Chapter 3

Research aims and questions and some notes on subject-verb agreement

3.1 Research aims and questions

The studies presented in this thesis have been undertaken to explore sensitivity to subject-verb agreement in developmental dyslexia, measuring performance on behavioural tasks and measuring neurophysiological responses. As has been discussed in the foregoing chapter, the language basis of developmental dyslexia has recently become more and more the focus of attention. With the discovery that dyslexia is hereditary, sophisticated longitudinal studies have been developed, enabling a detailed description of the pattern of linguistic development of a dyslexic child before the main symptom—the reading deficit—surfaces (cf. Koster et al., 2003; Lyytinen et al., 2001; Scarborough, 1990; 1991). Such studies point to delays in several areas of language development, including inflectional morphology, but the nature and the extent of the problems are as yet not clear. The experiments that will be described in the following chapters have been carried out to address the following aims and questions.

Firstly, this study aims to contribute to the existing evidence on syntactic deficits in developmental dyslexia by providing empirical data on the sensitivity to subject-verb agreement in dyslexic subjects—kindergarten children, 8 year olds and adults—, which are needed for a linguistic typology of developmental dyslexia.

Secondly, the data on subject-verb agreement morphology will be analysed to review three main hypotheses that have been outlined in chapter 2:

1. Morphosyntactic problems are the result of a difference in exposure to written text between dyslexic subjects and normally reading subjects.

2. Morphosyntactic problems are epiphenomena of deficits outside the syntactic system that underlie the reading problems observed in developmental dyslexia. Auditory perceptual difficulties (Joanisse et al., 2000) and/or an impairment in phonological awareness (Joanisse et al., 2000) and/or limitations in verbal
working memory (cf. Smith et al., 1989; Crain & Shankweiler, 1990; Bar-Shalom et al., 1993) have been assumed to interfere with grammatical processes.

3. Morphosyntactic problems are the result of a delayed or impaired development of the grammatical system (Byrne, 1981; Waltzman & Cairns, 2000) and are unrelated to the presence of phonological deficits. Such grammatical problems may interfere with the process of reading development.

Alongside a grammaticality judgement task tapping sensitivity to subject-verb agreement information, different measures of speech perception and phonological ability (phonological awareness, rapid naming and verbal working memory) will be presented to investigate a possible relation between phonological and grammatical disorders to review the hypotheses in (2) and (3).

The questions that will be addressed in chapter 4 are:

4. Can children at risk for developmental dyslexia be differentiated at pre-reading age from control subjects on the basis of phonological awareness, letter knowledge, rapid naming and sensitivity to subject-verb agreement?

5. Are results on the tasks measuring phonological awareness, letter knowledge, rapid naming and sensitivity to subject-verb agreement administered at kindergarten-age related to reading achievement after a year of formal reading instruction?

Chapter 5 studies children with developmental dyslexia of around 8 years of age. The main questions of the first experiment in chapter 5 are:

6. Are children with developmental dyslexia as sensitive to subject-verb agreement morphology as normally developing children?
7. If this is not the case, is decreased sensitivity to agreement morphology a consequence of a lag in reading experience?

Another aim of this thesis is to investigate the idea that developmental dyslexia and SLI are two manifestations of one disorder. Morphosyntactic deficits are typically present in the language of children with SLI. Recent studies have demonstrated language delays/deficits in developmental dyslexia, suggesting an overlap in symptoms of language deficits in dyslexia with those of children with SLI. This suggestion has led to a discussion on the justification of distinguishing these two syndromes. A central question in this debate is whether dyslexia and SLI should be viewed as two symptoms of one underlying deficit, or whether dyslexia and SLI are indeed two separate syndromes with distinct underlying mechanisms. One way of addressing this issue is submitting the same tasks to both groups, so that it can be investigated whether the two groups of children show an overlap in their task performance. In chapter 5, performance of the dyslexic children will be compared directly to that of children with SLI. Questions that will be addressed in chapter 5 are:

8. Is the level of sensitivity to agreement morphology of children with developmental dyslexia comparable to that of children with SLI?

9. Are agreement deficits in both experimental groups related to impairments in auditory perception, phonological awareness and verbal working memory?

10. What do the data tell us about the relationship between subject-verb agreement, auditory perception, phonological awareness, verbal working memory and word decoding/recognition skills?

Finally, neurophysiological responses to verb inflection violations have been well documented in normally reading subjects. In chapter 6, the properties of the P600 component (reflecting syntactic revision/repair) and an early negativity (ELAN) will be explored in a group of dyslexic adults and compared to normally reading controls to get insight into patterns of brain behaviour relative to processing syntactic information. The main question of that chapter is:
11. Do adults with developmental dyslexia differ from normally reading adults with respect to the P600/ELAN components?

3.2 Some notes on subject-verb agreement in Dutch

A verb needs to ‘agree’ with the subject of the sentence, which means that the verb form is related to the features of the subject, that is, person (first, second or third person), number (‘singular’ or ‘plural’) and gender (‘masculine’, ‘feminine’ and ‘neuter’) of the subject. In Dutch, the language that is studied in the experiments, only the person and number status of the subject play a role in the agreement marking of the verb.

Dutch is generally viewed as a Subject-Object-Verb (SOV) language (Koster, 1975, but see Zwart (1993) for an alternative approach) with the verb in final position in a subordinate clause (see example 1a) and with verb-second in a matrix clause (see sentence 1b). The movement of the lexical verb to the second sentence position is related to finiteness: a finite verb is in second position in a matrix clause, or in the first sentence position in the case of a yes-no question; compare 1b–c:

1a. Omdat Maartje een ijsje eet (V fin.)
because Maartje an ice-cream eats

1b. Paulien eet (V fin.) een koekje
Paulien eats a biscuit

1c. Eet (V fin.) Paco een boterham?
Does Paco eat a sandwich?

According to the Minimalist Program (Chomsky, 1995), the finite lexical verb moves to the second sentence position in order to check Tense (T) and Agreement features (AgrS for agreement with the subject; AgrO for agreement with the object). The movement of the verb can be overt (at Surface-level) or covert (at Logical Form (LF)). Overt movement of the verb is triggered by strong features of T and AgrS. If these features are weak, the movement takes places covertly. As has been shown above, in Dutch there is overt

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1 Or the first position in questions (see 1c).
movement of the verb indicating that the features of T and AgrS are strong. An example of a language with covert verb movement is English. In this language, do-insertion takes place in for example questions, as the verb does not move overtly to the first sentence position (see example 2).

(2). Did Mary kiss John?

Verb movement to check features of T, AgrO and AgrS can be depicted in a tree diagram, see Figure 1 below.

```
AgrSP
    Spec    AgrS'
       /     /       \
  \     \     \       \
  Paco_k AgrS    TP
       /     /       \
  eet_i T'

Figure 1. A tree diagram of the sentence ‘Paco eet een boterham’.
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The inflectional paradigm for present tense in Dutch is presented with the example of the verb *lopen* (inf.; to walk) in Table 1. Note that in Dutch, the plural verb form is similar to the infinitival.

### Table 1. Inflectional paradigm for Dutch present tense.

<table>
<thead>
<tr>
<th>Present Tense</th>
<th>Singular</th>
<th>Plural</th>
</tr>
</thead>
<tbody>
<tr>
<td>First person</td>
<td>Ik loop</td>
<td>Wij lopen</td>
</tr>
<tr>
<td>Second person</td>
<td>Jij loopt / loop jij</td>
<td>Jullie lopen</td>
</tr>
<tr>
<td>Third person</td>
<td>Hij/zij loopt</td>
<td>Zij lopen</td>
</tr>
</tbody>
</table>

Three types of subject-verb agreement violations are tested in the grammaticality judgement task presented in this thesis: (a) a singular noun as subject linked to a verb stem [V-]; (b) a singular noun as subject linked to a verb with the verb stem with the /en/ morpheme added [V + -en] and (c) a plural noun as subject linked to a verb which has a stem plus the /t/ morpheme added [V + -t].

The status of the surface verb forms in (a), (b) and (c) are ambiguous:

- (a) and (b) either represent faulty agreement morphology (the verb forms in (a) as inflected for the first/second person and in (b) inflected for the plural)
- or (a) represents omission of the agreement feature with the verb form as the verb stem
- or the verb form in (b) represents an infinitive with both agreement and tense features missing
- the verb form in (c) represents the third person singular, or the second person singular

This ambiguity of the inflected verb form does not have repercussions for interpreting the experimental data as evidence for the ability to discriminate between grammatical sentences and sentences in which subject-verb agreement is violated: the judgement task probes sensitivity to the well-formedness of agreement morphology and any interpretation of the verb forms will test just that.