of the inflectional problems as well as the omission of independent function words. It was also able to account for the optionality of inflectional errors of children with SLI by assuming that they lexicalize inflected forms. It may also be able to explain the different error rate seen with

different inflectional morphology by assuming that children with SLI use explicit knowledge to learn inflected forms as a compensatory strategy. Nevertheless, how this account could explain the syntactic problems which children with SLI experience remains to be seen.

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