Specifically language impaired and normally developing children:
Verbal passive
vs. adjectival passive sentence interpretation

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Abstract

The focus of this study is the acquisition and underlying syntactic representation of passive sentences in a subgroup of 15 ‘Grammatical specifically language impaired’ (SLI) children (aged 9:3–12:10) and 36 younger normally developing, language ability (LA) control children (aged 5:5–8:9). In particular, the paper is concerned with the differences between a verbal and adjectival passive interpretation of the passive participle in short passive sentences. Van der Lely (1994) proposed that SLI children have a ‘Representational Deficit for Dependent Relationships’ (RDDR). The syntactic characterization of this deficit is not altogether clear, but I propose that problems with Spec-Head relations may provide an adequate description. This proposal predicts that SLI children should be able to derive an adjectival passive but not a verbal passive representation. Active, full and short progressive passive, and ambiguous (potentially adjectival) short passive sentences were investigated. A picture pointing response paradigm, in which the child chose one of four pictures, enabled responses to be differentiated; i.e. transitive (actional), adjectival (static), and reversal (where thematic roles normally assigned to the subject or object were reversed). The test sentences were also administered to 12 adult subjects. The study revealed that Grammatical SLI children were significantly worse at interpreting transitive verbal passive sentences than the younger LA controls. The SLI children, and occasionally the younger LA controls, may interpret an unam-

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biquously verbal passive sentence as an adjectival-stative passive. The SLI children showed a
strong preference for an adjectival interpretation for the ambiguous passive sentences. Differ-
ences in the syntactic representations of verbal and adjectival passive sentences can account
for the findings. The data indicate that the Grammatical SLI children and young children have
problems deriving the syntactic representation underlying a verbal passive sentence but not
the less complex adjectival-stative passive. The findings from this study for Grammatical SLI
children are consistent with the proposed RDDR characterized by problems in Spec-Head
relations. The study provides new empirical evidence for the different syntactic nature of ver-
bal and adjectival passive sentences and has implications for language acquisition and the
modularity of language.

1. Introduction

The focus of this study is the acquisition and underlying linguistic representations
of passive sentences in specifically language impaired (SLI) children. In particular,
this paper is concerned with the potential differences between a verbal passive and
an adjectival passive interpretation of the passive participle in sentences. The inves-
tigation of the comprehension of passive sentences in a population of SLI children
may provide new empirical evidence for the different syntactic nature and character-
istics of verbal and adjectival passive sentences. This is because the linguistic deficit
in SLI children may impair particular syntactic abilities which are needed for the
syntactic representation of a verbal passive interpretation but not for an adjectival
passive interpretation. I shall clarify below the potential relationship between SLI
children’s linguistic deficit and verbal and adjectival passive sentences. First, I shall
provide some background information about a subgroup of SLI children who are the
subjects of this investigation.

1.1. The underlying nature of Grammatical SLI

SLI in children is a heterogeneous disorder. It is unclear to what extent the under-
lying nature and cause of SLI in children with different characteristics is related.
This study focuses on a sub-group who show a persistent and disproportionate
impairment in the grammatical comprehension and expression of language (i.e. so-
called ‘Grammatical SLI’ children (van der Lely, 1995)). Whilst this group show the
morphological deficits which are typical of SLI children (e.g. Bishop, 1994;
Leonard, 1989), they do not have a severe phonological impairment or articulatory
dyspraxia which has been found in some SLI populations (e.g. Hurst et al., 1990;
Gopnik and Crago, 1991). (See van der Lely, 1995, for a summary of previous find-
ings for this sub-group.)

The investigations of both the expression and comprehension abilities in Gram-
matical SLI children have highlighted that SLI children’s language deficit is not
restricted to morphology but also affects syntactic abilities: for example, they show
impairments with subject-verb agreement, tense marking, and the assignment of
theta roles and anaphoric reference in sentences when pragmatic cues are insufficient
for interpretation (van der Lely, 1995; van der Lely and Stollwerck, 1994). Previous
hypotheses put forward to account for SLI in children may account for the populations of SLI children under investigation, but they can not account for the linguistic impairments that have been found for Grammatical SLI children. For example, Leonard (1989, 1992) and Leonard et al. (1992) put forward an auditory perceptual deficit hypothesis to explain the difficulties young SLI children have with grammatical morphemes in their expressive language. Leonard proposed that SLI children have difficulties perceiving grammatical morphemes with 'low perceptual saliency' and consequently have limited processing resources left available to go on and build morphological paradigms (Leonard et al., 1992). On the other hand, Gopnik (1990) and Gopnik and Crago (1991) proposed a missing feature deficit in which syntactic features such as tense, number and person are absent from the grammars of a group of 'familiar SLI' subjects. An alternative hypothesis has been put forward by Clahsen (1989, 1991) to account for the linguistic abilities of a sub-group of German-speaking SLI children. He proposed that SLI in children is caused by a selective deficit in agreement in an otherwise intact grammatical system. Thus, in GB terms (Chomsky, 1981, 1986) features of AGR (e.g. person, number, gender) will not be correctly realized.

It is difficult to see how any of these hypotheses could account for the problems Grammatical SLI children have with assigning theta roles to NPs in comprehension (van der Lelv, 1993; van der Lely and Harris, 1990), in using the syntactic cues in the sentence structure to assign theta roles to syntactic functions of novel verbs (van der Lely, 1994) or with marking obligatory tense in their expressive language (van der Lely, 1995).

A more general claim was made by van der Lely (1994), who proposed that the expressive and receptive language of Grammatical SLI children could be accounted for by a deficit in dependent structural relationships between constituents (i.e., a Representational Deficit for Dependent Relationships (RDDR)). A dependent relationship between representations may be found, for example, with subject-verb agreement when the inflectional form of the verb is dependent on the syntactic relationship between a noun phrase and the verb and the grammatical number of the noun. Grammatical SLI children, like many other populations of SLI children studied (Bishop, 1994; Clahsen, 1989; Rice and Oetting, 1991), show particular difficulties with subject-verb agreement (van der Lely, 1995). In sentence comprehension the assignment of a theta role to a noun phrase is dependent on a combination of the verb's lexical properties and the noun's syntactic relationship to the verb (i.e., whether it is the subject NP or object NP). It is only when such a relationship between structures is required, that is, when lexical, pragmatic or general world knowledge is insufficient, that SLI children's impairment in comprehension is apparent (van der Lely, 1994, 1995; van der Lely and Dewart, 1986). Whilst the RDDR proposal captures the linguistic deficits shown by Grammatical SLI children, it is its very breadth that is its weakness. Therefore, a more constrained linguistic characterization of the properties of the deficit in structural dependency relationships is required. However, it is not altogether clear what this linguistic characterization should be.

There are clearly similarities with the notion of the RDDR proposal and Clahsen's (1989) missing agreement hypothesis, in that the basic notion of a deficit with
dependent structural relationships between constituents is a main feature of the agreement hypothesis. However, Clahsen's hypothesis appears to be too narrow a linguistic characterization to account for the findings from the English-speaking Grammatical SLI children. The agreement deficit hypothesis, for example, can not account for the deficits found with inflectional marking of tense, or the assignment of theta roles to syntactic structures. Thus, a broader characterization of the RDDR proposal is required.

One possibility is that a problem with Spec (specifier)-Head relations (Chomsky, 1992) can characterize the linguistic properties of the deficit underlying Grammatical SLI. Spec-Head relations characterize local relations between syntactic structures and ensure that syntactic features (e.g. case, number, gender, tense, etc.) are appropriately realized on the syntactic constituents. The most appealing property of this proposal is that it captures the syntactic 'domain' for feature checking. Without 'knowledge' of this domain, the general feature checking mechanism proposed by Chomsky (1992) can not function appropriately. Thus, feature checking may appear to apply optionally. I hypothesize that the primary deficit is in knowing what the syntactic domain (characterized by the spec-head relations) is in which the features should be checked. It follows that with such a deficit, the SLI child may not check the features of the appropriate elements. For example, for the SLI child, feature checking for tense could be carried out either correctly, within the Spec-Head domain, or incorrectly with another element in the syntactic or discourse context on which 'time' is marked, such as an adverbial. This pattern of feature checking may enable the child to acquire the semantic significance and thus semantic specification of morphemes but not their syntactic significance and specification. This is because features which do not match semantically could be ruled out by more general cognitive processes. The proposed pattern of feature checking may also account for why SLI children appear to optionally mark features and why they make omission but not commission errors: if the correct elements were checked then, for example, tense would be realized correctly, if not then the verb would remain in the stem form.

A deficit in Spec-Head relations can account for SLI children's problems with tense and subject-verb agreement and also for their problems with the assignment of theta roles. Within Chomsky's (1992) minimalist programme, structural case is assigned under Spec-Head relations to both the object and subject NP. Thus, if the NPs are not made 'visible' through the assignment of case, the subject and object NPs would not be differentiated. Therefore, secondary problems of assigning theta roles to particular NPs would follow.1

However, the discussion above is speculative and it is clear that many details of this linguistic characterization of the RDDR proposal have yet to be worked out (see van der Lely and Stollwerck, 1994, for further discussion). For the purposes of this research it is sufficient that the RDDR proposal claims that, first, Grammatical SLI is a modular language deficit (Fodor, 1983; Chomsky, 1986). Secondly, the RDDR proposal predicts that the representation provided by the syntactic module will be an

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1 I am grateful to Peter Coopmans for this suggestion.
'underspecified' syntactic representation with respect to the relationships between constituents. For example, the output of the syntactic module may omit case marking of the NPs, or coindexation between constituents.

When considering the implications of the RDDR proposal it is important to distinguish modular aspects of language (syntax, phonology, and aspects of morphology) from central system language processes (e.g. conceptual-lexical storage, pragmatic inference) (Sperber and Wilson, 1986; Smith and Tsimpli, 1995). Unlike modular language processes, central system language processes may be subject to the influence of the 'general knowledge base' (see Smith and Tsimpli, 1995). The domain of SLI children's deficit is hypothesized to be restricted to the modular language abilities (van der Lely, 1995).

Based on the RDDR proposal it is predicted that SLI children will be able to derive an adequate syntactic representation of the adjectival passive but not a fully specified syntactic representation of the verbal passive. This makes SLI children's interpretation of the passive participle in short passive sentences particularly interesting. SLI children may show a preference in deriving an adjectival passive interpretation rather than a verbal passive interpretation. This is because the syntactic representation of the verbal passive is hypothesized to be structurally more complex (see below) than an adjectival passive. Thus, the investigation of SLI children's interpretation of passive participles in sentences may provide empirical evidence from a new source for the syntactic differences between verbal and adjectival passive sentences.

In order to investigate the potential differences in the syntactic representation derived from sentences with the passive participle, four sets of semantically reversible sentences which differ in their syntactic and morphological properties will be used in the study. The study compares the performance of SLI children and younger children in three age groups to take account of normal developmental factors in lexical and syntactic knowledge in sentence comprehension. In addition, the test sentences were administered to a group of adult subjects to control for any potential differences in the SLI children's responses which could arise due to differences in the ages of the children. The syntactic and morphological structure of these sentences are described below, which for the purposes of this paper will be largely based within the Government and Binding framework (Chomsky, 1981, 1986).

1.2. Active, verbal passive and adjectival passive sentences

The four sentence types used in this investigation were:
(i) simple active sentences (e.g. The girl mends the teddy),
(ii) full passive sentences (e.g. The teddy is mended by the girl),
(iii) short progressive passive sentences (e.g. The teddy is being mended), and
(iv) short ambiguous (potentially adjectival) sentences (e.g. The teddy is mended). The structural and syntactic differences between these four types of sentences are most easily described by reference to the assignment of thematic roles by the predicate to argument positions in the sentences. Particular thematic roles are associated with particular predicates (Bresnan and Kaplan, 1982; Shapiro et al., 1987; Jack-
endoff, 1990). For example, the lexical representation for the verb mend specifies two arguments which correspond to the thematic roles AGENT and THEME/PATIENT\(^2\) as shown in (1) below.

(1) The girl mends the teddy

\[
\begin{align*}
\text{MEND ( X } & \quad \text{(Y) )} \\
\text{Agent } & \quad \text{Theme}
\end{align*}
\]

Annotation with the additional parentheses (e.g. (Y) above) indicates that this argument is the internal argument assigned to the direct object. The ‘X’ argument may be referred to as the ‘external’ argument.\(^3\) In a simple active transitive sentence like (1) the theme is assigned directly by the verb to the object position and the agent is assigned to the external subject position. In development, consistently correct comprehension of active transitive sentences, in which semantic or pragmatic cues are insufficient for interpretation (i.e. reversible sentences), does not occur in test situations until children are at least two years of age (Bever, 1970). However, the majority of investigations indicate that three years or more is the age at which children can consistently understand reversible active sentences (de Villiers and de Villiers, 1973; Strohner and Nelson, 1974; Harris, 1976).

The remaining three types of sentences (ii, iii, and iv above) are all types of passive sentences. Although the passive participle is clearly related to its active counterpart, differences in the argument structure and semantic structure have recently been emphasized (e.g. Pinker, 1989; Jackendoff, 1990; Grimshaw, 1990). Grimshaw (1990) proposes that the argument structure of an active and passive verb (e.g. mend vs. mended) differ in the number of open argument positions they contain. For the passive verb, the external argument is ‘suppressed’.\(^4\) The suppressed argument is represented as (X-0) in (2) below.

(2) MENDED (X-0 (Y))

\[
\begin{align*}
\text{Agent } & \quad \text{Theme}
\end{align*}
\]

For reasons to do with case (i.e. the passive morphology absorbs accusative case, leaving the object in a caseless position (Chomsky, 1981)), the internal argument is

\(^2\) Note, in a recent approach thematic roles are defined as argument positions within the semantic representation of a verb’s meaning (Dowty, 1991; Levin, 1985; Pinker, 1989; Levin and Rappaport, 1988). Traditional labels like ‘agent’ and ‘patient’ merely serve as mnemonics for some of the argument positions and will be used as such in this paper. For example, ‘agent’ is defined as the first argument of CAUSE and ACT, ‘patient’ is the second argument of CAUSE and ACT, and ‘theme’ the first argument of BE, etc. (Pinker, 1989).

\(^3\) But see Koopmann and Sportiche (1991) for arguments that all subjects are base generated and theta marked inside the VP.

\(^4\) For an alternative view see Baker et al. (1989), who suggest that the theta role normally assigned to the external argument of an active verb is assigned to the passive morphology -en in passive sentences. Thus, the argument structure of active and passive verbs is similar.
moved to the external subject position (Chomsky, 1986). Thus, the d-structure and s-structure differ as shown in (3).

(3) d-structure  [e] INFL/Is mend-ed the teddy
s-structure  [The teddy], INFL/Is mend-ed [e]

It is evident that the syntactic structure of passive verbs is somewhat more complex than that of active verbs and this may account for the late development of consistent comprehension of passive sentences. In test situations, reversible full passive sentences are not reliably comprehended until 4:6 to 5:0 or more years of age for both known real verbs (Bever, 1970; de Villiers and de Villiers, 1973; Maratsos, 1974; Strohner and Nelson, 1974; Borger and Wexler, 1987), and newly learnt novel verbs (Pinker et al., 1987). Young children's and agrammatic aphasic adults' failure to comprehend passive sentences has been attributed to the movement of the internal argument to the subject position (Borer and Wexler, 1987; Grodzinski, 1990). Borger and Wexler propose that due to maturational factors, young children do not have available an 'argument chain' which enables the moved internal argument in the subject position to be linked with the trace which is left behind in the object position. The argument chain establishes coreference between the trace and moved argument which enables the subject to receive the post verbal theta role. In other words, the young child does not have the ability to form an abstract representation (which has been characterized as an argument chain) of the dependent syntactic relationships between the moved NP in subject position and the trace in the empty object position. As a result, he/she will not be able to assign the theta role non-locally to the subject NP. (See Borer and Wexler, 1987, for further discussion.)

Sentences (ii) and (iii) above differ in the expression of the by phrase, a(argument)-adjunct (Grimshaw, 1990): Sentence (ii), the full passive, expresses the a-adjunct while sentence (iii), the short progressive passive, does not. However, in sentence (iii) the lexical auxiliary be which is marked by -ing for the progressive aspect makes the sentence unambiguously a verbal passive sentence.

The unambiguously verbal passive interpretation of sentences (ii) and (iii) may be contrasted with sentence (iv) (i.e. The teddy is mended). In English, in contrast to other languages such as German, this short passive sentence is ambiguous between a verbal (actional) passive or adjectival (stative) passive interpretation. In the example above, the adjectival interpretation would be that the teddy was in a state of having been mended, i.e. the mended teddy (cf. The teddy is big/The big teddy).

There has been much debate in recent years about the differences between verbal passive and adjectival passive sentences (e.g. Baker et al., 1989; Bresnan, 1982; Borger and Wexler, 1987; Grimshaw, 1990; Levin and Rappaport, 1988; Wasow, 1977). Based on Wasow's (1977) proposal, Borger and Wexler (1987) argue that the affixation process to the verbal stem which yields the verbal passive and adjectival passive participle has a different set of properties depending on the level of affixation or 'conversion' (Grimshaw, 1990) from a verb to an adjective. If affixation occurs in the lexicon, as with adjectival passives, Borger and Wexler propose that there is both category change (i.e. V > A) and elimination, rather than suppression,
of the external argument. Therefore, the adjectival passive participle involves only one thematic role. In adjectival passives, the syntactic expression of the internal argument in subject position follows from the lexical argument structure of the adjectival passive participle (Borer and Wexler, 1987; Grimshaw, 1990; Wasow, 1977).

Importantly for the purposes of this paper, there is a syntactic basis for the differences between verbal and adjectival passives. In the verbal passive, first the $V_0$ must be moved into the head position of some functional projection between IP and VP to enable affixation of the passive participle. Clearly, $V_0$ does not move into IP as IP is finite, but to a functional projection possibly between Negation and VP. Secondly, the internal argument is moved to Spec-IP (subject position) where it can receive case. Neither of these syntactic processes is required for an adjectival passive interpretation. The passive participle form of the verb for the adjectival passive may be retrieved directly from the lexicon and the internal NP is base generated in the subject position. Thus, no movement is necessary. Borer and Wexler (1987) argue that because adjectival passives do not require movement or traces, and hence require no argument (a)-chains, they are acquired earlier than verbal passives.

The different syntactic characteristics of the verbal and adjectival passive have implications for SLI children’s interpretation of passive sentences. Based on the hypothesized RDDR deficit underlying SLI, we may expect SLI children to have difficulties in forming ‘a-chains’ and hence deriving a syntactic representation of the verbal passive. However, SLI children should not have problems in deriving a representation of the adjectival passive as no dependent syntactic relationships (or a-chains) are incurred.

The developmental literature provides conflicting accounts about whether consistent comprehension of the full and short passive sentences develop together or whether the short passive is acquired before the full passive. The differences in experimental findings exploring consistent comprehension of full and short passive sentences may be attributable to a verbal-transitive vs. adjectival-stative interpretation of the short passive sentences. Maratsos and Abramovitch (1975), investigating children aged between 2:11 to 3:11 years, concluded that comprehension of full and short passive sentences develops in close synchrony. That is, the children were found to comprehend either both passive constructions or neither of the passive constructions. In contrast to this finding Harris (1976), who investigated children of 3:1 to 7:0, suggested that children whose comprehension of passive sentences was imperfect were aided by the agent deletion in short passive sentences. Maratsos and Abramovitch (1975) used an acting-out procedure whilst Harris (1976) used a picture pointing procedure. The picture pointing procedure used by Harris made it possible for children to interpret the short passive sentences as either an adjectival passive or a verbal passive sentence and achieve a correct response. Alternatively, the acting out paradigm only allows for a verbal-transitive response involving both theta roles as it is not possible to act out a stative, adjectival response. Thus, the different demands of test paradigms may account for the apparently earlier acquisition of the comprehension of short passive sentences than full passive sentences which has been found in some studies. Unlike previous known studies investigating passive sen-
tences in English, this study allows the child to choose between a transitive-active and adjectival-stative interpretation of the sentences by using a picture pointing paradigm which provides for either response.

The main questions to be addressed in this study were: (1) Do the SLI children process the morphological differences between the four sentence types? If so, (2) How do they interpret these sentences? And (3) Does the SLI children’s performance differ from younger children matched on tests of (a) single word vocabulary, and (b) tests of the grammatical comprehension and morphological expression of language? It is also of interest to establish whether the general deficit in assigning thematic roles to NPs in reversible sentences found in children of less than 9:0 years, persists in an older group of SLI children.

The RDDR proposal predicts that the SLI children would be particularly impaired in comparison to language ability control groups for sentences which require a verbal passive representation.

2. Method

2.1. Subjects

Five subject groups participated in the experiment: a subgroup of Grammatical SLI children and three groups of younger children who provided control groups for different language abilities. The experiment was also administered to a group of 12 adult subjects.

2.2. Specifically language impaired children

The SLI children for this study were selected from approximately 150 SLI children attending a residential school specializing in the education of SLI children. The SLI children in the school may come from any geographical part of England and from a variety of socio-economic backgrounds. In order to be admitted to the school the children have to be diagnosed by speech and language therapists and educational psychologists as having severe and persistent difficulties with language development. However, their non-verbal cognitive abilities as measured by performance sub-tests of standardized IQ tests (e.g. WISC-R, Wechsler, 1974) have to fall within the normal limits for their chronological age. In addition, the children do not have a deficit in motor skills, hearing, and neurological function that could account for their language problems. Further general details of the children attending the school may be found in Haynes (1992) and Haynes and Naidoo (1991).

A selection procedure was undertaken to identify a homogeneous subgroup of SLI children from the overall heterogeneous group of SLI children who attend the school. The subgroup was to be characterized as having a persistent impairment of grammatical language development. The subgroup were not to have severe speech impairments. For selectional purposes, grammatical abilities were measured on standardized tests of the comprehension and expression of grammar and morphology. A
profile of the children’s language abilities as measured on the set of standardized language tests is given below. However, I shall first provide details of the general selection criteria for inclusion in the subgroup.

First, the children were to have a chronological age of between 9:0 to 13:0 years of age. This was to try to ensure that the children’s language abilities on the majority of the selectional tests fell above a minimum of 5:0 years. The upper age limit was due to a practical consideration, i.e. it was determined by the overall length of the project being undertaken and the school-leaving age. Secondly, children were excluded from the group if they showed any signs of social-emotional abnormalities or ‘autistic-like’ symptoms, and/or had been diagnosed as having a semantic-pragmatic language disorder (see Bishop and Adams (1989) for general details characterizing semantic-pragmatic SLI children). Thirdly, no children were included in the study if they had articulatory dyspraxia, severe phonological disorder, omitted final consonants (regardless of the grammatical context) and/or were partially unintelligible (i.e. those children classified by Haynes (1992) as having speech or speech plus SLI).

Approximately 35 of the SLI children met these criteria. These children were then assessed on a battery of standardized language tests which tapped a range of comprehension abilities and expressive language abilities. The choice of tests was determined by their reliability in identifying SLI children and previous use in research, rather than any adherence to theoretical notions on which the tests were based. The tests provided a standardized measure of language abilities in relation to the children’s chronological ages. There were six language tests used for selection purposes. The British Picture Vocabulary Scale (BPVS) (Dunn et al., 1982), a test of comprehension of single word vocabulary. The Test for Reception of Grammar (TROG) (Bishop, 1983), a multi-choice test of understanding a range of grammatical structures in sentences. The Naming Vocabulary sub-test from the British Ability Scales (NV-BAS) (Elliot et al., 1978), which tests the ability to name pictured objects. The Grammatical Closure sub-test from the Illinois Test of Psycholinguistic Abilities (GC-ITPA) (Kirk et al., 1968), which tests production of morphology. The Action Picture Test (APT) (Renfrew, 1988) and the Bus Story (revised version, Renfrew, 1991), which provide measures of grammatical structure and semantic content of expressive language. Although the scoring on these latter two tests may be criticized on a theoretical basis (e.g. their definitions of linguistic criteria), they do seem to identify the subgroup of SLI children that I am interested in (see also Bishop and Edmundson (1987) for the tests’ prognostic value). The expressive responses from the APT and Bus story were audio-recorded on a Sony DAT recorder using an Electrocondenser microphone (ECM-959), positioned approximately 20 cm to the side of the child’s mouth. Detailed transcriptions were made from these recordings. The recordings provided a further means of checking the children’s articulatory ability and intelligibility. Three of the children did not meet the articulation ability criterion and were eliminated from the group.

Children were only included in the study if they showed a disproportionate impairment in comprehension and expression of grammatical-morphological abilities in relation to their semantic-vocabulary abilities as measured on at least some of
the six tests. The absolute scores (i.e. standard deviations (SD) or, if SD were not available for the test, equivalent age scores) were judged to be of lesser importance than the pattern of the scores across the tests. This is because when testing using standardized test of language, SLI children may show only a mild or even no significant impairment as the tests often tap a range of structures, some of which cause problems for the children, and some which do not. The test scores may also be influenced by language remediation therapy. This may cause the child to use a non-linguistic strategy to achieve a correct response. Therefore the following details must be taken as a guide only, and all test scores should be judged in relation to the child’s previous history of performance on the test in question. The SLI children included in the subgroup generally scored at least \(-1.5\) SD, though some scored up to \(-2.5\) SD below that expected for their chronological age on the test of grammatical comprehension and up to \(-5.5\) SD on the test of expressive morphology. Where SDs were not available for the tests the equivalent age scores were used as a measure of impairment. The children generally had an equivalent age score of at least three years below their chronological age on tasks tapping grammatical ability but many age-equivalent scores fell well below this minimum criterion. For example one SLI child, MP, who had a chronological age of 12:10 had an equivalent age score for ‘subordinate clauses’ on the Bus Story of 4:2 years. Whatever the individual child’s score was on grammatical abilities, generally, he/she was to have superior vocabulary-semantic ability.

A total of fifteen children met the selection criteria for inclusion in the subgroup of grammatically impaired SLI children. There were 13 boys and 2 girls. The group had a mean chronological age of 11:3 (range 9:3–12:10). A summary of subject details for the SLI children can be found in Table 1 and further details of the scores for four of the six tests used for matching purposes for each SLI child can be found in Appendix A. Further details of the selection procedure can be found in van der Lely and Stollwerck (1994).

2.3. Language ability control groups

The language ability (LA) control children were selected from a state school in central London. All the children spoke English as a first language and none of the children had a history of speech or language problems. Thirty-six children from the first three classes in the school were randomly selected. Their chronological ages fell between 5:5–8:9. There were 12 children in each of the three groups, which approximately corresponded to three 12-month age bands (i.e. 5:5–6:4, 6:5–7:4, and 7:5–8:9, hereafter the LA5, LA6 and LA7 controls respectively). The children were tested on all six language tests used for the selection of the SLI children. Provided the child’s scores fell within normal limits on all of the tests he/she was included in the group. Four of the six selection tests were used for matching purposes. These were the BPVS, TROG, GC-ITPA, and NV-BAS. Raw scores from these tests were

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5 This was the case for the SLI subjects RJ, AZ, RM, RW and AW (see Appendix A).
Table 1
Subject details: Chronological ages and raw scores from the four standardized tests used for matching purposes

<table>
<thead>
<tr>
<th>Subjects</th>
<th>SLI children (N=15)</th>
<th>LA5 controls (N=12)</th>
<th>LA6 controls (N=12)</th>
<th>LA7 controls (N=12)</th>
<th>Summary of analysis between groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>11:3 (1:1)</td>
<td>5:9 (0:4)</td>
<td>6:11 (0:4)</td>
<td>7:11 (0:5)</td>
<td>LA5&lt;SLI&lt;LA6=LA7</td>
</tr>
<tr>
<td>TROG</td>
<td>13.53 (1.45)</td>
<td>14.41 (8.56)</td>
<td>16.00 (1.75)</td>
<td>17.33 (1.23)</td>
<td>LA5&lt;SLI&lt;LA6=LA7</td>
</tr>
<tr>
<td>GC-ITPA</td>
<td>20.60 (3.92)</td>
<td>21.25 (3.16)</td>
<td>26.25 (4.08)</td>
<td>28.91 (2.19)</td>
<td>LA5&lt;SLI&lt;LA6=LA7</td>
</tr>
<tr>
<td>BPVS</td>
<td>79.00 (9.69)</td>
<td>56.25 (8.91)</td>
<td>71.67 (9.71)</td>
<td>80.00 (9.62)</td>
<td>LA5&lt;SLI&lt;LA6=LA7</td>
</tr>
<tr>
<td>NV-BAS</td>
<td>18.07 (1.22)</td>
<td>15.67 (1.61)</td>
<td>17.17 (1.27)</td>
<td>17.50 (0.90)</td>
<td>LA5&lt;SLI&lt;LA6=LA7</td>
</tr>
</tbody>
</table>

Note: TROG = Test of Reception of Grammar; GC-ITPA = Grammatical Closure sub-test, Illinois Test of Psycholinguistic Abilities; BPVS = British Picture Vocabulary Scale. NV-BAS=Naming Vocabulary, British Ability Scales.

compared with those of the SLI children’s scores. Table 1 provides a summary of the mean language test scores for the three control groups. For the purposes of this study it is most useful to compare the SLI children’s different language abilities on the four matching tests with those of the three LA control groups.

One-way ANOVAs with planned comparisons were carried out on the raw scores for each of the four language tests (which were used for matching purposes) to compare the SLI children’s and LA control groups’ performances. For the two tests tapping aspects of grammatical ability (i.e., TROG and the GC-ITPA) the SLI children’s raw scores did not differ significantly from those of the LA5 controls (F(1,47)=0.27, p>0.6 for both analyses). The SLI children performed significantly worse than the LA6 and LA7 controls on the two tests of grammar (F(1,47)=17.89, p<0.001, GC-ITPA; F(1,47)=4.70, p=0.035, TROG). Although the LA6 controls performed worse than the LA7 controls on the GC-ITPA, the LA6 and LA7 controls’ scores did not differ significantly on either test of grammatical abilities (F(1,47)=3.59, p=0.061, GC-ITPA; F(1,47)=0.53, TROG). Table 1 summarizes these results.

For the tests of comprehension and expression of single words, analysis revealed that the SLI children were performing significantly higher than the LA5 controls on the two tests (F(1,47)=38.20, p<0.001, BPVS; and F(1,47)=23.66, p=0.001, NV-BAS). The SLI children’s vocabulary scores did not differ significantly from those of the LA6 and LA7 controls on comprehension of single words (F(1,47)=1.02, BPVS; or on the expression of vocabulary, F(1,47)=3.06, p=0.087, NV-BAS). The LA6 controls’ scores were significantly worse than the LA7 controls on the BPVS (F(1,47)=4.61, p=0.037), but their scores did not differ significantly on the test of expressive vocabulary (F(1,47)=0.41) (see Table 1 for a summary of these results). Thus, these results confirmed that the SLI children had a disproportionate deficit in grammatical-morphological abilities in comparison to their expression and comprehension of single word vocabulary.
2.4. Design and materials

Subject group (SLI children, LA5, LA6, LA7 controls) constituted a between-subject variable in the experiment. There was one within-subject variable which related to the four sentence types (active transitive, full passive, short progressive passive, ambiguous passive). A picture pointing response paradigm was used in the experiment. The subjects had to choose one out of four pictures which they considered depicted the sentence most appropriately.

The verbs were selected according to the following criteria: (1) they could be easily represented pictorially, (2) an adjectival interpretation was possible in the short ambiguous passive sentence, (3) they could be used in semantically reversible sentences in which the NPs could take on either thematic role in a transitive sentence. Six verbs were selected for the sentences. Three of the verbs (wash, mend, paint) had regular morphology, i.e. the past participle form of the verb took the regular -ed inflection, and three of the verbs (eat, hit, cut) were irregular. One of the irregular verbs (eat) took the irregular -en inflection and the other two verbs had zero inflection in their participle form. Each verb was presented twice in each of the four sentence conditions, which gave a total of 48 sentences. A basic set of active transitive sentences was constructed and can be found in Table 2. It can be seen in Table 2 that the same pair of noun phrases was used for both presentations of a particular verb but with the word order, and consequently the thematic roles, reversed in the second presentation. For each active sentence a corresponding full passive sentence, a short progressive passive sentence (hereafter short passive) and a short ambiguous (potentially adjectival) passive sentence (hereafter, ambiguous passive) were constructed. One set of sentences is presented in Table 3. For each verb four pictures were drawn by a professional artist and assembled on an A4 (210–297 mm) sized sheet of paper. The pictures were to correspond to (1) a ‘transitive’ response, (2) a ‘reversal’ response, (3) an ‘adjectival-stative’ response, and (4) a semantic distracter response. For example, the four pictures for the verb mend were (1) a girl mending a teddy, (2) a teddy mending a girl (a rag doll), (3) a mended teddy (sitting down), (4) a mended girl (rag doll). Note, the ‘agent’ theta role was not depicted in the latter two pictures. Clearly, the picture which corresponded to a transitive, or reversal response etc. depended on the sentence presented with the pictures. For each of the eight presentations of each set of pictures the arrangement of the four pictures on the A4 sheet differed. The order of the 48 sentences was randomized for presentation. The appropriate pictures corresponding to this order were bound in a booklet form. All subjects were presented with the full set of sentences and corresponding sets of four pictures. A sentence presentation-response form was constructed.

2.5. Procedure

The child was seated at a small table beside the examiner. The child was told that she would be shown some pictures and had to listen carefully to a sentence. The child was told to look at all four pictures carefully before pointing to the one she thought described the sentence. It was emphasized that it was possible that more than
Table 2
Transitive active sentences used in the experiment

Test sentences

The girl washes the boy
The boy washes the girl
The teddy mends the girl
The girl mends the teddy
The woman paints the man
The man paints the woman
The man eats the fish
The fish eats the man
The elephant cuts the boy
The boy cuts the elephant
The car hits the lorry
The lorry hits the car

Table 3
An example of the test sentences for the four sentence types and the corresponding correct transitive response picture

<table>
<thead>
<tr>
<th>Sentence types</th>
<th>Test sentences</th>
<th>Transitive response</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Picture description</td>
</tr>
<tr>
<td>Active transitive</td>
<td>The man eats the fish</td>
<td>1. A man putting a fish on a fork into his mouth.</td>
</tr>
<tr>
<td></td>
<td>The fish eats the man</td>
<td>2. A large fish (shark) eating a man in the sea.</td>
</tr>
<tr>
<td>Full verbal passive</td>
<td>The fish is eaten by the man</td>
<td>1. A man putting a fish on a fork into his mouth.</td>
</tr>
<tr>
<td></td>
<td>The man is eaten by the fish</td>
<td>2. A large fish (shark) eating a man in the sea.</td>
</tr>
<tr>
<td>Short progressive passive</td>
<td>The fish is being eaten</td>
<td>1. A man putting a fish on a fork into his mouth.</td>
</tr>
<tr>
<td></td>
<td>The man is being eaten</td>
<td>2. A large fish (shark) eating a man in the sea.</td>
</tr>
<tr>
<td>Ambiguous passive</td>
<td>The fish is eaten</td>
<td>1. A man putting a fish on a fork into his mouth.</td>
</tr>
<tr>
<td></td>
<td>The man is eaten</td>
<td>2. A large fish (shark) eating a man in the sea.</td>
</tr>
</tbody>
</table>

Note, the adjectival-stative pictures are also a correct response: Picture 3 showed a fish skeleton on a plate. Picture 4 showed a skeleton of an eaten man at the bottom of the sea with his hat, glasses and a shoe floating on the surface.

one picture might be the correct one but she was to point to just one picture which she thought best described the sentence. Each sentence was spoken with as near neutral prosody as possible. If approximately 15 seconds elapsed before the child pointed to the picture or the child requested that the sentence be repeated then the examiner repeated the sentence. The number corresponding to the picture the child pointed to was recorded on the individual presentation-response forms. All 48
sentences were presented in one session and took approximately 20 minutes to administer.

2.6. Scoring

The responses were coded into the following four response categories. (1) Transitive (i.e., actional) response (in which both the agent and patient thematic roles were correctly depicted). This was a correct response for all the sentence types. However, for the ambiguous sentences an adjectival response was also correct. Table 3 provides an example of a set of the test sentences and the corresponding transitive response pictures. It can be seen from Table 3 that the transitive responses to the three passive sentences correspond to a verbal passive interpretation. (2) Reversal response, i.e. the correct thematic roles assigned to the subject and object were reversed. For the short progressive passive and ambiguous passive sentences a reversal response was taken to be the one in which the subject NP was assigned an agent role. (3) Adjectival (stative) responses were ones in which a stative interpretation was made, i.e. where the subject NP in the passive sentences was in the state described by the verb. For the active sentences an adjectival response was taken to be one in which the object NP was in the state described by the verb. (4) The semantic distracter response was one in which the subject in the active sentences, oblique object NP in the full passive sentences, or an unmentioned NP in the short passive sentences was depicted in the state described by the verb.

3. Results

The majority of responses fell into the transitive or adjectival response categories. There were very few semantic distracter responses made by any of the subject groups. Fig. 1 (a) to (d) shows graphically the mean proportion of transitive, adjectival and reversal response types for the four subject groups. It can be seen that, generally, there were few reversal responses made by the groups. The exception to this was the SLI children’s responses to the full passive sentences. The results for the adult subjects will be presented after the main analysis of the SLI children and three LA control groups.

3.1. Transitive responses

The initial analysis considered the transitive responses (see section 2.6) made for the four sentence types. The mean number of transitive responses for the four groups (SLI children, LA5, LA6, LA7 controls) can be seen in Table 4. A 4×4 (Group×Sentence type) ANOVA was carried out to investigate these data.

The main effects of Group and Sentence type were significant (Group, \(F(3,47)=13.04, \ p<0.0001\); Sentence type, \(F(3,141)=150.60, \ p<0.0001\)) The Group×Sentence type interaction was not significant (\(F(9,141)=1.84, \ p=0.06\)).

To investigate the main effect of group and to see if the SLI children were generally making fewer transitive responses than each of the three control groups, a
Fig. 1. Percentages of response types for the SLI children and the language ability control groups.
Short Progressive Passive Sentences

(c) Mean percentage of responses

100% 75% 50% 25% 0%
SLI children LA5 controls LA6 controls LA7 controls

Short Ambiguous Passive Sentences

(d) Mean percentage of responses

100% 75% 50% 25% 0%
SLI children LA5 controls LA6 controls LA7 controls

Fig. 1. (cont.).
Table 4
Transitive responses for the SLI children, LA control groups and the adult subject group

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>Subjects</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>SLI children</td>
<td>LA5 controls</td>
<td>LA6 controls</td>
<td>LA7 controls</td>
<td>Adults</td>
</tr>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
<td>Mean (SD)</td>
</tr>
<tr>
<td>Active</td>
<td>11.13 (1.06)</td>
<td>11.83 (0.38)</td>
<td>11.67 (0.49)</td>
<td>11.75 (0.45)</td>
<td>12.00 (0.00)</td>
</tr>
<tr>
<td>Full passive</td>
<td>7.26 (2.60)</td>
<td>8.91 (1.68)</td>
<td>9.42 (1.17)</td>
<td>10.67 (1.16)</td>
<td>11.50 (0.79)</td>
</tr>
<tr>
<td>Short passive</td>
<td>8.06 (2.96)</td>
<td>9.50 (1.88)</td>
<td>10.41 (1.31)</td>
<td>11.25 (0.75)</td>
<td>11.83 (0.39)</td>
</tr>
<tr>
<td>Ambiguous passive</td>
<td>2.93 (2.34)</td>
<td>5.50 (2.46)</td>
<td>4.25 (2.26)</td>
<td>5.58 (2.47)</td>
<td>6.83 (4.11)</td>
</tr>
<tr>
<td>Totalb</td>
<td>29.40 (5.37)</td>
<td>35.75 (4.31)</td>
<td>35.75 (2.86)</td>
<td>39.25 (3.54)</td>
<td>42.16 (7.28)</td>
</tr>
</tbody>
</table>

Note: Maximum score = 12.

a Total Maximum score = 48.

planned comparison was carried out and the SLI children’s responses were compared to each group. The analysis revealed that the SLI children were making significantly fewer transitive responses to the sentences than all three control groups (F(1,47)=34.03, p<0.001, for the SLI children and LA5 controls; F(1,47)=15.11 p<0.001, for the SLI children and LA6 controls and LA7 control groups). In addition, the younger LA6 controls made fewer transitive responses than the LA7 controls (F(1,47)=4.13, p<0.05).

Orthogonal comparisons of the sentence types revealed that generally the children made significantly fewer transitive responses for the ambiguous sentences than the other three sentence types (F(1,47)=323.44, p<0.0001). The groups’ performance on the active sentences was significantly better than on the two unambiguously transitive (verbal) passive sentences, for which the transitive response was the only correct response (F(1,47)=83.45, p<0.0001). This result reflects the increased difficulty in the comprehension of passive sentences. Although the groups generally performed better on the short progressive passive than the full passive (see Table 4), the difference did not reach the significance level (F(3,47)=3.83, p=0.056).

3.2. Adjectival responses

To investigate whether the children were interpreting the ambiguous passive sentences as an adjectival-stative passive, a transitive (verbal) passive or both, the mean number of transitive and adjectival responses for the ambiguous passive sentences were compared (see Fig. 1). The three control groups produced approximately similar numbers of transitive and adjectival responses (albeit with a slight bias to responding with an adjectival response). The percentages of adjectival responses to

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As our interest was in whether the SLI children’s performance differed from the expected performance based on their language abilities, the LA6 and LA7 controls who were both matched on vocabulary ability but had superior morpho-grammatical ability than the SLI children, were analyzed together.
the ambiguous passive sentences ranged between 51% to 62% for the three control groups and their transitive responses ranged from 35% to 46%. This suggests that the LA controls were sensitive to the ambiguity of these sentences. The SLI children on the other hand showed a strong preference for adjectival responses (73%) rather than transitive responses (24%). The SLI children’s adjectival and transitive responses for the ambiguous sentences are significantly above and below a chance level respectively ($t(14)=42.38, p<0.001$, adjectival responses; $t(14)=38.07, p<0.001$, transitive responses). In contrast, none of the LA control groups’ adjectival and transitive responses differed significantly from chance.

3.3. Reversal responses

It can be seen from Fig. 1 that, generally, there was a very low level of reversal responses for all four subject groups to all the sentence types. The exception to this pattern was the greater number of reversal responses made by the SLI children to the full passive sentences. Analysis revealed that the SLI children made significantly more reversal responses to the full passive sentences than the LA5 controls ($t(25)=2.22, p=0.036$), the LA6 controls ($t(25)=3.21, p=0.004$), and the LA7 controls ($t(25)=3.37, p=0.002$). These data reveal that SLI children’s problem in assigning thematic roles in full passive sentences persists even at ages 9:3 to 12:10 years.

Before discussing these results, two possibilities for the differences in the responses of the SLI children in comparison to the LA controls must be considered. First, the greater number of adjectival passive responses made by the SLI children could have been because they were older than the LA controls. It is possible that these older children may have been more sensitive to pragmatic factors than the younger children. For example, the older SLI children may have been more likely to infer that because the agent was not mentioned in the ambiguous passive sentences, an adjectival interpretation was the intended interpretation; or they may have been more aware that the pragmatic function of the passive is to focus on the patient. Hence, they choose the adjectival-stative response picture in which only the patient is depicted.

The second possibility is that there may have been differences in the inherent meaning of the individual verbs which could have caused an adjectival response or transitive response bias. Again, the older SLI children could have been more sensitive to this, resulting in the responses to individual verbs skewing the overall results for the SLI children.

To investigate these possibilities the 48 test sentences were administered to a group of 12 adult subjects and an individual verb analysis was carried out for the responses to the ambiguous short passive sentences for all the subject groups. The 12 adult subjects’ ages ranged from 22 years to 54 years and they came from a very varied range of socio-economic backgrounds.
3.4. Adult subject group and individual verb analysis

The responses of the adults showed, as would be expected, that nearly 100% of their responses to the active, full passive and progressive passive sentences were transitive responses (see Table 4). However, the main interest is to see how the adults interpreted the ambiguous sentences. The results revealed that 56.9% of their responses to the ambiguous passive sentences were transitive responses which corresponded to a verbal passive interpretation. Thus, the adults produced slightly more transitive responses as opposed to adjectival-stative responses to these sentences than the LA control children. These data make it unlikely that general experience which comes with age, and in particular the development of pragmatic knowledge and awareness of the discourse demands, can account for the SLI children’s larger number of adjectival responses. It appears that the adult subjects, like the younger LA control children, were sensitive to the ambiguity of the short passive sentences and were equally likely to make either a transitive or adjectival interpretation.

The mean percentage of adjectival responses made to each verb for the ambiguous sentences for the subject groups was calculated. The data for the three LA control groups were collapsed as there was no discernible difference between the groups’ responses. These data for the SLI children, the LA controls and the Adult subjects can be found in Table 5.

<table>
<thead>
<tr>
<th>Subject groups</th>
<th>Verbs</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CUT</td>
<td>HIT</td>
<td>EAT</td>
<td>MEND</td>
<td>WASH</td>
<td>PAINT</td>
</tr>
<tr>
<td>SLI children</td>
<td>90</td>
<td>56.6</td>
<td>63</td>
<td>83</td>
<td>56.6</td>
<td>90</td>
</tr>
<tr>
<td>LA controls</td>
<td>56.9</td>
<td>30.5</td>
<td>47</td>
<td>63</td>
<td>69</td>
<td>66.6</td>
</tr>
<tr>
<td>Adults</td>
<td>58.3</td>
<td>16.6</td>
<td>20.8</td>
<td>54.2</td>
<td>54.2</td>
<td>54.2</td>
</tr>
</tbody>
</table>

It can be seen from Table 5 that there was little overlap in the number of adjectival responses made by the SLI children and the two control groups. The LA control children and Adults mean number of adjectival responses to the ambiguous sentences ranged from 30.5% to 69% and 16% to 58.6% respectively, whereas for the SLI children the range was from 56.6% to 90%. For almost every verb the SLI children made more adjectival responses rather than verbal responses than both the LA controls and the Adult subjects.

Some differences between the responses to the verbs can be noted. For the children developing normally and for the Adult subjects it appears that the verbs hit and eat are more likely to be interpreted as actional-transitive, rather than stative verbs in ambiguous circumstances than the other verbs. Thus, generally the inherent meaning
of the verbs can account for why the SLI children made the number of transitive (verbal) passive responses that they did for these ambiguous sentences. In other words, the data indicate that the transitive responses made by the SLI children result from the verb’s lexical representation rather than a fully specified syntactic representation of a verbal passive. However, it should be noted that the SLI children’s transitive responses to these verbs were still less than 50%. In contrast, for the verb wash the adjectival-stative response is more likely to be selected, especially by the LA controls. This may reflect the potentially inherent reflexive marking for this verb (Reinhart and Reuland, 1993). This factor does not appear to have influenced the SLI children’s responses to this verb in relation to the other verbs. Further investigation of SLI children’s knowledge of inherently reflexive verbs is required.

4. Discussion

This study has investigated SLI children’s syntactic abilities by exploring their pattern of responses in a sentence comprehension task. A subgroup of SLI children were selected which had been identified as having a persistent deficit in aspects of the grammatical expression and comprehension of language. These ‘Grammatical SLI’ children were matched to three groups of younger children on language abilities, i.e. either on tests of morphological-grammatical ability or on tests of vocabulary. The comprehension of four types of sentences (active, full passive, short progressive passive and ambiguous (short) passive sentences) was investigated. In particular, the study focused on the ability of the children to form a transitive (actional) verbal passive interpretation versus an adjectival (stative) passive interpretation. By using a picture pointing paradigm it was possible to consider the different types of responses made by the SLI children and normally developing children: i.e. transitive (actional) responses in which the agent and theme were depicted; adjectival responses in which only the patient/theme was depicted in the picture and was in the ‘state’ described by the verb; and reversal responses in which the correct assignment of the agent and theme to the NP(s) in the sentence was reversed. In this discussion I shall first summarize the results from the experiment. The underlying nature of SLI in this subgroup of Grammatical SLI children and the implications for normal language acquisition will then be considered.

The analysis of the transitive responses showed that the SLI children made significantly fewer transitive responses to the sentences than the younger language ability matched control groups. It was perhaps surprising that the SLI children’s performance was significantly worse and that they made significantly fewer transitive responses than even the youngest children (aged 5:5 to 6:4) who were matched on two standardized tests tapping morphological and grammatical ability. This may be attributed to the fact that these standardized tests assess a range of morphological and grammatical forms, but only some of these forms are problematic for the SLI children. It was perhaps less surprising that the SLI children’s performance was significantly worse than the performance of the LA6 and LA7 controls who were matched on single word vocabulary.
However, as can be seen from Fig. 1, the SLI children’s transitive responses showed a pattern largely similar to that of the younger LA controls across the four sentence types. The groups made significantly fewer transitive responses to the ambiguous sentences than the other three sentence types. The children made significantly more transitive (correct) responses to the active sentences than the two verbal passive sentences, and there was no significant difference between the two verbal passive sentences, i.e. the full and short progressive passive sentences. The good performance (over 97% correct) on the active sentences by even the youngest LA control children indicates that the errors on the passive sentences may be attributed to the syntactic structure of the sentences rather than any difficulties with the task itself. The very high level of performance by the SLI children on the active sentences (almost 93% correct) may be contrasted with their performance on the two verbal passive sentences, in which they scored 60% and 67% correct. Thus, these sentences continue to cause difficulties for this older group of SLI children.

The normally developing children produced a similar number of transitive and adjectival responses to the ambiguous passive sentences. In contrast, the SLI children showed a strong preference for adjectival responses rather than transitive responses. The individual verb analysis revealed that the SLI children’s adjectival response bias was apparent even when the inherent meaning of the verb may bias the LA controls and adult subjects to produce a transitive response. The SLI children’s preference for an adjectival-stative interpretation can not be accounted for by the difference in the chronological ages of the subjects, and thus a more mature use of general world knowledge and pragmatic inference. The group of adult subjects made a similar number of transitive and adjectival passive interpretations to the ambiguous sentences as the LA control children. If anything, the data show a trend for the adults to produce more transitive responses to the ambiguous sentences than the younger LA controls.

The pattern of responses made by the Grammatical SLI children (see Fig. 1) indicate that they differentiate the four sentence types. Moreover, they appear to be sensitive to the morphological differences between the active and passive form of verbs and the syntactic structures. If this had not been so one might have expected reversal errors to have occurred for the two short passive sentences. However, a substantial (and significant) number of reversal errors was made by the SLI children only for the full passive sentences. Whilst the data indicate that the SLI children are sensitive to the different sentence forms, their performance is still significantly worse than that of all three control groups.

This study has revealed that the SLI children show a strong preference for an adjectival-stative interpretation of the passive participle form of the verb when either a transitive verbal passive or an adjectival-stative passive interpretation is potentially available from the syntactic structure. In other words, the data indicate that the SLI children derive the underlying adjectival passive representation (which is syntactically less complex) rather than the verbal passive representation (which is syntactically more complex). Moreover, an adjectival-stative interpretation appears to be a possible interpretation for the SLI children for, what should be syntactically, an unambiguous verbal passive sentence. By providing a possible adjectival-stative
response to passive sentences this study has revealed that young normally developing children of 5 and 6 years may also consider that an adjectival-statue picture is a possible interpretation for the unambiguous verbal passive sentences. However, 7–8-year-old children developing normally and adult subjects make very few if any adjectival-statue responses to unambiguous verbal passive sentences.

Based only on the data from the normally developing children, the adjectival-statue interpretation to the full and progressive passive sentences could have been explained by general cognitive maturational factors outside the ‘language module’ (Fodor, 1983; Smith and Tsimpili, 1995). For example, the task demands in scanning four pictures may have contributed to the younger children’s occasional choice of the first picture which was at least partially consistent with the interpretation of the sentence. There are at least two reasons why this explanation is not very strong. First, if the adjectival-statue picture was generally an acceptable interpretation for the full and short progressive passive sentences, it could have been expected that the young normally developing children would have produced a similar number of adjectival-statue and transitive-actional passive responses as they did for the short ambiguous passive sentences. Secondly, if maturational factors, such as the ability to make pragmatic inferences, or awareness that the pragmatic purpose of the passive is to focus on the patient, could alone account for the adjectival-statue responses, then it might have been expected that the older 9–13-year-old SLI children would have performed well on this task. In addition, it would have been predicted that adjectival-statue responses should have increased, rather than decreased, as the children got older.

A more parsimonious explanation is that, at least on occasions, for young children the underlying syntactic representation derived from the sentences is not sufficiently specified to rule out an adjectival-statue interpretation. The only way to reliably interpret a transitive verbal passive sentence is with a fully specified (and more complex) syntactic representation that rules out alternative interpretations, such as the adjectival-statue interpretation. The data indicate that the development of a-chains (Borer and Wexler, 1987), that is, a representation of a dependent relationship between syntactic constituents, is required before a verbal passive may be unambiguously derived from sentences with a passive participle. Thus the data support Borer and Wexler’s (1987) proposal. This explanation provides the most parsimonious account for the SLI children’s pattern of responses to the full and progressive passive sentences.

The ‘underspecified syntactic representation’ explanation for the SLI children’s responses poses the question as to whether the SLI children produce an underspecified representation all of the time, or only some of the time. I propose that an underspecified syntactic representation for the full and progressive passive sentences is formed all of the time. The additional lexical information provided by the by phrase and progressive aspect may be sufficient for the SLI children to pragmatically infer that a transitive-actional interpretation is the desired response.\(^7\) The significant pref-

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\(^7\) See Tsimpili (1992) for further discussion that aspect is formed within the VP. It is also interesting to note that aspectual inflection -ing is relatively unimpaired in SLI children’s expressive language (Clahsen, 1989; Leonard, 1989).
ference for adjectival-stative interpretations made by the SLI children for the ambiguous passive sentences suggests that in the absence of additional lexical information a transitive-actional interpretation is not made. Thus, whilst the SLI children’s syntactic representations for the different sentence forms may differ due to the morphological and lexical differences in the sentences, this does not mean that a fully specified syntactic representation of the verbal passive is necessarily formed.

The explanation above is supported by the individual verb analysis carried out on the responses for the ambiguous passive sentences. This analysis revealed that even when the inherent meaning of a verb may strongly bias a transitive interpretation for all the control groups, e.g. as with the verb hit, the SLI children still made more than 50% adjectival responses. The data indicate that when a verb does not have a transitive bias in its meaning, as indicated by approximately 50% transitive responses made by the LA controls and adult subjects, the SLI children make almost all adjectival interpretations. For example, for the word mended the SLI children produced 83% adjectival responses, and for painted and cut 90% of their responses were adjectival. Thus, the lexical properties of words may play a stronger role in circumstances in which pragmatic cues do not bias one particular interpretation.

Further evidence for the underspecification of syntactic representations is provided by the significant number of reversal errors made by the SLI children for the full passive sentences. It appears that even when the SLI children attempt to make a transitive-actional interpretation they incorrectly assign the thematic roles to the subject and object NPs. I have proposed above that this is because the NPs are not made ‘visible’ through the assignment of case which is assigned under Spec-Head relations. Thus, the subject and object NPs may not be differentiated, resulting in secondary problems in assigning theta roles to particular NPs. The lack of reversal errors for the short passive sentences makes it unlikely that they interpret the passive participle form of the verb as either an active or a (fully specified) transitive-actional verbal passive. If this had been so, a similar number of reversal errors for the short passive sentences could have been expected.

Further investigation is warranted to confirm if the SLI children generally produce an underspecified syntactic representation for transitive verbal passive sentences, or whether they are producing this underspecified representation only some of the time, albeit significantly more often than even 5-year-old children. A sentence-picture judgement task may enable this issue to be clarified. In addition, comparisons between SLI children and young normally developing children may shed light on whether the same explanation is appropriate for the two groups. However, whether the SLI children produce an underspecified representation some, or all of the time, it appears that the SLI children’s deficit is with forming an unambiguous transitive (actional) passive representation. More specifically, the results indicate that a verbal passive representation of short passive sentences, involving syntactic affixation of the passive participle and movement of the internal theta role to subject position causes particular difficulties for the SLI children. Thus, this deficit may be located within the syntactic module.

The SLI children’s preference for an adjectival-stative interpretation, particularly in ambiguous circumstances, is consistent with the view that an adjectival passive
may be derived from a less complex syntactic representation. That is, it may be derived from a lexical affixation of the past participle and does not require syntactic movement. Thus, this study provides new empirical evidence for the underlying syntactic differences between the adjectival and verbal passive.

The findings from this study, as mentioned above, are consistent with the view that the ability to form a verbal passive is dependent on the formation of an argument chain between the moved internal argument and its trace in object position (Borer and Wexler, 1987). However, the data from the SLI children suggests that their impairment in forming a verbal passive is due to problems with both of the processes involved in forming the verbal passive: i.e., the movement of the verb to a functional projection to receive the passive participle affixation (as indicated by the adjectival-stative interpretation preference) and the movement of the internal argument to subject position (which has been identified as such by case assignment) and the representation of this relationship enabling the appropriate theta role to be assigned to the subject NP (as indicated by the reversal errors). Both of these impairments may tentatively be characterized by problems with Spec-Head relations. Furthermore, it appears that the syntactic abilities needed for a verbal passive interpretation have not yet matured in the SLI children, and as such they resemble very young children.

There are similarities with the ‘underspecification of syntactic representations account’ and the hypothesis put forward by Grodzinsky (1990) to account for agrammatic aphasics’ good interpretation of adjectival passive sentences but impaired interpretation of verbal passive sentences. Grodzinsky (1990) proposed that traces are deleted from agrammatics’ representations. Whilst the data from this study are consistent with such an interpretation, when considering possible explanations underlying Grammatical SLI previous findings must also be taken into account. The absence of argument chains or syntactic traces can not account for this group’s optional tense marking in their expressive language (van der Lely, 1995) or their deficit in using the syntactic cues of transitive active sentences, as well as passive sentences, to assign theta roles to syntactic functions of novel verbs (van der Lely, 1994). It is evident that the Grammatical SLI children’s deficit extends beyond the maturation of argument chains or the representation of traces.

5. Conclusion

This study has shown that Grammatical SLI children continue to be significantly worse at interpreting transitive verbal passive sentences than younger children of 5–8 years. The Grammatical SLI children show a preference for interpreting passive sentences as an adjectival-stative passive, especially ambiguous passive sentences which are consistent with either a transitive or adjectival interpretation. Differences in the syntactic representation required for verbal and adjectival passive sentences can account for the findings. I have proposed that, whilst SLI children’s syntactic representation for the different sentence forms in this study may differ, their syntactic representation for a verbal passive is not sufficiently specified to rule out an adjectival-stative interpretation. The SLI children appear to have particular problems...
with the movement of the verb to a functional projection to receive the passive participle affixation and with representing the movement of the internal argument to subject position where it can receive case and its theta role. I have claimed in the introduction that an RDDR, which I have tentatively suggested may be characterized by problems with Spec-Head relations, can account for the previous findings of Grammatical SLI children. The findings from this study are also consistent with such a deficit and, thus, provide support for the RDDR proposal.

This study, which has investigated Grammatical SLI children, whose syntactic deficit was predicted would cause particular problems for deriving the syntactic representation underlying a verbal passive but not an adjectival passive, has provided new empirical evidence for the different syntactic nature of verbal and adjectival passive sentences. In addition, the data complement the findings in which impaired general cognitive abilities but good language abilities have been found in other subjects, such as Williams syndrome children (Bellugi et al., 1990) and a teenage polyglot savant (Smith and Tsimili, 1991, 1995). Further investigations of the linguistic abilities of Grammatical SLI children based on the predictions raised in this study may provide further insight into our understanding of the maturation of syntactic abilities in language acquisition as well as the modularity of language.
### Appendix

#### Table A.1

Raw scores, z-scores or standard scores and equivalent age score for the matching and selection language tests for individual SLI children.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Chronological age</th>
<th>Language tests</th>
<th>BPVS</th>
<th>TROG</th>
<th>NV-BAS</th>
<th>GC-ITPA</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Raw score</td>
<td>Equivalent age</td>
<td>Raw score</td>
<td>Equivalent age</td>
<td>Raw score</td>
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<tr>
<td>JW</td>
<td>9:3</td>
<td>60 (−1.7) 6:5</td>
<td>10 (−2.2) 5:3</td>
<td>17' 7:9</td>
<td>17 (−3.7) 6:0</td>
<td></td>
</tr>
<tr>
<td>WL</td>
<td>9:5</td>
<td>72 (−0.9) 7:9</td>
<td>12 (−1.7) 5:9</td>
<td>19' 7:9</td>
<td>18 (−3.8) 6:3</td>
<td></td>
</tr>
<tr>
<td>JS</td>
<td>9:10</td>
<td>89 (0.0) 9:9</td>
<td>13 (−1.5) 6:0</td>
<td>19' 7:11</td>
<td>17 (−4.6) 6:0</td>
<td></td>
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<tr>
<td>AZ</td>
<td>10:3</td>
<td>72 (−1.3) 7:9</td>
<td>12 (−1.9) 5:9</td>
<td>19' 7:11</td>
<td>16 (−5.5) 5:10</td>
<td></td>
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<tr>
<td>RJ</td>
<td>10:11</td>
<td>76 (−1.4) 8:2</td>
<td>16 (−0.8)* 9:0</td>
<td>19' 7:11</td>
<td>16* 5:10</td>
<td></td>
</tr>
<tr>
<td>AZ</td>
<td>11:0</td>
<td>72 (−1.7) 7:9</td>
<td>12 (−2.1) 5:9</td>
<td>18' 7:11</td>
<td>24* 7:11</td>
<td></td>
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<tr>
<td>RM</td>
<td>11:4</td>
<td>85 (−1.0) 9:3</td>
<td>16 (−0.9) 9:0</td>
<td>19' 7:11</td>
<td>29* 9:8</td>
<td></td>
</tr>
<tr>
<td>LL</td>
<td>11:9</td>
<td>91 (−0.8) 10:0</td>
<td>15 (−1.3) 8:0</td>
<td>20' 7:11</td>
<td>20' 6:8</td>
<td></td>
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<tr>
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<td>13 (−2.2) 6:0</td>
<td>18' 7:11</td>
<td>21* 7:0</td>
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<tr>
<td>SB</td>
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<td>90 (−0.7) 9:5</td>
<td>15 (−1.6) 8:0</td>
<td>17' 7:9</td>
<td>24' 7:11</td>
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<td>16' 6:3</td>
<td>17* 6:0</td>
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<td>78 (−1.8) 8:5</td>
<td>12 (−2.5) 5:9</td>
<td>20' 7:11</td>
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<td>16 (−1.2)* 9:0</td>
<td>17' 7:11</td>
<td>22' 7:3</td>
<td></td>
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<tr>
<td>MP</td>
<td>12:10</td>
<td>87 (−1.4) 7:9</td>
<td>13 (−2.2) 6:0</td>
<td>18' 7:11</td>
<td>26* 8:6</td>
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</table>

*Note: BPVS=British Picture Vocabulary Score; TROG=Test of Reception of Grammar; NV-BAS=Naming Vocabulary, British Ability Scales; GC-ITPA=Grammatical Closure sub-test from Illinois Test of Psycholinguistic Abilities. SS = Standard Score. * = SS or z-score not available.

*On the basis of the scores for RJ and AW, they would not have been included in the group. However, previous scores on this test for both children showed a greater deficit in relation to their BPVS scores. It appeared that the TROG score obtained above represented a sudden improvement on this test. This may have resulted from the remedial help they were receiving at this time which was directed at improving the performance on particular structures which were assessed in this test.*

#### Table A.2

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<td></td>
<td></td>
<td>(age)</td>
<td>(age)</td>
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<tr>
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<td>28 (6:1)</td>
<td>14 (8:2)</td>
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<tr>
<td>WL</td>
<td>9:05</td>
<td>23 (5:1)</td>
<td>10 (6:4)</td>
</tr>
<tr>
<td>JS</td>
<td>9:10</td>
<td>29 (6:4)</td>
<td>11 (6:10)</td>
</tr>
<tr>
<td>AZ</td>
<td>10:03</td>
<td>42 (5:3)</td>
<td>13 (7:10)</td>
</tr>
<tr>
<td>RJ</td>
<td>10:10</td>
<td>27 (5:10)</td>
<td>8 (4:7)</td>
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Table A.2 (cont.)

<table>
<thead>
<tr>
<th>Chronological age</th>
<th>Language tests</th>
<th>Action Picture Test</th>
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<tbody>
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<tr>
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<td>Info. (age)</td>
<td>Sent. length (age)</td>
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<tr>
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<td>28 (6:1)</td>
<td>14 (8:1)</td>
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<tr>
<td>JW 11:9</td>
<td>24 (5:3)</td>
<td>10 (5:6)</td>
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<tr>
<td>CT 11:11</td>
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<tr>
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</table>

Note: Action Picture Test/Bus Story: Info = information score; sub-clause = number of subordinate clauses; (age) = Equivalent age score.

References


