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Dutch gender in specific language impairment and second language acquisition

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In this article we compare five groups of learners acquiring Dutch gender as marked on determiners and adjectival inflection. Groups of L1 (first language) children and L1-SLI (first-language specific-language-impairment) children are compared to three Turkish-Dutch L2 (second language) groups: adult L2, child L2 and child L2-SLI. Overall, our findings show that gender is vulnerable in both SLI and L2 groups. More particularly, they suggest that all child groups basically make the same type of errors and that they all differ from the adult group. It is suggested that any differences between the child learners can best be understood in terms of factors that influence intake (in both SLI and L2) rather than in terms of access to grammatical principles: SLI children have a (major) processing deficit and L2 children have received less input to Dutch, both factors causing poorer intake. That problems with the intake are crucial is further supported by the clear cumulative effect of bilingualism and SLI: the L2-SLI group not only differs from the child L2 controls but also from the Dutch L1-SLI group.

Keywords: SLI, L2 acquisition, processing limitations, agreement deficit, Dutch gender, age effects, frames, rules

I Introduction

Specific language impairment (SLI) is a 'pure' developmental language disorder in that children with SLI seem to develop normally except that

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they show significant limitations in their spoken language ability. Unlike children with other types of language disorders, they show no signs of hearing impairment, mental retardation, social-emotional disorders or neurological damage. They are, however, still unable to learn a language rapidly and effortlessly (Fletcher, 1999). On the basis of the identification of a chromosome that co-segregates with this language impairment, it has been suggested that there may be a genetic component to SLI (Fisher *et al*., 1998). This is supported by the finding that SLI children more often have parents or siblings with a history of language learning problems than other children (Leonard, 1998). Additionally, SLI is more likely to be seen in males than in females.

Researchers investigating SLI often (implicitly and explicitly) compare language acquisition in SLI and second language (L2) acquisition. However, different theories of SLI imply different relationships between SLI and L2 acquisition. If, for instance, SLI is a representational deficit such that one or more principles of Universal Grammar are not available (e.g. Clahsen, 1989; 1993; Gopnik and Crago, 1991), monolingual children diagnosed as having SLI (child L1-SLI) would have to rely on other learning mechanisms. Assuming that the accessibility of Universal Grammar is dependent on a critical period, these learning mechanisms might be comparable to those used by (typical) L2 learners who are no longer in the critical period for language learning, i.e. adults. Following this hypothesis, we would expect similarities between child L1-SLI and adult L2 acquisition.

A similar relation between SLI and L2 acquisition obtains in Ullman's declarative/procedural (DP) model (Ullman, 2001a). Ullman proposes a neurobiological explanation for the lexicon–grammar distinction, where two neural systems entail different linguistic functions. The declarative memory system underlies the mental lexicon, where idiosyncratic linguistic mappings are stored, and the procedural memory system underlies the mental grammar necessary for the acquisition and use of rule-governed computations in language. According to Ullman (2001b; 2004), access to the procedural memory becomes more difficult when age increases. L2 acquisition by adults would therefore be more difficult and more dependent on declarative memory than child L1 acquisition. As for SLI, Ullman and Pierpont (2005) argue that children have a 'procedural deficit' that reduces the ability to learn grammatical rules, whereas

declarative memory is relatively spared. This perspective thus also leads us to expect similarities between child L1-SLI and adult L2 acquisition and, crucially, these should differ from typical L1 acquisition.[1]

Other researchers see SLI as basically a processing and/or perceptual problem, causing learners to have relatively more difficulty in analysing the input (the primary language data) (e.g. Leonard and Eyer, 1996; Miller *et al*., 2001; Ellis Weismer and Evans, 2002). In this case, a rather different relation between SLI and L2 acquisition applies: L1-SLI children can in principle construct the same rules as typically developing children, since the same type of knowledge is available. The crucial difference is that L1-SLI children show a delay as a result of their reduced capacity to process the input necessary for constructing grammatical rules. The intake – that part of the input that can be used effectively for acquisition (see Corder, 1967) – is reduced. Compared to typically developing children, SLI children need more input to overcome their intake problem.

Although proponents of this approach have not found the exact nature of the processing problems yet, there is independent evidence for this type of limitation. Several studies show, for instance, that in nonword repetition tasks SLI children score significantly lower than unimpaired age controls who were exposed to the target language for the same length of time as well as younger language controls (e.g. Gathercole and Baddeley, 1989; Archibald and Gathercole, 2006). If, in general, SLI children have difficulty in processing the input, we may expect to see a delay in precisely those aspects where a relatively large and fine-grained input is needed in order to set rules. Inflectional morphology and functional elements in general are a case in point.

Looked at from this perspective, children with SLI are not comparable to adult L2 learners, but rather to child L2 learners: they, too, acquire the L2 within the critical period but have to construct rules based on a poorer intake than typically developing L1 children. The actual cause for the reduced intake is different in the two groups, however. Some linguists argue that L2 children have a processing disadvantage compared to L1 learners (Bialystok and Miller, 1999; Thorn and

[1] For a more detailed discussion on Ullman's DP model, we refer to Blom *et al*. (this issue).

Gathercole, 1999; Foursha *et al*., 2006), which may lead to a reduced intake. Even though reduced processing capacities in L2 acquisition might play a role, we believe that there is at least one other factor that has much more impact. There is, in fact, a rather straightforward reason why the intake of L2 children is reduced compared to L1 learners, whether typical or atypical. Unlike in L1-SLI, the reduced intake in the L2 children is, in general, directly related to the fact that these children are exposed to two languages and will therefore by definition have received less input in their L2 compared to their L1 age-mates. This does not necessarily imply a delay, since some linguistic rules can be acquired rather easily and do not need a large input/intake. However, if the threshold for a particular linguistic phenomenon is not attained very easily, we expect a delay in child L2 acquisition that is comparable to the delay seen in SLI. In other words, the delay in both L1-SLI and child L2 acquisition is the result of reduced intake. It is processing problems that lead to the reduced intake in SLI, whereas in L2 acquisition the reduced intake is primarily a consequence of the reduced input.

The controversy between the representational (or procedural) and the processing approach to SLI is, hence, directly related to the relationship between SLI and L2. One of the complications in this debate is that a comparison between both typical and atypical (child) L1 acquisition and (adult) L2 acquisition is indirect. It is evident that if we make this comparison, age, knowledge and transfer of a previous L1 may be confounding factors. The goal of this article is to examine which relationships between L2 acquisition and SLI apply. We hope to overcome the problem of confounding factors by comparing groups of child L1, child L1-SLI and adult L2 with two groups of L2 children, one of which is diagnosed with SLI (i.e. child L2-SLI) and one which is typically developing (i.e. child L2). In so doing, the L2-SLI children can be compared with a group of L1-SLI children, groups of unimpaired L2 and L1 children and a group of (unimpaired) L2 adults. Following the methodology of Schwartz (1992), among others, we have selected L2 groups with the same L1, namely Turkish, in order to – as far as possible – control for transfer. As a result, we hope to be able to give a more precise characterization of the relation between SLI and L2 acquisition, focusing on the error types learners make in terms of qualitative and quantitative similarities and differences. As well as having a theoretical, linguistic goal, this comparison may also have a more

practical purpose, since it should in the end contribute to a better diagnosis of L2 children. There has been a lack of clarity to date on the difference between delay due to SLI and typical L2 delay.

The linguistic area chosen to disentangle SLI and L2 learners has to be such that errors can be expected and that the threshold is not attained very easily. Cross-linguistic research comparing the acquisition of agreement relations in SLI and L2 acquisition shows that both learner populations show similarities in the substitution types used (Paradis and Crago, 2000; Håkansson, 2001; Håkansson *et al*., 2003; Paradis *et al*., 2003; Paradis, 2005). In order to be able to distinguish the predictions from the two types of theories discussed above, adult L2 acquisition needs to show a qualitatively different error pattern from child L1 and child L2 acquisition, at least to some extent. The Dutch gender system has exactly these properties. As shown by Weerman *et al*. (2006) and Blom *et al*. (2006; this issue), the way gender is visible via agreement in adjectival inflection is a locus for contrast between adults and children. We may expect that gender, as it is dependent on agreement, is a potential SLI marker, although this remains to be shown. While the verbal domain has been identified as a vulnerable area in agreement for SLI (e.g. Clahsen, 1993; Leonard, 1998; Paradis and Crago, 2000), gender agreement in SLI has not yet received as much attention.

The structure of this article is as follows. In the next section, we describe the Dutch gender system and its acquisition in as much as it is relevant for our purposes. We present our working hypotheses and research questions in Section III. In Section IV, we discuss the methodology: the participants, the test procedure and the data analysis. The results are presented in Section V. Finally, Section VI contains the conclusion and the discussion.

II Dutch gender agreement: the system and its typical acquisition

Dutch has a two-way gender system that distinguishes neuter and common gender (for further details, see the introduction to this issue). Whether a root noun is neuter or common is in the large majority of cases unpredictable. The distinction surfaces in several ways, two of which are relevant here, namely the system of determiners and the system of adjectival inflection, to be discussed here in this order.

In the determiner system, gender is visible only on definite determiners. The definite determiner that combines with a common noun is *de*; *het* combines with a neuter noun, as illustrated in (1). In the indefinite and plural determiners gender is neutralized, as shown in (2) and (3).

1)	a.	De/*het	tafel	definite, singular, common
		the	table	
	b.	Het/*de	boek	definite, singular, neuter
		the	book	
2)	a.	*Een*	*tafel*	indefinite, singular, common
		a	table	
	b.	*Een*	*boek*	indefinite, singular, neuter
		a	book	
3)	a.	*De/*het*	*tafels*	definite, plural, common
		the	tables	
	b.	*De/*het*	*boeken*	definite, plural, neuter
		the	books	

In terms of type frequency, common gender is the default: around 80% of the Dutch root nouns are common (Van Berkum, 1996). From a morphological point of view, we can also classify common gender as the default, since the determiner *de* appears if gender is neutralized, as in the plural; see (3).

The distinction between common and neuter is visible in adjectival inflection in one particular condition only, namely on attributive adjectives in singular indefinite noun phrases. Interestingly, the indefinite determiner itself does not show gender variation; only the adjective does. The adjective has no overt inflection if the noun is neuter (4b), whereas it does have a suffix (namely a schwa *-e*) if the noun is common gender (4a).

4)	a.	*Een*	*grote*	*appel*	indefinite, singular, common
		A	big	apple	
	b.	*Een*	*groot*	*paard*[2]	indefinite, singular, neuter
		A	big	horse	

The situation in (4b) is a special case since in all other situations (see the introduction to this issue) the attributive adjective is inflected with a schwa.

[2] The *-o/-oo* alternation in (4a) and (4b) is simply an orthographic convention of Dutch.

Inflection with a schwa is the default for attributive adjectives, as formulated in (5a). This does not mean that the bare adjective is infrequent in Dutch. In addition to the situation described in (5b), the bare adjective is the only option in all non-attributive positions, i.e. either predicative or adjunct positions.[3]

5) a. In case of attributive adjectival inflection, insert the schwa,
   b. except if the noun is [neuter, singular and indefinite].

What do we know about the acquisition of the Dutch gender system by typically developing children and adults with respect to determiners and adjectival inflection? First of all, acquisition of the two-way Dutch gender system is notoriously difficult for both L1 and L2 learners. Experimental studies and spontaneous language analyses of the L1 acquisition of Dutch determiners show that, in the initial stages, children tend to use bare nouns followed by a stage where they use so-called proto-determiners (Wijnen *et al*., 1994; Taelman, 2005). In Dutch, proto-determiners seem to appear around the age of 2;0 and are phonetically realized as a schwa (e.g. Bol and Kuiken, 1990; Wijnen *et al*., 1994; Rozendaal and Baker, to appear). Between ages 2;0 and 3;0, children begin to produce the full form of determiners with a higher frequency. As for instance shown by Blom *et al*. (this issue), L1 children start to learn neuter determiners relatively late. Whereas the percentage of correct use of common determiners is above or around 90% from three years onwards, correct use of neuter determiners has only reached 75% at age seven. Children overgeneralize common determiners to neuter nouns; overgeneralization in the other direction does not occur.

As previously mentioned, little is known about the acquisition of gender agreement in Dutch SLI children. Evidence from Dutch (Bol and Kuiken, 1988) and German child data (Clahsen, 1991; Roberts and Leonard, 1997) show a limited use of determiners and a simplification of the determiner system as compared to unimpaired younger children, with the most frequent error being determiner omissions.

A number of studies (Cornips and Hulk, 2005; this issue; Hulk and Cornips, 2006a; 2006b; Blom *et al*., 2006; this issue; Unsworth, this issue)

[3] An example of a bare adjective in predicative position is *de appels zijn groot*/**grote* 'the apples are big', and an example of a bare adjective in adjunct position is *de hond bijt boos*/**boze de postbode* 'the dog bites the postal carrier angrily'.

investigate the L2 acquisition of Dutch gender agreement in determiners. Basically, the same types of errors are found here as in L1 acquisition, that is, both in child L2 and in adult L2 acquisition, common determiners are overgeneralized, whereas neuter determiners are not. Furthermore, both groups tend to omit determiners in the first stages of acquisition. Omission does not seem to be an interference phenomenon that only shows up if the L1 does not have determiners. For instance, learners of Dutch with a Moroccan and a Turkish background both omit determiners in their early L2 development, although only Turkish is a language without determiners. More evidence comes from German, where determiners are overt in a way essentially similar to Dutch. Parodi *et al*. (2004) examine the adult L2 acquisition of German nominals of untutored learners of Spanish, Italian, Korean and Turkish: languages with and without definite determiners. They find that the determiner omission rates for early stages of German L1 acquisition were the same as those of the Korean and Turkish L2 learners. Crucially, the L2 learners with a Romance background also omit determiners, albeit to a lesser extent. This suggests that there is positive rather than negative transfer in this domain.

Differences between L2 adults and L2 children are, however, observed with respect to the acquisition of gender in adjectival inflection (Sabourin and Haverkort, 2003; Cornips and Hulk, 2005; Weerman *et al*., 2006; Blom *et al*., 2006; this issue). Children frequently overgeneralize attributive adjectives with a schwa ending (**een grote paard* 'a big+suffix horse' instead of *een groot paard*), whereas adults typically make two kinds of mistakes: they overgeneralize adjectives with a schwa ending, but they also overgeneralize bare adjectives (**een groot appel* 'a big apple' instead of *een grote appel*). Although both L1 and L2 children overgeneralize the schwa ending, there are also differences between these two groups. L1 children reach a level of 70% correct use of the special rule in (5b) around the age of 7, whereas there are indications that L2 children have not acquired this rule even after more than ten years' exposure to Dutch (compare Laloi *et al*., 2005; Weerman *et al*., 2006). In other words, for (some of) these L2 children the stage in which the schwa is overgeneralized to all attributive adjectives is the end state, that is, fossilization has taken place.

The differences between child and adult learners have to be interpreted. They can be seen as evidence for a critical period in the sense

of Lenneberg (1967), Newport (1990), Hyltenstam and Abrahamsson (2003), as has been argued in earlier work (Blom *et al*., 2006; this issue; Weerman *et al*., 2006). Opinions vary on the length of the critical period (for some discussion see, among others, Bley-Vroman, 1990 and Meisel, 2004). In fact, the contrast between L1 children and L2 children in adjectival inflection is relevant in this respect. L1 and L2 children are similar to each other but different from adults in that they first strongly overgeneralize the schwa ending (and not the bare adjective). In this stage, (5a) seems active. Although, like their L1 counterparts, L2 children do acquire this rule, they have relatively less time to deduce the special rule (5b) of the adjectival system; the L2 children start in the same way as the L1 children, but they cannot complete the system within the critical period. The different profiles for the three learner groups are summarized in Table 1.

At first sight, it is surprising that age of onset influences the acquisition of gender in Dutch attributive adjectives, but not in definite determiners. After all, formally, both can be seen as instances of agreement: adjectives as well as determiners agree with the noun. Why would the one type of agreement be age dependent and the other not? Following Blom *et al*. (this issue), we assume that this difference is only apparent. The acquisition of agreement in general may be age dependent, but it is plausible that the effect of formal agreement can be mimicked rather successfully in some cases by other learning mechanisms. More specifically, given that gender has to be stored for every root noun separately in Dutch, a lexical frame that specifies the type of determiner (*de* or *het*) to be combined with the specific noun is entirely adequate. In fact, the result is exactly the same as an agreement relation between the noun and the determiner with rules that spell out the neuter determiner as *het* and the common determiner as *de*. As argued by Blom *et al*. (2006; this issue), however, adjectival agreement as in (5b) cannot be successfully

Table 1 Profiles of the acquisition of attributive adjectival inflection in child L1, child L2 and adult L2

Profile	Adjectival inflection	Typical for:
1	correct use of A-e and A-ø	late stage of child L1
2	overgeneralization of A-e	early stage of child L1, child L2 and late stage of child L2
3	overgeneralization of A-e and A-ø	adult L2

achieved with lexical frames. It would require not only extensive input but also extensive storage. For instance, in order to correctly produce *een groot paard* 'a big horse', it will not suffice to learn that the adjective is uninflected if it is preceded by an indefinite determiner *een* 'a' since *een grote appel* 'a big+suffix apple' requires a schwa. Neither is it enough to learn that *paard* 'horse' is always preceded by an uninflected adjective since in *het mooie paard* 'the beautiful+suffix horse' the adjective is inflected. In fact, even the frame *een*-Adjective-*paard* 'a-adjective-horse' is not completely adequate since other indefinite contexts also require an uninflected adjective: e.g. *mooi paard heb je daar!* 'you have got a beautiful horse there!', *menig mooi paard* 'many a beautiful horse', enig mooi paard 'any beautiful horse', *zo'n mooi paard* 'such a beautiful horse', *ieder groot paard* 'each/every big horse', *welk groot paard* 'which big horse'. A rule system with features that spell out adjectives with the features of (5b) as bare (features that are present on adjectives as a result of agreement) is not only more parsimonious but also empirically more adequate.

Following this line of reasoning, the contrast between gender in adjectives and gender in determiners can be understood in terms of the aforementioned distinction between procedural and declarative memory proposed by Ullman (2001a; 2001b; 2004). The acquisition and use of gender in adjectives can only be represented successfully by means of the procedural memory (grammar). The acquisition and use of determiners, however, can be achieved rather successfully by relying on declarative memory (lexicon). Ullman argues that the system supporting the acquisition of grammar is not as available after puberty as the system supporting lexical knowledge. Therefore, agreement in determiners and adjectives may be accounted for in terms of rules but, as long as a declarative alternative is empirically successful, L2 adults may look similar to children. This alternative works for determiners but not for adjectives, hence the observed contrast.[4]

[4] Strictly speaking, it is not possible to decide whether children use a rule system or lexical frames when acquiring gender in determiners, since the two seem empirically indistinguishable. Blom *et al*. (this issue) argue that children may start with frames and via these acquire the rule system based on features. As pointed out, use of the feature system becomes empirically visible via adjectival agreement. We leave open the question whether or not the step from frames to rules always takes place in the critical period or whether this step is dependent on further conditions.

III Questions and hypotheses

In the introduction, we briefly sketched two approaches to SLI that imply different relationships to L2 acquisition. In one approach, SLI is considered to be the result of a deficit in the linguistic representation or a deficit in the procedural memory. Following the discussion in Section II, we hypothesize that the system of rules that underlie the morphology of agreement is not available in SLI. Typical child development in the critical period is characterized by rule-based agreement. Learners, like adult L2 learners, who do not have this mechanism at their disposal may mimic the effects of agreement by means of lexical frames, this being a case of declarative knowledge. Accordingly, adult L2 learners and SLI children share a dependency on declarative memory, albeit for different reasons: for the children, this is a consequence of a linguistic deficit, whereas for the adults, it is a result of their age. Hence, in terms of types of errors, the groups should pattern as laid out in (6), although the extent to which errors occur may be different.

6) SLI as an agreement deficit:
   a. Child L1-SLI, child L2-SLI and adult L2 are comparable.
   b. Child L1 and child L2 are comparable.

The effect of an agreement deficit can only be visible where lexical frames and rule-based morphology are empirically distinguishable. As discussed, gender in adjectival inflection is such a case. More specifically, we expect the groups in (6a) to show two types of errors on adjectival inflection. These groups should be in accordance with profile 3 of Table 1. In the groups in (6b), only the schwa ending should be overgeneralized. They should have either profile 1 or 2 in Table 1. Note, however, that if they have profile 2, this does not necessarily mean that they will acquire profile 1. As discussed, learners may learn (5a) during the critical period, and then this system may become fossilized if (5b) is not acquired within the critical period as well.

On the second approach, SLI children have, in principle, the capacity to construct the correct grammatical rules, but they have a deficit in general cognitive and perceptual processes. Consequently, the intake of SLI children is relatively poor. They need more exposure to Dutch than their unimpaired peers and, hence, more time to arrive at the correct analysis. In terms of type of errors, all child groups should be the same,

although error frequencies will differ. On the other hand, adults will show different types of errors due to the age-dependency discussed in Section II. Hence, the groups are predicted to pattern as in (7).

7) SLI as a processing deficit:
   a. Child L1, child L2, child L1-SLI and child L2-SLI are comparable.
   b. The adult group stands alone.

With respect to adjectival inflection, we expect the groups in (7a) to overgeneralize the adjectives with a schwa ending in the early stages of acquisition and, hence, to show profile 2 in Table 1. In contrast, the adults should have profile 3, that is they should make two types of errors. Since we focus here on relatively early stages of acquisition, we do not expect profile 1 to show up, although it is an interesting question to what extent this profile can be attained by the child L2, child L1-SLI and child L2-SLI groups in later stages. We will come back to this issue in the final section.

If problems with the intake resulting in delay are crucial rather than the capacity to construct rules, further predictions on the acquisition of the gender agreement system can be formulated. SLI and L2 are assumed to be factors causing delay. Assuming that the groups are comparable in terms of length of exposure and similar type of input to the target language, certain groups should produce fewer errors than others in terms of omissions of definite determiners, overgeneralizations of the common determiner to neuter contexts and schwa overgeneralizations in adjectival inflection. This is made explicit in (8):

8) a. The error rate in child L1-SLI > child L1.
   b. The error rate in child L2-SLI > child L2.
   c. The error rate in child L2 > child L1.
   d. The error rate in child L2-SLI > child L1-SLI.

The L1-SLI children should have a higher error rate than the typical child L1 group (8a). The same should be true for the child L2-SLI group compared to the typical child L2 group (8b). Taken together, (8a–b) provide information on the impact of SLI in the domain of gender agreement. The comparison in (8c–d) should provide information on the impact of the L2 factor: we expect L2 children to show a delay compared to L1 children. Finally, the L2-SLI group should show a more profound or 'double delay': in addition to the processing deficit

caused by SLI, the L2-SLI children also have to deal with two linguistic systems, which, as discussed in the introduction, implies a reduced intake compared to L1 children. The L2-SLI group is therefore expected to show more errors on determiners and adjectival inflection than the child L1-SLI group and, in fact, than any other child group.

As discussed, the predictions in (8) are based on the idea that the actual intake will differ in the child groups. For the SLI groups, intake is hindered by a processing problem whereas for the L2 groups, intake is (mainly) influenced by reduced input in the L2 (as compared to the L1 groups). Both factors play a role in the L2-SLI children. It is not clear *a priori* what the impact of the one is compared to the other. In the present approach, there is in principle a way to investigate this difference, namely by comparing the child L1-SLI group with the child L2 group. The relevant question is formulated in (9).

9) Is the error rate in child L1-SLI > child L2 or is child L2 > child L1-SLI?

If the impact of SLI on gender agreement is higher than in L2 acquisition, we expect the child LI-SLI group to show a higher percentage of determiner omissions, overgeneralizations of common determiners and schwa endings on adjectives, and vice versa.

IV Method

1 Participants

We cross-sectionally compared data from Dutch child L1, child L1-SLI and Turkish-Dutch child L2, child L2-SLI and adult L2 populations. Our Turkish-Dutch L2 groups come from one of the biggest immigrant communities (second and third generation) in the Netherlands (Backus, 2004). All populations were selected from the western part of the Netherlands in order to control for dialect variation of Dutch. A general problem, however, in selecting and comparing L2 and SLI populations is the natural heterogeneity between and within the groups. In order to control for the heterogeneity as much as possible, we used a number of SLI, L2 and proficiency criteria, which we now describe, first, for the L2-SLI children and then for the other groups.

The child L2-SLI group had been diagnosed as language-impaired by qualified speech pathologists/therapists in the Netherlands and were

enrolled in schools for children with language impairment. The commonly used selection criteria of Stark and Tallal (1981) were applied to select children as having SLI. They were identified as not having a neurological disorder, hearing impairment or socio-emotional problems. Only children with a score higher than 80 on SON-R – a standardized non-verbal intelligence test (Snijders *et al*., 1989) – were selected. Their expressive language performance falls below age expectations. That is to say, all children scored at least 1.5 and 2 standard deviations below the (Dutch) norm on articulatory and production language subtests, respectively. Their admission to special schools for speech and language impairment was additionally determined on the basis of finding a language deficit in their native language, Turkish. Turkish vocabulary measurements (Schlichting, 2006) and a parental questionnaire were used for this purpose.

For the selection of the child L1-SLI group, the same relevant SLI-criteria were used. All L1-SLI children were taken from the same schools for language-impaired children as the L2-SLI children. The unimpaired child L1 and child L2 populations were selected from regular elementary schools or day care. Both groups were reported by their teachers to be developing typically.

Both child L2 groups have acquired Turkish from birth, whereas exposure to Dutch started between age 1;0 and 4;0. All L2 children were born in the Netherlands. Information about the children's specific language situation was obtained using a modified version of the parental questionnaire *Anamnese meertaligheid* 'Questionnaire on the child's multilingual context' (Blumenthal and Julien, 1999). As is clear from Table 2, both child L2 groups are comparable in terms of onset and length of L2 exposure. The selected adult L2 group came to the Netherlands after puberty (> age 15), and did not have any contact with Dutch before immigration. They had all learned Dutch in a formal teaching setting in a regional centre for education. Participants were tested while still attending classes. Unlike the child L2 populations, the L2 adults showed a high degree of variability regarding their L2 input.

In order to determine the level of Dutch proficiency in the unimpaired child L2 and adult L2 populations, both groups participated in a sentence repetition task taken from the *Taaltoets Alle Kinderen* 'Children language assessment' (TAK; Verhoeven and Vermeer, 2002),

a standardized proficiency measure for child (L2) populations.[5] According to the TAK, child L2 learners had a higher proficiency than adult L2 learners. That is not surprising since the L2 children's exposure to Dutch is considerably larger than in the adult group (Table 2). Details of the different learner populations are given in Table 2.

As is clear from Table 2, all child groups except the (unimpaired) child L1 group have a similar mean age (ages 7;3–7;5). We included the younger typically developing child L1 group for comparison to determine the severity of the delay of the older L1-SLI children. Table 2 also shows that the five learner groups in the study differ with respect to two L2-factors: first, the onset of exposure to Dutch (child L1 vs. child L2 vs. adult L2) and, second, the length of exposure to Dutch. The child L1 group, child L2 and child L2-SLI groups have been exposed to Dutch for a similar amount of time (compare the child L1-SLI and adult L2 group).

2 L1 background

It is important to consider possible L1-interference effects from Turkish on the Dutch gender data. Unlike Dutch, Turkish does not have a gender system; neither does it have definite determiners or adjectival inflection. Indefiniteness of a noun is signalled by *bir*, which is also the numeral 'one' (Underhill, 1976). At first sight, one might think that any omission of determiners is therefore due to L1 transfer. However, as pointed out in Section II, this does not seem to be the case since L2 studies on the acquisition of the Dutch and German determiner system report an absence of determiners in early L2 stages even for learners with an L1 with overt determiners. In that sense, determiner omissions may rather be taken to be an indicator of an early stage of acquisition of Dutch, as it is also seen in typically developing L1 children.

3 Procedure

Both determiners and adjectival inflection were elicited in a sentence completion task involving 10 high-frequency, non-derived singular

[5] In the sentence repetition task taken from the TAK, each test sentence contains two conditions: a word order property of Dutch and a function word. If both conditions are repeated correctly, two points are awarded. If only one of the two conditions is repeated correctly, one point is awarded, etc. The maximum score is 40 points (20 sentences).

Table 2 Information on the different learner populations

Population	Language	*n*	Age range	Mean age (years)	Onset of Dutch exposure (years)	Length of Dutch exposure (months)
Child L1	Dutch	32	4;1–5;11	4;11	0	59
Child L1-SLI	Dutch	25	6;2–8;0	7;3	0	87
Child L2	Turkish-Dutch	19	6;3–8;6	7;4	1;0–4;0	63
Child L2-SLI	Turkish-Dutch	20	5;11–8;3	7;5	1;0–4;0	62
Adult L2	Turkish-Dutch	9	18–31	26;5	>15	38

root nouns.[6] The adjectives that were used denote four common colours ('green', 'blue', 'red', 'yellow') or four contrasting adjectives ('small–short' and 'big–tall'). Table 3 presents the different nouns used in the task.

In the adjectival inflection task, each noun was tested in definite and indefinite conditions as illustrated in (10a) and (10b) for the neuter root noun *glas* 'glass'. The experimenter gives first the stimulus and the bold capitals indicate the correct response of a learner. For discourse reasons, the adjectival inflection items were presented first in the indefinite context in (10a) followed by a definite context in (10b). In (10a), the learner had to describe a minimal contrast between the same objects (two or more) that were distinguished by the adjectives 'big' and 'small'.

10) Elicitation material for adjectival inflection

a. Indefinite condition with neuter noun

Kijk, twee glazen.
Dit is een … ***GROOT GLAS***
en dat is een … ***KLEIN GLAS.***
'Look, two glasses.
This is a … **BIG GLASS**
and that is a … **SMALL GLASS'**

b. Definite condition with neuter noun

Ik pak… ***HET GROTE GLAS.***
'I take … **THE BIG GLASS'**

Table 3 Nouns used for the elicitation of gender agreement

Common gender	Neuter gender
Appel 'apple'	*Glas* 'glass'
Auto 'car'	*Mes* 'knife'
Baby 'baby'	*Paard* 'horse'
Schoen 'shoe'	*Schaap* 'sheep'
Vis 'fish'	*Vliegtuig* 'plane'

[6] The nouns were selected from the standardized vocabulary list for Dutch children under the age of 3 (N-CDI: Zink and Lejaegere, 2002). Furthermore, nouns were also taken from the Dutch vocabulary list (Schlichting and Lutje Spelberg, 2002) for non-native speakers of Dutch under the age of four.

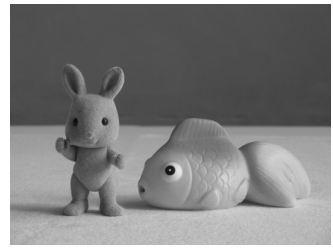
In the determiner task, a gender-marked definite determiner was elicited for each noun, illustrated in (11a) for the (neuter) noun *vliegtuig* 'plane' and for the (common) noun *vis* 'fish' in (11b).

11) Elicitation material for determiners

a. Neuter noun

Kijk, een vliegtuig. Waar is Kroko?
Kroko staat voor … ***HET VLIEGTUIG***
'Look, a plane. Where is Kroko?
Kroko stands in front of … **THE PLANE'**

b. Common noun



Kijk, een vis. Waar is Konijn?
Konijn staat naast … ***DE VIS***
'Look, a fish. Where is Rabbit?
Rabbit stands next to … **THE FISH'**

Two examples of each task were introduced in a training session to familiarize participants with the experimental setting. The set-up of the training items was the same as the example scenarios just given. Items of a test for verbal inflection were used as fillers.

4 Data analysis

In order to examine the production for adjectival inflection, two adjectival responses per noun were elicited in the indefinite condition (10a) and one adjectival response per noun in the definite condition (10b), resulting in three possible correct responses in the adjectival inflection task. Responses containing an elliptical construction in definite and indefinite contexts, where the noun was missing, for instance, *een grote ø* or *een groot ø* (a big ø) 'a big one', were excluded, since the noun and hence gender information is missing.

In the determiner task (11), the use of a definite determiner with a noun was tested twice. The adjectival inflection task also elicited an extra definite determiner, thus resulting in at most three definite determiners per item per participant. Alongside the production of the definite determiners *de* and *het*, we also scored the use of bare nouns since they represent a stage in acquisition. Responses with an indefinite determiner *een* as a

substitute for the definite determiner were excluded from the analysis since they do not provide any information about the acquisition of gender. There were also a few instances of demonstrative pronouns (*dat* and *die*) used instead of a definite determiner; these were also excluded. Furthermore, in both tests we excluded all noun responses that were different to the stimulus noun (e.g. *auto's* 'cars' instead of *auto* 'car').

In addition to group differences, intra- and inter-individual variation among learners and samples could be expected, given the possible heterogeneity within SLI groups, on the one hand, and L2 groups, on the other. To determine whether our samples are normally distributed or not, we carried out the Shapiro–Wilk test, a reliable measurement for sample sizes smaller than 50. It turned out that our samples are significantly different from a normal distribution ($p < .05$). We therefore used non-parametric tests: the Mann–Whitney was used for the comparison of two independent samples (i.e. child L1 with child L1-SLI) whereas the Wilcoxon Rank was used for related samples (i.e. two related test conditions within one group).

V Results

Following our research questions, we make a distinction between adjectival inflection and determiners. In Section 1 we first present the results of the adjectival inflection task, since this domain allows us, as discussed above, to test the predictions of the representational and the processing approach set out in respectively (6) and (7). Here we compare the child data with that of L2 adults. The results of the determiner task are presented in Section 2, where only the questions in (8) and (9) are central.

1 Adjectival inflection

Table 4 summarizes the results of attributive adjectival inflection in the contexts where a schwa is always required, that is, definite contexts and indefinite common gender contexts.

Table 4 shows that all child groups are similar, being above or close to the 90% correct criterion, irrespective of contexts.[7] This is clearly not

[7] In child language acquisition research, a correct score > 90% is a commonly used criterion for targetlikeness/full achievement of a specific linguistic variable (Brown, 1973).

Table 4 Inflection on attributive adjectives in definite and indefinite singular contexts (%) requiring schwa

	Definite common gender (e.g. *de groene appel* 'the green apple')			Definite neuter gender (e.g. *het grote paard* 'the big horse')			Indefinite common gender (e.g. *een groene appel* 'a green apple')		
	n	**schwa**	*bare	*n*	**schwa**	*bare	*n*	**schwa**	*bare
Child L1	91	**100**	0	87	**99**	1	94[a]	**100**	0
Child L1-SLI	112	**96**	4	109	**94**	6	230	**98**	2
Child L2	82	**94**	6	78	**89**	11	150	**93**	7
Child L2-SLI	91	**90**	10	81	**88**	12	183	**87**	13
Adult L2	38	**68**	32	54	**65**	35	60	**73**	27

Note: [a]Given the lower concentration span in younger children, their test contained fewer items in the indefinite contexts of adjectival inflection compared to the other groups.

the case in the adult L2 group. At first sight, this may be caused by the fact that the adult L2 learners are the least proficient group, and this error pattern might reflect an early stage. There is, however, no evidence demonstrating that child L1 and child L2 learners produce bare adjectives in the early stages of acquisition. In addition, the relatively high percentages of bare adjectives (32%/35%/27%) in the adult L2 group as opposed to both child L2 groups is in line with earlier studies on the L2 acquisition of Dutch (Blom *et al*., 2006; this issue; Weerman *et al*., 2006), which also examined more proficient L2 adults.

Table 5 presents the results of the groups regarding the special rule of adjectival inflection (5b), where a bare adjective is required in indefinite, singular, neuter gender contexts.[8] Overall, the accuracy rates in this context are low. The variation among the learner groups indicates that the acquisition of the special rule for adjectival inflection is particularly difficult for SLI and L2 groups. The adult L2 learners are not the group with the lowest performance on the special rule of adjectival inflection. At 31%, the L2 adults' use of bare adjectives is similar to the corresponding percentages in Table 4 (32%/35%/27%). This suggests that the fairly high score of bare adjectives in the adults is not related to the correct attribution of gender. Rather, adult L2 learners incorrectly use both the bare adjective and the overtly inflected adjective (schwa) in both contexts, whereas children, irrespective of having SLI or learning an L2, only tend to use schwa erroneously.

Within the child groups, the unimpaired L1 children – although only performing around chance level (55%) – make fewer errors than all the other child groups in the indefinite neuter context. The comparison

Table 5 Inflection on attributive adjectives in indefinite neuter gender contexts (%) requiring bare adjective (e.g. *een groot paard* 'a big horse')

	n	*schwa	bare
Child L1	93	55	45
Child L1-SLI	236	69	31
Child L2	149	77	23
Child L2-SLI	184	84	16
Adult L2	138	69	31

[8] In the first instance, diminutive nouns were also included in the analysis on adjectival inflection in the indefinite context. After having analysed the data, we noticed that the diminutive nouns were frequently reduced to root neuter nouns. Consequently, we excluded these data from further analyses.

between the SLI groups and the respective unimpaired groups reveals SLI effects. Statistical testing shows that the difference between the child L1 and child L1-SLI is significant ($z = -5.306, p < .001$) whereas the higher scores in the child L2 group are not significantly different from the ones in the child L2-SLI group ($z = -1.338$, $p < .181$). Significant L2 effects are found between the typically developing child L1 and child L2 groups ($z = -4.064, p < .001$) but not for the difference between the L1-SLI and L2-SLI children ($z = -1{,}378$, $p < .168$). The L2-SLI children are the least proficient child group given the percentages, suggesting a cumulative effect of L2 and SLI. We have to be careful in drawing this conclusion, however, since not all differences are significant. Note that the length of exposure to Dutch is similar for the child L1 group and child L2 group, which makes between-group comparisons even more reliable.

2 Determiners

The processing account makes predictions for gender attribution in definite determiners in the child groups (8). As discussed in Section IV, we distinguished between the use of three response categories (*de*, *het* and bare). Table 6 presents the results for the outcome for the common gender nouns (*de appel* 'the apple'), and Table 7 for Dutch neuter root nouns (*het paard* 'the horse').

Note, first, that learners hardly overgeneralize the neuter determiner *het* (between 0% and 10%) in the common gender context.[9] Both L1 groups are almost targetlike in the common gender context (93–89% accuracy) as

Table 6 Use of definite determiners with common gender nouns (%): common gender (e.g. *de auto* 'the car')

	n	*de*	*het	bare
Child L1	278	93	7	0
Child L1-SLI	348	89	4	7
Child L2	234	77	10	13
Child L2-SLI	267	71	0	29

[9] Two children per group produced the few occurrences of the neuter gender determiner *het* in the child L1 (7%) and child L2 (10%) groups.

opposed to the L2 groups, which signals L2 effects. Statistical testing shows that the L2 effects found between the child L1-SLI and child L2-SLI groups ($z = -3.287, p < .001$), and between the unimpaired L1 and L2 groups ($z = -1.820, p < .069$) are (nearly) significant.

All groups, with the exception of the unimpaired L1 children, show omission of definite determiners, although to different degrees: the child L1-SLI group uses significantly fewer bare nouns than the child L2-SLI group ($z = -3.898, p < .001$). The child L2 group takes an intermediate position, in the sense that their use of bare nouns (13%) can be compared to that of the L1-SLI children (7%), the difference, however, remains significant ($z = -2.429, p < .015$). Similarly, the fact that the unimpaired child L2 group (10%) also produces some instances of *het* as a substitute makes them comparable to the unimpaired child L1 group (7%) ($z = -2.418, p < .016$).

Table 7 presents the production of definite determiners with neuter nouns. Again, there are clear differences between the accuracy rates in the L1 and L2 groups: both L1 groups use *het* more accurately: the child L1 group outperforms the child L2 group ($z = -2.737, p < .006$), and the child L1-SLI group outperforms the child L2-SLI group ($z = -2.657, p < .008$). Significant SLI effects are also found in light of the higher error rates in both SLI groups as compared to their respective unimpaired L1 ($z = -2.359, p < .018$) and L2 ($z = -2.535, p < .011$) peers.[10]

Table 7 Use of definite determiner with neuter gender nouns (%) (e.g. *het paard* 'the horse')

	n	*de	het	bare
Child L1	266	44	56	0
Child L1-SLI	347	71	24	5
Child L2	244	68	15	17
Child L2-SLI	262	76	1	23

[10] Gender was also examined in diminutive nouns but excluded from further analysis since they were frequently reduced to neuter root nouns. It is noteworthy, however, that, overall, all learner groups performed better in attributing neuter gender when morphological cues are present (i.e. diminutives) than with root neuter nouns. The differences between the two conditions are in most cases approaching significance: for the child L1 group 85%/56% ($z = -1.917, p < .055$); for the L1-SLI group 48%/24% ($z = -3.051, p < .002$); for child L2: 29%/15% ($z = -1.820, p < .069$) and for the child L2-SLI group: 6%/1% ($z = -1.439, p < .150$).

It may seem that the L2 effect is stronger than the SLI effect, given that the unimpaired L2 children produce more errors (85%) than the L1-SLI group (76%). The differences are not significant, however ($z = -.237$, $p < .812$). In addition, we should note that there are considerable differences in the length of Dutch exposure between both groups (Table 2: child L2: 63 months; child L1-SLI: 87 months).

With respect to error patterns, we find the same tendency as in the common gender context (Table 6): both child L1 groups only substitute the default gender *de* for neuter *het*, whereas the L2 learners also frequently produce bare nouns. Statistical testing reveals that the L2 and L2-SLI groups produce significantly more bare nouns than the respective L1 ($z = -5.562$, $p < .001$) and L1-SLI groups ($z = -3.486$, $p < .001$). In the light of the fact that the occurrence of bare nouns is characteristic of early stages in development, both child L2 groups seem delayed in their acquisition of gender agreement.

VI Conclusions and discussion

In this study, we examined the acquisition of Dutch gender agreement in attributive adjectival inflection and definite determiners in different groups of learners: typically developing L1 children, L1-SLI children, impaired and unimpaired L2 children. For adjectival inflection, adult L2 learners were also included. The first language of all L2 groups is Turkish. The goal of this study was to contribute to the theoretical debate concerning whether SLI is caused by linguistic-representational deficits or by general processing problems. Moreover, we addressed the question of age dependencies on grammatical rule learning. We also hoped to shed light on the relative weight of SLI and L2 acquisition in acquiring gender agreement.

As discussed in Section III, the two approaches to SLI predict a different division of the groups examined in our study. On the assumption that the acquisition of agreement is age dependent, and that SLI entails a deficit in the representation of the agreement system or in procedural memory, we expect the impaired groups to pattern with the L2 adult learners in adjectival inflection (profile 3 of Table 1) and to be different from the corresponding unimpaired child L1 and child L2 learners (6).

This prediction is clearly not confirmed by our data. We find no profound differences in error patterns between the impaired and unimpaired

child populations: all children robustly overgeneralized the schwa ending in adjectival inflection but not the bare adjective. As opposed to the children, the adult L2 learners produced both error types frequently in adjectival inflection. This is in accordance with the idea that age effects play a role in the acquisition of agreement. One way to explain this finding is, following Ullman (2001b; 2004), that access to procedural memory is different after puberty. The fact that all child groups show the same error type is more in line with the processing approach (7).

If we follow the idea that processing capacities are the crucial distinction between the impaired and unimpaired groups, the intake of both SLI groups should be relatively poor. The result is a delay and, thus, a higher error pattern as compared to their unimpaired (younger) L1 and L2 peers, as noted in (8a–b) repeated here as (12).

12) a. The error rate in child L1-SLI > child L1.
    b. The error rate in child L2-SLI > child L2.

The data strongly support the hypotheses in (12a) and (12b): Both SLI groups produce a higher omission rate of definite determiners, more overgeneralization of the common determiner *de* in neuter contexts and more schwa overgeneralization in adjectival inflection where bare adjectives – in accordance with rule (5b) – are required.

As to the impact of reduced intake of Dutch in the child L2 learners, we also expected the L2 groups to be delayed as compared to their corresponding L1 peers (8c–d), repeated here as (13).

13) a. The error rate in child L2 > child L1.
    b. The error rate in child L2-SLI > child L1-SLI.

Again, the hypotheses in (13a) and (13b) are confirmed: both L1 groups outperform the corresponding L2 groups by using fewer bare nouns and producing higher scores with the neuter determiner *het* and with bare adjectives. These results are possibly unsurprising considering the differences in length of exposure for the L1-SLI children (87 months) and the L2-SLI children (62 months). On the other hand, the child L1 group (59 months) and the child L2 group (63 months) have similar lengths of exposure (Table 2). Despite this difference, clear group differences show up, suggesting that the Dutch input/intake in the L1 and L2 groups is indeed different.

What about a cumulative effect of SLI and L2 in our L2-SLI group? As discussed in Section III, we expected the L2-SLI children to show a double delay, that is, they should make more errors in both domains than all the other child groups. It turned out that indeed their gender system is highly restricted, if not non-existent: the L2-SLI children do not distinguish between neuter and common determiners, and barely show any sign of applying rule (5b). Consequently, it seems that the L2-SLI children perform better in the common gender conditions, but this is in fact only a side effect of overgeneralizing *de* and the schwa ending in adjectives.

Let us finally turn to the question in (9) on the relative impact of SLI and L2 on the acquisition of gender agreement, repeated in (14).

14) Is the error rate in child L1-SLI > child L2 or is child L2 > child L1-SLI?

As argued in Section III, one way to tackle this problem is by comparing the child L1-SLI group with an unimpaired child L2 group. The results reveal that in nearly all conditions the L1-SLI children perform significantly better than their unimpaired L2 peers, suggesting that the reduced intake in the L2 children has a more significant impact than the processing deficit in SLI. What makes this outcome possibly less surprising is that the L2 children in our experiment had considerably less exposure to Dutch than the L1-SLI children (Table 2). Clearly, this complicates the comparison between L1-SLI children and L2 children; future research will need to match these two groups on this variable to address this question in full.

There is, however, one striking case where both groups are comparable, namely in the inflection of bare adjectives: The observation that the L1-SLI children (69% errors) have great difficulty in acquiring (5b), as compared to the L2 children (77% errors), who have had less exposure to Dutch, suggests that this is indeed an SLI marker. The low accuracy in the L2-SLI children (84% errors) – having the same length of exposure to Dutch as the unimpaired L2 group – provides extra evidence that deducing the grammatical rule in (5b) is problematic in SLI. In Table 1, we saw that a later stage of typical child L1 acquisition is characterized by profile 1: correct use of both the bare adjective as well the inflected one. The data presented here suggest that the other groups may indeed fail to acquire this profile. In other words, they

might end up with an incomplete adjectival system without rule (5b) of the target.

There is, however, one caveat to be made when considering the acquisition of (5b). If a learner incorrectly inflects the adjective in *een grote glas* 'a big glass' (the correct form being *een groot glas*), there are two possible causes for this error. One option is that the learner has not acquired (5b). It might also be the case, however, that the learner assumes that *glas* 'glass' is common gender. If so, the inflection of the adjective would be correct, although, of course, the gender would not be in accordance with the Dutch standard. In order to see to what extent one of these options is correct, we related the outcome of the determiner task and the adjectival inflection task, that is, for the adjectival inflection task we based ourselves on the gender attributed by the learner in the determiner task. If a learner consistently combined *het* or *de* with a particular noun, we considered it as a stable neuter noun or stable common noun, respectively (recall that all nouns were tested three times for gender).

If we carry out this procedure, it turns out that the number of stable neuter nouns is relatively small. Since neuter is apparently the marked gender as we saw in Section V, this result is not surprising. The unimpaired younger L1 children show considerably more stable neuter nouns than any of the other groups. In most cases, they correctly use the bare adjective. This suggests that these children have already acquired (5b) and that it is the number of stable neuter nouns that develops (Blom *et al*. 2006; this issue). For the child L1-SLI, child L2 and child L2-SLI groups, the number of stable neuter nouns is too low to draw any firm conclusions. Whether or not these groups will eventually acquire (5b) is thus uncertain, and we leave this for further research.[11]

Our study confirms that agreement relations are vulnerable in SLI, as has already been stated by various studies on verb agreement. In general, it seems that in verb agreement the SLI and L2 children make the same mistakes as the unimpaired younger groups, the difference being quantitative in nature. The L2 children catch up with their unimpaired L1 peers in verb agreement rather quickly (Blom *et al*., 2006). Although all children are indeed comparable to and different from the adult learners

[11] The consistency procedure has no effect on the asymmetry we found for adult and child learners in Section V. Adults overgeneralize both bare adjectives and schwa in adjectives although they barely produce stable neuter nouns.

in our study on gender agreement, it is unclear if the SLI and L2 groups (and, of course, the L2-SLI children) will indeed eventually acquire the same agreement system as the L1 children.

As argued above, our results support the idea that SLI can best be understood in terms of factors that influence the intake rather than in terms of grammatical principles to which the children may or may not have access. Nevertheless, the delay caused by SLI may be so severe that certain rules may not be adequately acquired in the period in which grammatical principles are readily available. Interestingly, here the two different approaches to SLI meet each other. At the point where learners are no longer in the critical period, they both predict that learners must depend on other strategies to deal with the input. This does not mean however that we cannot empirically distinguish the two approaches. On the processing approach, the early stages of SLI learners should be different from those of the adult learners. That part of the system acquired by the SLI children in the early stages is, however, likely to have an effect on the output in later stages. This seems to be the case in Dutch adjectival inflection. On a representational approach, on the other hand, SLI learners should be similar to adult learners from the start.

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