Specific language impairment in Dutch

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2. Specific Language Impairment

2.1 Introduction

Over the years, various disciplines have proposed explanations for specific language impairment in children. Depending on the point of view that the researcher took, different aspects of the disorder have been considered. In this chapter a review will be given of the SLI literature.

Because this study will focus on inflectional morphology and argument structure, the linguistic explanations for SLI, or for the symptoms of (grammatical) SLI, will be emphasised. It will become clear that there is much debate on how the morphosyntactic symptoms of SLI are best explained. The literature provides less evidence for problems with verb argument structure. Also, fewer theoretical explanations anticipate difficulties in this area. The purpose of the present chapter is to explore what predictions and research questions are justified by the literature so far.

2.2 Specific language impairment

2.2.1 Definition

Specific language impairment (SLI) to date has been defined by exclusion. SLI is a language impairment in children that is not caused by a perceptual handicap, by intellectual deficits, a peripheral motor disorder, a frank neurological dysfunction, or by emotional or behavioural problems (Stark & Tallal, 1981). The measure of language delay adopted in the Stark and Tallal (1981) criteria - scores on language tests should be one year delayed, based on the means of production and comprehension measures; in addition, for expressive language there should be a delay of at least twelve months and for receptive language at least six months - is not always respected by researchers: children with an exclusively expressive disorder are often included in the SLI population. The discrepancy between language and overall development (often defined as a discrepancy between the verbal and nonverbal tasks in an intelligence test), however, is a part of almost every definition of SLI\(^1\) and the exclusionary criteria are essentially acknowledged.

One exception is worth mentioning. Bloom and Lahey (1978) in their influential book rejected exclusion. In their way of thinking, the language characteristics override the causal determinants. To quote one of their definitions: "the term language disorder will

\(^1\)See Fey et al. (1994) for a discussion on the arbitrariness of the boundary between SLI and mental retardation in children who are in the borderline IQ range.
be used here as a broad term to describe certain behaviors, or the lack of certain behaviors” (Bloom & Lahey, 1978: 290). Their taxonomy (content-form-use) abstracts away from clinical categories. SLI is not a clinical category in their book anyway, unexplained as it is by etiology. But more importantly, clinical categories do not guide their behaviour-based approach in the first place.

To return to the exclusion criteria, it should be stressed that a child is only called specifically language impaired insofar as no etiology can be established. Whether the language impairment is the primary disorder can never be ascertained, whereas a secondary language disorder can be verified, save for misdiagnosis. The SLI label always remains susceptible to counterevidence. It is to be expected that advanced technology will exclude more children from the SLI population by identifying causes that extend to language (De Jong, 1996).

The definition of SLI results in a heterogeneous population because it excludes rather than includes children. It fails to specify what the common nature of the impairment is. Not every researcher takes this situation for granted. According to Tomblin (1996), more effort should be taken to test the validity of the SLI label. He criticises the fact that descriptions of SLI “do not require certain features of language to be impaired, rather, any deficits (...) are likely to lead to a diagnosis of language impairment” (Tomblin, 1996:192).

2.2.2 Symptoms of SLI

While definitions of SLI do not contain a specification of the nature of the language problem, some symptoms are more dominant than others. SLI is strongly associated with morphosyntactic difficulties, especially the comprehension and production of grammatical morphemes. These symptoms will be described in section 2.5. Also prominent are phonological restrictions. Quite often, language-impaired children suffer from verbal dyspraxia as well, but phonology may also be disordered at a more abstract, nonpraxic level (Beers, 1995). Lexical problems (in word storage and word access) constitute another symptom that has been described in the literature (for a review, see Johnston, 1988). Pragmatic problems may be apparent as a secondary effect of deficits in language form. Several authors claim a separate (semantic-) pragmatic disorder, though this claim remains controversial and pragmatic disability is now sometimes seen as part of the autistic spectrum. In this study I will start from the linguistic view which holds that there is a substantial subgroup of SLI children whose problems lie mainly within morphosyntax, but I will broaden that view by adding argument structure to the range of their potential weaknesses.

2.3 Approaches to SLI

SLI has been studied by several disciplines. These professions have all contributed their own points of view as well as their biases, and their own methodologies and orthodoxies. Several explanations of SLI have been proposed. Concepts and theories from theoretical and clinical linguistics will serve as the guideline for the present
Specific Language Impairment

study. The investigations to be reported here fit in with a tradition that seeks to apply linguistic tools to help explain the nature of SLI (cf. Hansson, 1997). Before marking out the linguistic approach, a bird's eye view is given of approaches that search for explanations outside the core linguistic system.

2.3.1 Terminology

Through the years, language disorders in children have successively been viewed in different ways. The way our conceptions of SLI have changed can be illustrated by looking at the titles of some general books on SLI. In 1972, Rutter and Martin edited a volume entitled *The child with delayed speech*. In his contribution to the book, T.T.S. Ingram distinguishes a group of 'specific developmental speech disorders' that roughly corresponds to SLI. Admittedly, the ambiguity of the term 'speech' was recognised at the time - several authors mentioned speech and/or language problems. However, the more common label included the word 'speech' rather than 'language'. In 1978, Wyke edited a collection of articles, *Developmental Dysphasia* (previous researchers had coined the names 'aphasia in childhood' (Ewing) and 'developmental aphasia' (Eisenson)). Recent titles are *Specific speech and language disorders in children* (Fletcher & Hall, 1992) and *Specific language impairments in children* (Watkins & Rice, 1994). First of all, the ambiguous term *speech* as a cover term for articulation and language disorders has been replaced consistently by more specific labels: articulation disorders are recognised not to be synonymous with language disorders. Secondly, *delay* was substituted by *dysphasia* or *specific* impairment. This change highlights the fact that the disorder does not show an even language profile in which all components are lagging behind equally. Finally, the term *dysphasia* has been rejected by many authors because it suggests a connection to (acquired) aphasia and thus to suspected brain pathology. This connotation has been avoided in recent literature, although the label *developmental dysphasia* remains popular with some authors (Blanken et al., 1993; Gopnik, 1990b; Clahsen, 1991; Njiokiktjien, 1987; Grimm & Weinert, 1987). Currently, the label *specific language impairment* is most often used. This term is neutral. It does not reflect any etiologic hunch; it merely points at the most obvious behavioural abnormality exhibited by the children it applies to.

Successive research traditions have changed the way we look at language disorders. They will be presented here in a chronological order, but none of them can be referred to in the past tense: each tradition continues to contribute to the field of language pathology.

2.3.2 The search for causes: the medical model

When language impairment in children was first recognised, the medical model dominated diagnostic and therapeutic approaches to the disorder. This model demanded that language disorders be approached categorically. Each type of disorder was to be matched by a clinical category, defined by a singular cause. If such a point of view is taken, the linguistic characteristics of the disorder are irrelevant to the planning of treatment. Identification of a cause should suffice for selecting an
intervention strategy, or conversely for justifying non-intervention. If the cause could be found, linguistic symptoms should be curable accordingly. Bishop and Rosenbloom (1987) plotted etiologic and behavioural categories in a two-way classification of language disorders. In their matrix, linguistic characteristics were matched to medical causes. Obviously, the matrix included language disorders with a clear medical etiology. Mental retardation, hearing deficits, chromosomal abnormalities can all influence linguistic proficiency in children in a fairly predictable way. However, in Bishop and Rosenbloom's table the more specific language problems fall under the heading aetiology unclear. This is exactly where the medical model falls short. Where the cause is not clear, the way to intervention is closed. The medical model cannot deal with 'causeless' disorders.

It is not always certain what constitutes a cause. One etiologic explanation of SLI that has always had its supporters is the occurrence of otitis media with effusion (OME). Stark and Tallal (1981) excluded children with recurrent episodes of OME from their SLI population, because they felt they could not be sure that the language disorder was independent of the otitis. Not many authors follow this guideline. Although OME is a clearly detrimental factor, controversy remains over whether there is a causal link between OME and SLI. Bishop, after reviewing the literature about the contribution of OME to language disorder, concludes that "middle ear disease is not an adequate general explanation for the cause of SLI" (Bishop, 1997b:46).

Tomblin (1996) lists a number of epidemiological risk factors (or antecedents: Robinson, 1987) that are associated with the occurrence of SLI. These factors accompany many case descriptions of SLI and it is possible (though the evidence is not conclusive) that they are causally related to the disorder. The most obvious factors that Tomblin includes are: gender ("males are more liable for SLI than are females", Tomblin, 1996:198; ratios in the literature vary between 3:1 and 4:1) and familiality (SLI often concentrates in families). These epidemiological patterns are circumstantial evidence for the genetic transference of the disorder (see section 2.3.3).

Frustrated by the lack of diagnostic evidence for causal factors in many individual children, some authors have resorted to linguistic description of symptoms as a tool for diagnostics and intervention. In the absence of identifiable causes, a direct clinical purpose is served by an analysis of the language that the child has at its disposal (Bloom & Lahey, 1978). In a more fundamental way, it has also been suggested that the language performance of children with SLI falls within normal distribution, albeit in the lower percentiles of the population. According to this rationale, investigating causes would by definition prove redundant (Leonard, 1991). I will return to this position in section 2.3.6.

2.3.3 The search for causes: new developments

Recently, the search for causes has been resumed, partly encouraged by new techniques like functional magnetic resonance imaging (fMRI) and positron emission tomography (PET). As a consequence, the original scepticism about the value of etiologic research efforts has diminished. The investigation of causal factors that could contribute to SLI is expected to benefit from progress in technology. New instruments for brain cartography and for measuring brain activity may well prove to illuminate
Specific Language Impairment

children's functioning. Plante and her colleagues (Plante, 1991; Plante et al., 1991; Plante, 1996) have done pioneering research in morphometry and in the monitoring of brain activity. The results are equivocal. Plante found a high degree of symmetry for the right and left planum temporale where asymmetry is common. Such a lack of asymmetry, however, is also seen in some normally developing children and is not necessarily predictive of SLI. In general, so far, it is not clear that membership of the SLI population predicts with any confidence how the child's brain will look and how brain activity will be different from that seen in normals. Nevertheless, it is to be expected that, as research on suspected causes of SLI makes advances, the core population of children with SLI will become smaller as a broader range of secondary language disorders is identified.

In addition, attention is drawn to the exploration of genetic antecedents for language impairment (of course this interest and the interest in brain atypicalities overlap). The observation that SLI often 'runs in the family' has been substantiated by studies of families with a high concentration of language disorders (Tomblin, 1989; Gopnik & Crago, 1991; Bishop, 1992b; Matthews, 1994). In particular the study of a London family half of whose members (spanning three generations) showed evidence of specific language impairment was a major incentive for investigations of the relationship between SLI and genetics (Gopnik & Crago, 1991; Pembrey, 1992; Vargha-Khadem et al., 1995). A different type of research tradition that has similar implications concentrates on the language of twins. Bishop (1992b) found that when language-impaired twins belonged to a monzygotic pair, their twin brother or sister was bound to be language-impaired more often than if the twins were dizygotic. Tracing back all incidences of SLI to hereditary transmission is premature. There may even be a genetic subtype of SLI, with a distinctive symptomatology (Van der Lely, 1993). In a recent collection of papers (Rice, 1996) the genetic study of SLI gets a boost. In order to assist geneticists' search for the genotype of SLI, linguists initiate attempts to determine a solid phenotype of the disorder. Although there are more aspects to the phenotype (for instance, epidemiological risk factors like gender of the child, familiality), linguists primarily equate a phenotype of the disorder with a clear diagnostic marker of SLI.

Whether linguistic research will soon lead to the identification of a phenotype marker is questionable. Pennington (1986; cf. Shriberg et al., 1997) draws a fundamental distinction between a phenotype marker and a diagnostic marker. Pennington proposes five requirements that phenotype markers must fulfil (the criteria here are quoted from Shriberg et al., 1997:287):

1. the marker must be expressed in all genotypes that code for the disorder.
2. the marker ideally is bimodal, so that family members can be identified as affected or nonaffected.
3. the marker must be present in all individuals who meet standard diagnostic criteria and in some but not all of their relatives who do not.
4. the marker must have a 'logical and potentially causal' relation to the full-blown disorder.
5. the phenotype marker should ideally involve only a single test or trait.
One diagnostic marker that has been proposed - and that will be discussed in more detail underneath - is related to the Optional Infinitive (OI) stage (Wexler, 1994). In this developmental stage children do not regard the marking of finiteness on the verb as obligatory. According to Rice and her colleagues (Rice et al., 1995; Rice & Wexler, 1996a, 1996b) an extended version of this normal stage (the Extended Optional Infinitive stage: EOI) can be taken to be a clinical marker of SLI: children with SLI are characterised by their continuing inconsistency in the marking of tense.

Going by Pennington's criteria, it is easy to see that EOI - the diagnostic or clinical marker - cannot simply be equated with a phenotype marker for SLI. The nature of SLI itself predicts that the differences between affected and nonaffected individuals, for any given trait, will be proportional rather than absolute. Thus, it is not the case that children can simply be marked as affected or unaffected on the basis of their use of a grammatical marker (criterion 2) and a simple test that the child can pass or fail is not available (criterion 5). The measures are typically formulated as arbitrarily chosen percentages of use in obligatory contexts. This particular symptom is also not easy to relate to co-occurring symptoms - if one wants to account for accompanying symptoms at all (criterion 4). Finally, the marker does not characterise the entire population (criterion 1) although there is an overlap with the performance of nonaffected individuals (Lahey et al., 1988), so perhaps the OI marker can meet criterion 3.

I will not go into the details of the EOI account until later (section 2.6.9). The point to be made here - and the EOI has served as an illustration because it has been claimed explicitly to be a clinical marker of SLI - is that SLI is a heterogeneous disorder that is not easily straitjacketed into a phenotype. There may be an underlying fallacy inherent in the search for SLI markers to begin with: that a multidetermined disorder is conceived of as unitary (Miller, 1996). Also, it must be reiterated that if EOI is a marker of SLI at all, it is a marker of the subtype of SLI in which grammatical symptoms predominate (2.4).

Locke (1994) put forward an explanation for SLI that started from the assumption that the impairment has a genetic basis. His article does not present empirical evidence but rather attempts, in an essayistic way, to make sense of some contradictory findings encountered in the literature on SLI. A major contradiction is that many SLI children, while exhibiting the linguistic symptoms that mark their disorder, also fall short of controls when they are tested on certain tasks that are not linguistic and that sometimes are not even related to linguistic ability. Evidence of cognitive shortcomings beyond language has been presented by Johnston and her colleagues (see Johnston, 1992; 1994).

Support for the validity of unmarked verb forms as a hallmark of SLI comes from a recent study. In an attempt to find a variable that distinguishes between children with SLI and typically developing children, Bedore and Leonard (1998) performed a discriminant function analysis. Grammatical morphology - operationalised by a verb morpheme composite - proved to be the most sensitive measure. It predicted membership of the SLI group with a high degree of accuracy. The composite consisted of regular past tense affix -ed, third person singular -s and copula and auxiliary be forms. Omission of these elements was identified with the SLI children. These findings are in line with the Fletcher & Peters (1984) study.
Locke acknowledges the considerable amount of data that suggests that children with SLI have deficits beyond the linguistic capacity. He draws up a model that relates the linguistic delay to the nonlinguistic symptoms. Assuming, as Locke does, that genetic determinants, together with early experience, result in atypical brain development, two patterns are possible: cortical maturation may simply be slower or neuro-anatomical differences from normally developing brains may come into being in impaired children (cf. Plante, 1991; Plante, 1996). In both cases, the outcome of atypical brain development may logically affect nonlinguistic capacities as well as language skills.

2.3.4 Underlying processes explaining SLI

The original medical model was followed by what Bloom and Lahey (1978) called a 'specific abilities orientation'. For want of well-established etiologic causes alternative explanations were offered. Considering that language skills depend to some extent on other functions, the search for causes changed its perspective from medical causes to processes (perceptual, cognitive, motivational) that, if they are deficient, implicate language (of course, these deficits in turn may have medical causes, even though they are not identified). This tradition continues to spawn research until the present day.

Bloom and Lahey (1978) listed auditory sequential memory, use of temporal cues and the processing of multisensory input as 'specific abilities related to language disorders'. They reviewed these factors critically and remained sceptical as to the importance and also the discreteness of these processes.

Auditory processing, especially of short sequences that are presented rapidly, has been shown repeatedly to be limited in children with SLI. Tallal and her colleagues have demonstrated this vulnerability in a number of experiments. In the most classic of their investigations (Tallal & Piercy, 1973), they presented two sounds and asked children to identify which sound came first or last and, in another task, whether the sounds were similar or different. Children with SLI were sensitive to two variables: the length of the inter-stimulus interval and the length of the stimulus (this was true for nonverbal stimuli as well). Their poor performance was reflected in a higher number of errors and a longer reaction time. Recently, Wright et al. (1997) have drawn attention to the importance of another factor that influences performance in this task: the possibility of backward masking of the first stimulus by the second one. Processing the most recent stimulus would obscure children's memory of the preceding one (a phenomenon that had already been anticipated by Bishop, 1992a). Lately, there has been a lot of attention for an extension of the research on rapid auditory processing. In these new studies, the previous assumptions were tested in a therapeutic context (Merzenich et al., 1996; Tallal et al., 1996; Tallal, 1997). Speech was modified acoustically to lengthen the stimuli, to increase the inter-stimulus interval and to amplify the transitions. Children with SLI performed better under these conditions. By subsequently training the children with stimuli that were more and more like the rapid signals that are immanent in natural speech, the therapy effect was generalised. The first results were impressive. The training software (named FastForword) is now available for use in therapy. Critics argue that it is not yet quite clear which ingredients
of the program are the effective ones and consequently at which level the child is assisted by them (Bishop, 1997a; Rice, 1997).

Gathercole and Baddeley (1990) blamed a limitation of short term phonological memory for many children's language problems. They located the deficit in the 'phonological loop'. The term derives from Baddeley and Hitch's (1974) model of working memory. The main component of that model is the 'central executive', that is assisted by two 'slave systems' one of which is the phonological loop which 'maintains verbally coded information'. Gathercole and Baddeley's finding that the phonological short term memory in children with SLI is inadequate was refuted by Van der Lely and Howard (1993). A key point of criticism was that Gathercole and Baddeley's subjects were assessed by measuring knowledge of single words, which represents an area that is rather well-preserved in children with SLI (the dependent variables were taken from similar linguistic sources). In Van der Lely and Howard's own research, in which grammatical rather than semantic performance was the independent variable, no short term memory deficit was found among the language-impaired individuals.

Gathercole and Baddeley (1993) acknowledged the grammatical deficit and checked potential explanations for it. One is that each symptom has an independent cause, another that phonological working memory affects separate aspects of language proficiency independently. A third one is in line with the importance these authors attribute to lexical skills: they propose "that vocabulary knowledge is pivotal to any aspect of language use (...) Individual words represent the building blocks of language, and without understanding of these units the higher-level aspects of language processing cannot proceed" (Gathercole & Baddeley, 1993:65).

Before we move on to the linguistic explanations of SLI, it is important to note that within accounts of SLI that employ medical categorisations or accounts that refer to abilities underlying linguistic faculties, the linguistic predictions that follow from the presumed cause are not always specified. Predictions are often of a general nature and, if so, the symptoms cannot be deduced from them.

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3Van der Lely and Howard's criticism would also harm other explanations that depend crucially on lexical skills. Locke's work (Locke, 1994) is an example: Locke builds up his explanation from the assumption that the difficulties originate (linguistically, that is) in lexical knowledge, after which other components fail accordingly. For authors who consider the grammatical deficit contained in SLI to be the core of the impairment (Van der Lely is a declared supporter of this position) the main difficulty is located in the grammar itself.

4It is possible to link this image to Leonard's (1989) attempt to define the learnability problem that children with SLI face. I will return to Leonard's explanation of SLI later. In his account these children are unable to readily acquire morphological paradigms. Because the surface characteristics of grammatical morphemes increase the processing load, cells in the targeted word structure template (Pinker, 1984) are not filled. Instead, children stick to word-specific paradigms that they give up reluctantly. It can be argued that a certain number of lexical items have to be acquired for morphological analysis to happen (in normal acquisition, it has been argued that the verb lexicon needs to reach a 'critical mass' before inflectional morphology becomes productive; Marchman & Bates, 1994). In this way, delay in the acquisition of lexical material may be connected to morphological delay. However, this position would gain strength if difficulties in morphological marking were mirrored by a similar delay in lexical development. Judging from the evidence reported in the literature, it seems that lexical development is affected by SLI to a lesser extent than morphosyntactic development is.
2.3.5 Intermezzo: what kind of explanation is given?

When we think about explanations for SLI, it is important that we distinguish between different levels of explanation (and of causation). The identification of an etiology informs us about the cause of the disorder. In other words, it explains the *existence* of the disorder. What it does not necessarily do is explain the *form* that the disorder takes. A linguistic explanation, on the other hand, intends to do precisely that. But then again a linguistic explanation, while it draws our attention to the way the symptoms pattern, does not explain why a language disorder develops in a child in the first place. Then there is the approach by which skills are explored that are prerequisites for language and that, when impaired, may affect language ability adversely. This approach is situated halfway the medical-linguistic scale. It does not explain the existence of the disorder, though it may bring us closer to an explanation, and it may come up with a dysfunctional process that differentially affects separate language skills. Njiokiktjien (1987) proposes a distinction between etiology per se and pathogenesis. The latter is not unlike what I have called a deficit in an underlying process above.

The debate on the origins of SLI can be summarised in one central question: *is SLI a general deficit that can be traced back to lower levels of dysfunctioning or is it a disorder that uniquely affects higher cognitive functions?* Whenever authors disagree, it is usually about the level at which the impairment originates. A classic example of this debate is the discussion between Gathercole and Baddeley (1990) and Van der Lely and Howard (1993) that was mentioned before. The issue is also high on the agenda in Bishop's (1997b) book in which she shows quite clearly that the child’s language system is a mixture of bottom-up and top-down processes, so the level at which the processing is deficient is hard to establish with certainty.

2.3.6 Linguistic problems, whatever the causes

Bloom and Lahey (1978) supported a descriptive approach to language disorders. In the absence of convincing etiologic evidence⁵, they supported the analysis of language behaviour per se as the most useful way of dealing with diagnosis and therapy. In their view this road could be taken without consideration of the causes of language impairment (by implication, this would lead to a rejection of the exclusion criterion). One might call this an agnostic view. Their rationale was revived explicitly by Leonard's (1991) position that children with SLI belong to the lower ranges of language normality. Consequently, Leonard predicted that "research on discovering a cause for specific language impairment could very well come up empty" (Leonard, 1991:67).

The overt rejection of the medical model has been influential, but there are now signs of retreat and some authors consider the disregard of medical causes harmful. Tomblin (1996), after taking stock of an era in which speech therapists have rejected the medical model in favour of a behavioural model, concludes: "As a result, little work

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⁵I might add that if a cause is found, this does not immediately render a linguistic approach obsolete. After all, another problem with the medical approach is that finding a cause does not always define the therapy. If a cause is irreversible, it is not open to remediation.
Specific Language Impairment

has been invested in testing and refining the diagnostic standards for many developmental communication disorders, including SLI\(^6\) (Tomblin, 1996:192).

2.3.7 Linguistic problems - linguistic causes

Lately, writers are once more defending language as the target area for study in children with language disorders. However, a different rationale is formulated for a linguistically oriented approach. Children's linguistic shortcomings are now assumed to be internal to the language module. Language is deemed to be deficient in its own right. Richard Cromer was among the first to put forward this idea. In his 1978 chapter, he spelled out a research agenda: "the study of developmental dysphasia (...) may provide clues to the nature of the language acquisition device by providing evidence of the types of linguistic structures these children find difficult or impossible to master regardless of the mode of input" (Cromer, 1978:112). In previous empirical work Cromer had identified a 'hierarchical structuring deficit' that would affect language-impaired children's syntax\(^6\) and cause the children to process sentences in a linear way. This finding suggested a problem located within the grammatical module - after all, hierarchy is a hallmark of human language. Subsequent work by Cromer, however, showed that the hierarchical structuring proved deficient even if the hierarchy was nonlinguistic in nature.

The major shift towards linguistic explanations did not come about until the late 80's. In that period linguistically trained researchers of language impairment tested assumptions that were based on linguistic theory and used data from language-impaired children in the spirit of Cromer's agenda. Linguistic constituents and algorithms like functional categories in general, INFL in particular, as well as parameter setting and case marking were analysed in samples elicited from children with SLI. In this research tradition a key linguistic difficulty would be pinpointed, rather than an extralinguistic underlying process. These investigations will be discussed in the next section.

At the same time, theoretical linguistics developed a renewed interest in language pathology. This enthusiasm was largely due to optimism on the possibility of localising language modules, thanks to new technologies like PET-scanning and fMRI. Also, research came up with fresh evidence for a possible genetic basis for language impairment (Gopnik & Crago, 1991; Bishop, 1992b). Several authors claimed a high degree of independence for linguistic knowledge. In particular Gopnik's work was hailed by theoretical linguists as sound evidence for the psychological reality of linguistic modules (this enthusiasm is reflected by references to Gopnik's and Gopnik and Crago's research in several books and articles by theoretical linguists: Chomsky, 1991; Jackendoff, 1994; Pinker, 1994, Newmeyer, 1997). Evidence for modularity not only derived from research on aphasia and specific language impairment. It was also found in studies on high-functioning individuals with mental retardation. In particular,

\(^6\)This claim was made not only for specifically language impaired children, but for the oral output of deaf children as well.
Williams syndrome can be accompanied by a high level of language proficiency, in sharp contrast to other levels of cognitive functioning (Bellugi et al., 1993). Conversely, a substantial number of children with Down's syndrome show language deficits beyond the level that is predicted by their general cognitive functioning (Rondal, 1993; Chapman, 1995).

If impairments can be that selective, an independent module for language, or a submodule for a specific language domain, can arguably be claimed. Language pathology is thus seen to produce the evidence for linguistic theories of modularity (Fodor, 1983): a linguistic component that can be affected separately can be granted an independent status.

Linguistic frameworks and theories on language acquisition have been invoked to explain the typical pattern of SLI children's deficits - the coherence of their symptoms - and have spawned numerous linguistic accounts of grammatical SLI. Before I discuss these theories, a survey of the most seriously affected areas in morphosyntax is presented in section 2.5. These are the symptoms that linguists felt they had to account for in their explanatory theories on SLI.

### 2.4 Classification

One issue that is closely related to the basic assumptions of the medical model is classification. From an etiologic point of view identification of causes results in distinct categories or syndromes. Rapin and Allen (1983; 1987) have proposed a set of clinical categories that they found to be useful for clinical practice and that represented subgroups in the population that they encountered in their clinic. A clinical category calls for a separate etiology. Unfortunately, no etiology is known for the many language-impaired children that, for want of something better, are called specifically language-impaired. Rapin and Allen attempt to solve this problem by hypothesising, for each subtype, a brain region where a lesion is expected, but they do so in the absence of empirical evidence for the lesion. This procedure highlights the problem that challenges medically oriented researchers in SLI: as no cause can be established, SLI remains an amorphous syndrome (if a syndrome at all: in later work, Rapin and Allen avoid this term). The subtypes proposed by Rapin and Allen (1983; 1987) include (I omit the extension 'syndrome'): verbal auditory agnosia, verbal dyspraxia, phonological programming deficit, phonological-syntactic deficit, lexical-syntactic deficit and semantic-pragmatic deficit. The subtypes that have been most widely

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7Two kinds of modularity are relevant here (Frijn & de Haan, 1991): external modularity concerns the independence of grammar from other cognitive modules, internal modularity concerns the independence of components of grammar. A hidden assumption underlying external modularity is that only language is deficient. However, the existence of additional symptoms does not contradict this claim. The crucial test is, whether the module is independent of other modules. Research on deficits in other resources, such as reported by Johnston and her colleagues, should not be read as a falsification of the independence of the language disorder but as evidence that the disorder is not restricted to grammar. It may still be proven that the symptoms derive from a common cause.
accepted are verbal dyspraxia, the phonological-syntactic type (often named a morphosyntactic disorder, sometimes accompanied by verbal dyspraxia) and the semantic-pragmatic type (Fletcher, 1991; Van der Lely, 1994). When Rapin (1996) revisited her original taxonomy she acknowledged the fact that the cause is more often than not unknown in children with SLI. Instead, she points at the indications that a genetic factor is involved. However, the same restriction holds: even if we know that genes are involved, how does that help us in matters of classification and diagnosis? For the moment, the genetic foundation of SLI is as much a black box as the presumed brain pathology invoked in the original classification by Rapin and Allen (1987).

In general, when researchers have proposed taxonomies of SLI types, the categories have been behavioural rather than clinical (to the extent that Rapin and Allen’s categories have been adopted, they have been used without the original reference to a suspected cerebral dysfunction). The main purpose of classification is usually a descriptive one: to break down groups of children with SLI into subgroups according to their language behaviour and in a way that is transparent and produces recognisable (behavioural) categories.

Miller (1987, 1991), for example, gathered a list of clinical subtypes from the judgements of speech therapists in his Madison school district. They mentioned the following behavioural categories as indicative of distinct types of language disorder: difficulties with sentence formulation, word finding, rate, discourse, reference or semantics (as well as simple delay). Miller suggested measures for each of these diagnostic characteristics that might lead to the identification of subgroups with well-defined language problems. Fletcher (1991) referred to Miller’s typology and foresaw a future classification that would accommodate subtypes in a language production model that could serve as an explanatory basis for understanding output errors.

In a longitudinal study by Haynes and Naidoo (1991) a very practical approach to classification was taken. The authors performed a longitudinal study of the language-impaired children that attended a school for special education in England. The investigation included 156 children and spanned 13 years. Individual impairments were classified according to level of processing (comprehension, production and speech (articulation)) and degree of severity (an impairment on either level was characterised as minor, moderate or severe). Severity was determined by referring to test scores and choosing cut-off points. The outcome was a set of nine subtypes. Obviously, not all the ‘cells’ in this taxonomy contained a large number of children, but some represented subtypes that were common as well as recognisable. A good example is what Haynes and Naidoo label the ‘Classic’ subtype (this type included the largest number of individuals). In these children, expressive language is severely impaired and speech impairment is severe or moderate; comprehension is affected in a minor or moderate way.

Recently, Conti-Ramsden et al. (1997) applied a battery of psychometric tests to evaluate the language difficulties of a group of 242 English children. They also interviewed their teachers about their opinion of the children’s impairments. When cluster analysis was performed on the test results, six ‘robust subgroups’ of language impairment emerged. The groups could all be matched with categories coined by Rapin and Allen (1987). The largest group resembled Rapin and Allen’s phonologic-syntactic deficit syndrome, that is much like Haynes and Naidoo’s Classic type. The
added value of the Conti-Ramsden et al. (1997) study is that the authors were able to relate subtypes to patterns in test behaviour. In this way, they made it possible for other researchers to replicate the taxonomy and provide clinicians with a way of identifying a child with a subtype. One caveat that Conti-Ramsden et al. express is that the procedure in its present form makes the clinician dependent on standardised tests only and does not incorporate the characteristics of SLI children’s spontaneous language.

One conclusion that can be drawn from the literature on classification is that there is a large subgroup of children with a grammatical impairment (also labelled phonological-syntactic or ‘Classic’). Their impairment is more significant in language production than in language comprehension. The grammatical symptoms may be accompanied by phonological or praxic symptoms. It is this group from which the subjects in this study will be recruited. In the literature on SLI this group is often taken as representative of the SLI population at large. This is a connotation that is not intended here. There are other subgroups and the results from this study should not be generalised beyond the grammatical subtype of SLI.

2.5 Grammatical SLI: a linguistic profile

Linguistic explanations of SLI have originated empirically in research on the symptoms of SLI. Recurring patterns in linguistic shortcomings have culminated in a narrow definition of language impairment. More than anything, problems with free and bound grammatical morphemes are acknowledged to be the principal characteristic of SLI. Clearly, by doing so, researchers have made the core of the language-impaired population smaller. The explanations to be discussed underneath do not address children with exclusively pragmatic or phonological disorders. Admittedly, the segregation of grammatical research from other fields (phonology, semantics, pragmatics) makes it hard to estimate the overlap between subgroups of children with SLI.

It is important to recognise the fact that the theories to be reviewed here address grammatical impairment, either explicitly (when the researcher marks out the subjects as belonging to this subtype) or implicitly. This is not to say that other types do not exist - they do. This partiality merely reflects the bias inherent in the literature. This is why the heading of this section refers to ‘grammatical SLI’.

2.5.1 Inflectional morphology

The late 80s and early 90s have seen a proliferation of theories on grammatical disorder. Previous literature on language impairment from the 70s and early 80s had been influential in highlighting crucial shortcomings in the language of children with SLI. Adopting a methodology introduced by Morehead and Ingram (1973), elements were identified that were more seriously affected than the general delay predicted. Whereas before 1973 comparisons between language impaired children and
chronological peers had been favoured, younger children now entered the picture. The reason was, that it was assumed that a fair equivalent of the impaired children's language was not to be found in the output of their chronological age matches, but in children who were in a comparable stage of language acquisition.

The measure that allowed for a comparison with language age (LA) peers was Brown's (1973) Mean Length of Utterance. A host of publications argued that MLU (measured in morphemes), as well as developing (correlating) with age, was a representative index of morphosyntactic growth. Children with equal MLU's, the reasoning went, could be said to be roughly in the same stage of language development. On the other hand, group differences that subsisted in a comparison with MLU matches would signal a more specific difficulty where the dependent variable was concerned. The first study in which this measure was used was reported by Morehead and Ingram (1973). Their research topic was the expression of base syntax in language-impaired children. Menyuk (1964) had claimed that SLI children had extraordinary syntactic difficulties; she found clear-cut differences between children with SLI and chronological age (CA) peers and inferred that language-impaired children were qualitatively different from normals. Their language, she argued, was deviant rather than delayed. Morehead and Ingram (1973) demonstrated that Menyuk's results were artefactual. Using Brown's measure as an innovative matching tool to select a younger control group, Morehead and Ingram made the difference with typically developing children virtually disappear. They found a simple delay pattern rather than a deviant pattern in the children with SLI. The one measure that showed differences even under the MLU matching condition was the range of construction types. Phrase structure rules and transformations, on the other hand, were similar in range (the terminology derived from Chomsky, 1965).

Over the years, several individual grammatical morphemes were investigated in a way that followed the same rationale. A number of studies on inflectional morphology and free grammatical morphemes demonstrated that on the morphophonological level children with SLI did not behave like their younger peers when matched on MLU. In a survey of the literature on grammatical SLI, Fletcher and Ingham (1995:611) list a number of grammatical categories that prove problematic for SLI children with English as their native language: plural -s; 3rd person -s; past tense -ed; auxiliary be; determiner the/a; infinitive particle to; case-marked pronouns.

The consensus that developed on a distinct set of grammatical symptoms of SLI - again, mainly based on research with English-speaking children - paved the way for a

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8Objections have been raised against the validity of MLU as an index of morphosyntactic development. One disadvantage is its limited tenability: as soon as the value of MLU exceeds 4.0, the growth becomes less linear. From then on it depends more and more on external influences, like subject matter and interaction type, instead of grammatical morphology and verb argument structure. This implies that differences between children in morphosyntactic ability are not solidly reflected by their MLU values. Another issue that has been discussed with regard to MLU is what could be called counterbalance. If a child is matched to a typically developing child by MLU and is known to omit grammatical morphemes frequently while the normal child does not, what compensatory elements on the part of the language-impaired child make for the similar MLU value? (Plante et al., 1993; Johnston & Kamhi, 1984; De Jong, 1997b). Lahey (1990), who also considered mental age and IQ as reference points, suggested that we better stick to chronological age instead, also in order to avoid confusion over group-internal and between-groups variability (cf. Kamhi, 1998).
research tradition according to which SLI exceeds language delay and involves specific symptoms within the grammar. This selectiveness has promoted an abundance of theories that aim to explain the linguistic coherence of the symptoms that SLI presents, while ignoring, it must be said once more, extragrammatical symptoms.

2.5.2 Word order

The grammatical symptoms of SLI are most often associated with individual grammatical morphemes. These morphemes are either omitted in an obligatory context or substituted. To a lesser degree problems are found in word order. Problems with word order are closely related to the typological properties of children's native language. One symptom is apparent in Verb Second (V2) languages. In these languages the finite verb is the second element in the sentence. In V2 languages like German and Dutch the verb is in final position during the early stage of acquisition. In this stage, the verb retains the infinitival form. SLI children learning V2 languages tend to stick to that position for an extended period. There are also data that show children with SLI producing finite forms in final position, but this symptom seems to be restricted to German and Swedish children with SLI (Grimm & Weinert, 1990; Hansson & Nettelbladt, 1995).

Grimm and Weinert's (1990) argument that word order problems per se exist in German SLI children is controversial. They failed to come up with quantitative data, so it is not clear how widespread the symptom is among German children with SLI. As for interpretation, it can be argued that the position of the verb is dependent on agreement features, in which case the problem would not lie in word order itself, but would be secondary to agreement difficulties (Clahsen, 1992; Clahsen & Hansen, 1993).

Swedish SLI children exhibit different symptoms (Hansson & Nettelbladt, 1995; Hansson, 1998). Because subject-verb agreement does not exist in Swedish, word order phenomena in this language are not ambiguous like they are in German. Hansson and Nettelbladt’s SLI subjects were more rigid in their word order patterns than normally developing children. Subject-verb inversion occurred less often. Even when a constituent was topicalised (an obligatory context for inversion in Swedish) the impaired children would often maintain the subject-verb word order. They also produced verbs in third position when the sentence contained a negation - an ungrammatical sequence in Swedish.

2.5.3 Argument structure

Recently, investigations of verb argument structure have demonstrated that this area is also vulnerable in language-impaired children. Argument structure is the syntactic constellation that results from a verb’s meaning. Verb meaning is represented as a thematic structure, which defines the participants (e.g. agent, theme, goal) that are involved in the action that the verb labels. These participants, or thematic roles, are mapped onto arguments that express the thematic roles in syntax. In syntactic terms, this is the subcategorisation frame of the verb. It requires that a verb is accompanied by, for instance, a direct object or a prepositional phrase.
King and Fletcher (1993; Fletcher, 1992) found that children with SLI would sometimes omit verb arguments and thus use a transitive verb in an intransitive frame (or a ditransitive verb in a monotransitive frame). Even when omission of an argument did not result in ungrammaticality (as with verbs like eat; cf. Rispoli, 1992) the children with SLI showed a marked propensity to select an intransitive frame. Also, it has been shown that children with SLI produced fewer alternating argument structures (as in she broke the bottle; the bottle broke) and preferred one of the alternants instead (Fletcher et al., submitted; though compare Loeb et al., 1998).

Rice and her colleagues (Rice & Bode, 1993; Watkins et al., 1993) have highlighted the vulnerability of lexical verbs in a different way. They described a small set of verbs that are highly frequent and have a nonspecific meaning (verbs like put, go). The authors coined them ‘general all purpose’ (GAP) verbs and proposed that children with SLI relied on this subset when retrieving an action label. While this might seem a lexical strategy, Rice (1991) suggested that this preference might well mask a problem with verb argument structure. Not only would the impaired children have a restricted set of verbs, they would also have fewer argument structures available.

2.6 Grammatical SLI: linguistic theories

The theories that are summarised in Table 2.1 can be clustered, I propose, in four sets of linguistic explanations:

1. weak characteristics and language-specific cues impede the child's learning of grammar;
2. features or rules that are intrinsic to the language are not available to the child;
3. dependency relations, such as agreement, are not available to the child;
4. there is an extension of early stages of morphosyntactic development.

I will discuss each of the explanations in turn, while sticking to the order above. First, however, some remarks must be made on generality. Theories are different in their scope. One limitation to the applicability of a theory concerns the extent to which it can explain grammatical SLI at large or serves more modest aims. It will become clear that for the data to be discussed here, many explanations only touch at one or a few symptoms presented by the children. If the task we set ourselves is to find out whether existing accounts are falsified by any particular set of data, the results are predictable. Let me formulate one shot across the bow: none of the theories can cover all of the symptoms found for SLI in a specific language and so each can be discarded. I will opt here for a more conservative approach and assume that each theory can deal with part of the symptoms of SLI. I will try to estimate the contribution each can make to our understanding of what is wrong with the grammatical knowledge or performance of children with SLI.

Each of the explanations to be discussed below makes reference to linguistic theory. Most often this is Chomsky's government-binding paradigm (Chomsky, 1981). Various studies highlight a particular module of the Chomskyan model of grammar. I will approach these explanations eclectically. While theories may depend on a linguis-
tic theory that has been abandoned or revised in the meantime or that is not shared by other researchers, I will treat each explanation in its own right.
<table>
<thead>
<tr>
<th>Hypothesis (author(s))</th>
<th>Locus of linguistic problem</th>
<th>Predicted symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hierarchical Planning Deficit hypothesis (Cromer, 1978)</td>
<td>Syntax. Processing deficit of hierarchical relationships.</td>
<td>Sentences with hierarchical structure are interpreted in a linear way</td>
</tr>
<tr>
<td>Surface hypothesis (Leonard, 1989)</td>
<td>Morphophonology. Processing problem increased by non-saliency of grammatical morphemes</td>
<td>Morphemes which are non-syllabic, unstressed, short in duration are vulnerable to omission or reduction</td>
</tr>
<tr>
<td>Sparse Morphology hypothesis (Leonard et al., 1988)</td>
<td>Morphology. Low degree of morphological marking in the target language makes children less aware of inflection</td>
<td>Bound morphemes in languages with sparse inflectional morphology are prone to omission</td>
</tr>
<tr>
<td>Missing Feature hypothesis (Gopnik, 1990a)</td>
<td>Morphology. Semantico-syntactic features that are to be marked morphologically are lacking in the child's grammar</td>
<td>Problems with agreement, tense, gender and number marking (among other features)</td>
</tr>
<tr>
<td>Implicit Rule Deficit hypothesis (Oetting &amp; Rice, 1993; Gopnik &amp; Crago, 1991; Ullman &amp; Gopnik, 1994)</td>
<td>Morphology. Symbolic rules for morphological marking are lacking in the child's grammar</td>
<td>Problems with regular morphological marking; irregulars not affected because they are rote-learned; omissions exceed substitutions</td>
</tr>
<tr>
<td>Differential Agreement Checking hypothesis (Rice, 1994)</td>
<td>Morphosyntax. Deficit in Spec, Head agreement</td>
<td>Problems with subject-verb and quantifier + noun agreement and with case marking; no problems with plural marker; determiner-noun (Head, Head)</td>
</tr>
</tbody>
</table>
Table 2.1 continued

<table>
<thead>
<tr>
<th>Hypothesis (author(s))</th>
<th>Locus of linguistic problem</th>
<th>Predicted symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Representational Deficit for Dependency Relations</td>
<td>Morphosyntax.</td>
<td>Problems with agreement, binding and theta role assignment; plural marking not</td>
</tr>
<tr>
<td>(Van der Lely, 1994)</td>
<td>Deficit in government</td>
<td>affected</td>
</tr>
<tr>
<td></td>
<td>relations</td>
<td></td>
</tr>
<tr>
<td>Delayed acquisition of functional categories</td>
<td>Morphosyntax.</td>
<td>Later appearance of reflexes of DET, INFL and COMP</td>
</tr>
<tr>
<td>(Loeb &amp; Leonard, 1991; Eyer &amp; Leonard, 1995)</td>
<td>Delayed development of</td>
<td></td>
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<td></td>
<td>functional heads</td>
<td></td>
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<tr>
<td>Extended Optional Infinitive stage (Rice et al.,</td>
<td>Morphosyntax.</td>
<td>Optional rather than consistent marking of finiteness; agreement</td>
</tr>
<tr>
<td>1995)</td>
<td>Extended stage of optional</td>
<td>unaffected; irrelevant for plural marking</td>
</tr>
<tr>
<td></td>
<td>use of infinitive while</td>
<td></td>
</tr>
<tr>
<td></td>
<td>tense marking is not yet</td>
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<tr>
<td></td>
<td>acquired</td>
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</table>

2.6.1 Functional categories in linguistic theory

Linguistic theories on grammatical SLI emphasise the difficulties that arise in the production and (to a lesser extent) comprehension of functional (grammatical) categories. Functional categories have drawn a lot of attention in linguistic theory as well as in language acquisition research (e.g. Radford, 1988).

Whereas in earlier stages of linguistic theory, the main nodes in tree diagrams represented lexical categories - verb phrases (VP), noun phrases (NP), adjective phrases (AP), and prepositional phrases (PP) - linguistics presently is less interested in lexical categories and stresses the importance of functional phrasal categories like INFL (inflection), and COMP (complementizer). Verbs only exist as elements that move along a set of functional projections that make sure that a verb is derived in the right position and in the right form. Lexical categories are subordinated to the functional ones that determine the syntactic phrasal structure.

Recent developments have added new functional categories to the derivation. DET (determiner) has been attributed phrasal status. INFL has been divided into Agr-S (agreement to the subject) and T (tense) (Split INFL; Pollock, 1989). NEG (negation) has been included as well. In addition to Agr-S the structure of various languages has necessitated another functional head, Agr-O, to account for agreement to the object.

Another innovation, casually mentioned above, is the concept of checking. Under the Minimalist framework (Chomsky, 1992) an inflected verb is retrieved from the lexicon. While moving to a higher position in the hierarchical representation of the sentence structure, the inflected verb is compared to the requirements posed by each functional head. If the form does not answer these requirements, the derivation
collapses. In an earlier stage of linguistic theory, this would be phrased differently. It would be said that certain functional categories were not available apparently, so the relevant sentence structure could not be built (or the verb could not be inflected: the verb was thought to collect the inflection while moving). This changing approach is highly relevant for issues we will discuss later, like the role of agreement in SLI (sections 2.6.5, 2.6.6). Lack of agreement can now be reanalysed as a failing checking relationship between two elements.

### 2.6.2 Surface hypothesis

The Surface hypothesis started out as an adaptation by Leonard (1989) of Pinker's (1984) learnability model. In Pinker's view the learning of morphology can be pictured as filling the cells that make up a morphological paradigm. The crucial step for children is to break free from word-specific paradigms and develop a template for, say, verbs in which the verbal stem is complemented by a grammatical morpheme in a rule-governed way, regardless of the verb involved. One proposal by Pinker was that, with regard to the process of paradigm building, grammatical elements that are low in phonetic substance are introduced later. According to Leonard (1989) this step is hampered even more in language-impaired children by distortions of the input. Relevant to his explanation is the assumption of an auditory processing problem. Tallal and her colleagues have shown in a number of investigations (Tallal & Piercy, 1973; 1978) that children with SLI fail to process short, rapidly produced acoustic sequences in a reliable way. Leonard (1989) claims that the surface form of morphological markers on English verbs makes them prone to distorted processing. He gives the following definition for the elements that are 'weak': "Low phonetic substance morphemes are nonsyllabic consonant segments and unstressed syllables, characterised by shorter duration than adjacent morphemes, and, often, lower fundamental frequency and amplitude" (Leonard, 1989:186). The prototypical example is the marker for present tense third person in English, the regular form of which is root plus -s. In reception it is nonsalient. In production it invites phonological processes that are characteristic of young children, like final consonant deletion or cluster reduction (as other morphemes may be susceptible to unstressed syllable deletion; Cf. Beers, 1995). Other grammatical morphemes share these features. Their weak surface characteristics make them willing candidates for neglect in input as well as for reduction in output.

The Surface hypothesis was supported by various investigations by Leonard and his colleagues in which English-speaking children with SLI were compared to children with different native languages, in particular Italian. On the one hand, there were sharp cross-linguistic differences. Comparisons with Italian showed that grammatical morphemes that cause trouble for English children were relatively unaffected in Italian SLI children. Since the surface characteristics of the Italian affixes make them more salient (they are stressed, syllabic and, importantly, they are prone to lengthening),

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9Prosody is a factor that may contribute to SLI in its own right. For prosodic influences on the realisation of grammatical morphemes in SLI, see Gerken and McGregor (1998; cf. Wijnen, Krikhaar & Den Os, 1994).
these findings support an explanation that highlights the interference of phonetic characteristics with SLI children's production of grammatical morphemes. Also, the Italian children - as predicted by the hypothesis - did not perform very well on morphemes that lacked the salience that is so typical of their mother tongue, like clitics. This discrepancy within Italian was not restricted to children with SLI. In normal children a similar difference was found.

Recently, Leonard (1998) has elaborated on the nature of SLI children's problem with surface characteristics. He stresses the fact that morphological problems are seriously increased by the entire processing burden that the relevant morphemes entail. The children's limited processing capacity makes them less versatile in dealing with the rapid auditory signals and it is this rapidity in the context of ongoing speech that is especially taxing. As Leonard put it, "If inflected words were typically heard in one-word sentences separated by pauses, there would be no problem." (Leonard, 1998:251)

Taken at face value, the Surface hypothesis seems to predict problems with any morpheme that has weak surface characteristics (or even with any weak non-morphemic segment). However, in Leonard's view this will not be the case. Surface phonetics is only one of the factors appearing on the list of influential factors. The semantic transparency of the feature encoded by the grammatical morpheme is also part of the hierarchy that determines the ease with which it is acquired. The paradigmatic requirements for inflection of verbs (marking happens not only for number, but also for person and tense) make verbs more vulnerable than nouns. This addition is crucial if one wants to explain the discrepancy that is witnessed between verbal and nominal inflection. In a number of investigations, SLI children have performed better on noun pluralisation than on verb morphology (Oetting & Rice, 1993; Rice & Oetting, 1993; Bartke, 1998).

Many critics of the Surface hypothesis (e.g. Clahsen, 1992) have addressed the dissociation between noun and verb morphology. These arguments have not done justice to Leonard's original (1989) position, that was taken within Pinker's framework of paradigmatic learning. As children fill the paradigms, their learning is never determined by one factor only.

Explanations like the Surface hypothesis have a strong psycholinguistic thrust. Within this explanation, the symptoms are not explained by assuming that part of the grammar is absent. The grammar is intact. Instead, Leonard appeals to the major processing demands on grammatical morphemes. In doing so, Leonard (1989) combines the taxing effects of the surface characteristics of grammatical morphemes with Pinker's model of paradigm building. Bishop (1992a; 1997b) prefers to count the surface account among the explanations that are nonmodular and that link the grammatical symptoms to a perceptual deficit.

One implication of the Surface hypothesis is that cross-linguistic differences are anticipated in the symptoms of SLI. This is in contrast to theories that claim a deficit in the language acquisition device itself. Such a deficit should by definition affect an SLI child from every language background. Any difference between children from contrasting language backgrounds could result from typology only (that is, it would depend on the role that the affected module plays in the language concerned).
2.6.3 Sparse Morphology hypothesis

In the same vein as the Surface Hypothesis, Leonard et al. (1987; 1988; Leonard, 1998) observed the preservation of verb morphology in SLI children in connection with the general appearance of the ambient language. Bates and MacWhinney (1982) pointed out that children, when they face the task of matching basic functions to surface representations, face a number of competing options (Bates and MacWhinney propose a Competition Model). The representations that are available to them differ cross-linguistically and can take the form of: lexemes, word order patterns, morphological markings, and intonational contours. Children whose native language is rich in verb morphology - pro-drop languages come to mind - are bound to select morphology as the most informative cue and to follow an Operating Principle (the term is coined by Slobin, 1973) that instructs them to observe word endings closely and hypothesise that a marking is in order (Slobin's Operating Principle A read: "Pay attention to the end of words" (Slobin, 1973:191)). For English children the picture looks different. Word order is highly informative in English, affixing is not. English children acquire a language in which not every verb stem is modified by a grammatical morpheme and therefore they may be slow in becoming aware of the occasional need for affixes in finite forms. In Leonard's view such cross-linguistic differences put children whose native language has a sparse morphology at a disadvantage. The Sparse Morphology explanation overlaps crucially with the assumption that surface characteristics are influential. Slobin (1973:202) formulated this universal: "A child will begin to mark a semantic notion earlier if its morphological realisation is more salient perceptually (ceteris paribus)". A sparse morphology overlaps with nonsalient surface marking. The two are in a tautological relationship: children learn a language in which affixes are highly salient, and so the language encourages them to watch the end of words. Leonard has put both hypotheses to the test by comparing his data of English-speaking children with SLI to those of peers whose native languages have a rich morphology. The results support both explanations in a complementary way. The Sparse Morphology hypothesis does not, it seems, produce intra-linguistic predictions. It is an explanation of why certain linguistic devices present children from one language background with more difficulties than children with a different native language It stresses once more the importance of in particular verb morphology for the child's ability to grasp and replicate the structure of the target language. Language-specific predictions, however, must include a reference to the specific form of the inflection. In that respect, the Sparse Morphology hypothesis only traces gross cross-linguistic differences while the Surface hypothesis specifies the nature of these projected differences.

2.6.4 Missing Feature hypothesis / Implicit Rule Deficit hypothesis

Gopnik (1990a; 1990b) introduced her Missing Feature or Feature Blindness hypothesis inspired by a case study of a language-impaired boy who showed no evidence of awareness of what she called syntactico-semantic features. In her report on this boy Gopnik stated - guided by the literature - that his problems were not unlike
those of SLI children in general. This implicit generalisation paved the way for including the missing feature account in the canon of SLI theories. Subsequently, the hypothesis has kept the SLI research field busy for some years.

The basic idea of the Missing Feature hypothesis is that children with SLI lack the features that are expressed by grammatical morphemes. Number, person, gender, but also tense and aspect, Gopnik claimed, are not available to these children, so their production of the grammatical morphemes that encode them will occur in a hit or miss manner at best. Putting it in Pinker's (1984) terms, the dimensions that head the paradigmatic matrices are considered absent. The prediction, then, must be that children, in marking verbs, will not discriminate between inappropriate and obligatory contexts.

Bishop (1994), Leonard (1992) and others refuted this prediction. One obvious counterexample is the dissociation between SLI children's handling of nominal and verbal morphology. Whereas the Surface hypothesis anticipated such a difference by pointing out the differential complexity of both, the Missing Feature hypothesis predicts that the features are missing that underlie either. Bishop (1994) found that, in her SLI data, morphological markers were not randomly distributed, as the hypothesis would have it. Features differed in difficulty and that difference was mirrored by the children's error pattern.

In a remake of the Feature Blindness hypothesis, Gopnik and Crago (1991) proposed an absence of rules rather than features in SLI children's grammars. Pinker and Prince's (1988) dual model of acquisition of morphology featured in this explanation. According to Pinker and Prince, inflection follows two separate paths. On the one hand, the irregular forms are stored in memory. On the other hand, the learning of regular morphology necessitates an abstract symbolic rule that affixes a morpheme to the verb stem. Gopnik and Crago suggest that only memory can serve the SLI children: the symbolic rule is not available to them. In fact, children will handle the learning of regular verbs in much the same way they approach irregular verbs: regular forms will also be rote-learned. This hypothesis was supported by the dissociation between regular and irregular verbs in past tense formation: according to several researchers, irregular verbs are affected less seriously by SLI than regular verbs.

On the other hand, the dissociation between regular and irregular verbs invites one of the key criticisms of this theory. Bishop (1994) found that substitution of unmarked verb forms for inflected forms occurred with regular as well as irregular verbs. Past tense was impaired with both groups of verbs (Ullman & Gopnik, 1994; Gopnik, 1994). Also fundamentally inconsistent with a rule deficit is the production of overgeneralisations, because they presuppose that a rule is at work - they cannot be rote-learned because they are not part of the input. Such evidence to the contrary was found by Leonard (1994; Leonard et al., 1992) and by Bishop (1994), who found the morphological errors that are typical of SLI as well as overgeneralisations in language samples of the same language-impaired children. Even the members of the London family that inspired Gopnik and Crago (1991) to hypothesise a rule deficit in the first place were shown to produce overregularisation errors (Vargha-Khadem et al., 1995).
There is a fundamental problem with the Missing Feature and Rule Deficit hypotheses, that was raised by the authors themselves. Gopnik (1990a) drew attention to the problem of dealing with grammatical utterances in an 'ungrammatical child'. While discussing the subject in her case study, she pointed out that even the correct morphological markers should be read as the outcome of a deficient system. In a similar vein, Crago and Gopnik (1994) criticised a tradition (exemplified by Miller, 1987; cf. Klee & Paul, 1981) according to which a percentage of filled obligatory contexts (anywhere between 50 and 90%, depending on the researcher) is taken as the criterion for the acquisition of a grammatical element. Instead, they claimed that even a relatively high score cannot be considered a guarantee for an intact grammar, due to the arbitrariness of the criterion. This is a valid point to make, if we take into account the fact that SLI children's performance is less than consistent. However, Gopnik (1990a) took this position to the extreme by abandoning any criterion. Apart from the fact that one does not gather much insight into the representativeness of the data she presents, examples that do not fit the theory are not interpreted as counterevidence, but as the chance output of an otherwise incomplete grammar. It is hard to falsify a theory if one accepts this point of view and a theory that is not open to falsification is a poor theory. While Crago and Gopnik's (1994) criticism is not trivial - I will return to the issue in Chapter 4 - Gopnik’s (1990) study makes the reader take for granted that one gets a fair impression of the language-impaired child she reports on.

A point should be made about accounts, like the Missing Feature hypothesis, that claim that part of the grammar is absent. 'Missing' - what is the status of this notion? Traditionally, there are at least two ways of characterising deviant language. One is, to relate it to normal development: deviant utterances will not be found at any stage of development in a normal child. Still, the occurrence of such deviancies is a natural outcome of the chronological asynchrony that exists between interacting linguistic levels (while the development of each level may not be deviant if seen in isolation; Curtiss & Tallal, 1991). Elaboration of sentence structure may be ahead of consistent morphological marking. The unmarked verb forms that persist in SLI children will not be encountered in an otherwise complex sentence in the output of a normally developing child - this ‘mismatch’ in the SLI children’s output is one of the phenomena that produces 'deviant' sentences (Bishop & Rosenbloom, 1987).

Another definition of deviance would be that the grammar of the child does not respect the constraints of Universal Grammar (UG) (Guilfoyle, 1993). As I interpret it, the Missing Feature hypothesis does predict a violation of UG constraints. Logically, then, it predicts that there will be no cross-linguistic differences, save for typology - after all, the scope of the violation is universal, not language-specific. The same is true for other explanations that presume that a grammatical component is missing. Moreover, this position implies that linguistic cues in the language input will not influence the child's grammar (Guilfoyle, 1993), so it is fundamentally incompatible with the Surface hypothesis.

### 2.6.5 Missing Agreement hypothesis
The Missing Agreement (or Grammatical Agreement Deficit) explanation was proposed by Clahsen (1989). It was inspired by findings in German investigations of SLI. In German, as in Dutch, there is an association between verb position and finiteness. Both are Verb Second languages. In such languages the finite verb in the main clause moves to the second sentence position. The close relation between verb form and verb placement is, in Clahsen's view, a unidirectional one. Children with SLI have no problem placing the verb in the right position. Movement is simply not possible because the verb is not marked for the features for which it should match the grammatical subject. Word order in general is not disturbed. Within constituents word order tends to be correct (Clahsen, 1992). Clahsen and Hansen (1994) tested Clahsen's hypothesis by teaching children with SLI to mark verbs for subject features. They found that children, having been trained this way, had no problem selecting the right position for the finite verb. Their conclusion, however, seems premature. It is not possible, in their design, to completely disentangle verb position and verb form. Clahsen (1989; 1992) explored the various reflexes of agreement problems and anticipated that there would be other symptoms because they depend on agreement relations as well. The Missing Agreement hypothesis follows the framework of Generalised Phrase Structure Grammar (Gazdar et al., 1985). Clahsen refers to the Control Agreement Principle proposed by Gazdar et al. Following the definition of this principle, he draws a connection between: subject-verb agreement, finite forms of auxiliaries, overt structural case marking and gender marking on determiners and adjectives. All of these elements should prove to be deficient in SLI simultaneously if the explanation is sound.

According to the Missing Agreement account, paradigmatic learning is relatively well preserved in SLI. There is no reason why the child should not learn to some extent the particular forms that, for instance, past tense marking takes. Overregularisation is a phenomenon that is not affected by an agreement deficit. Whether a verb is regular or irregular has no bearing on subject features.

Clahsen's Missing Agreement explanation does not envisage significant difficulties with tense. Tense, he proposes, is marked on the verb without being dependent on a functor within the linguistic context. Clahsen acknowledges that SLI children face problems here, but he thinks the problem with tense marking is more marginal than that of subject-verb agreement.

One problem with the Missing Agreement account that surfaces here is that it correctly predicts that there are difficulties with subject-verb agreement, but fails to take care of other symptoms. Guilfoyle (1993) points out that the omission of auxiliaries, articles and complementizers is not explained by Clahsen. His theory predicts agreement errors, but not the omission of functional heads. It also does not pinpoint the form the agreement difficulties must take (in German, it seems, they will result mainly in utterance-final infinitives and the occasional stem substitution). It takes care of the

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10In Swedish, subject-verb agreement does not exist. Therefore, the finding that Swedish children have difficulties with verb placement is one that cannot be explained under the Missing Agreement account (Hansson & Nettelbladt, 1995; Hansson, 1998).
agreement problem, but does not fully explain the surface symptoms it produces. This ambiguity will be discussed in Chapter 5, where the Missing Agreement hypothesis is applied to the Dutch data.

2.6.6 Differential Agreement Checking hypothesis

Discrepancies between what SLI entails in different languages follow from typological differences, but they are also filtered by differing views on the structure of the languages. For example, Rice (1994; see also Rice & Oetting, 1993) proposes an amended version of the Missing Agreement account. Rice (1994) claims that SLI affects the checking of Spec, Head agreement only and that checking of Head, Head agreement is unaffected. The reason she makes this distinction is that she wants to explain why the nominal system (and thus determiner-noun (DetN) agreement) in English is relatively unimpaired. The difficulties with DetN agreement for which Clahsen finds evidence in his German SLI data are due to a typological difference, according to Rice. German would be different from English in that DetN agreement would fall under Spec, Head agreement in German, not Head, Head agreement. This is an inventive explanation but it is not supported by current linguistic accounts of the structure of German and Dutch (Zwart, 1995; Leemans, 1996\textsuperscript{11}). In fact, it would imply that the claim of a separate Determiner Phrase is redundant: the determiner would be a specifier of a nominal head.

2.6.7 Representational Deficit for Dependency Relations

This explanation (Van der Lely, 1994) makes claims that are different from those resulting from the Missing Agreement hypothesis, although not where agreement is concerned. For agreement, it can be read as a descriptive variant of Clahsen's proposal. Van der Lely proposes that children with SLI have a deficit in representing dependent relations. Dependency goes beyond agreement. Van der Lely and her colleagues found several other areas where the children fell short: pronoun case marking (though Clahsen's explanation allows for that symptom to occur as well), tense marking, syntactic bootstrapping (matching thematic roles onto syntactic functions), and the application of binding principles (Van der Lely, 1993; Van der Lely, 1994; Van der Lely & Harris, 1990). Van der Lely predicts that children with SLI will meet with difficulties in the comprehension and production of all elements that mark syntactic dependency.

2.6.8 Delayed acquisition of functional categories

There is a general consensus concerning the prominence of difficulties with functional categories (\textit{INFL}, \textit{DET} and \textit{COMP} - or \textit{I}, \textit{D} and \textit{C}) among SLI children.

\textsuperscript{11}Spec, Head agreement in Dutch noun phrases is assumed for:
- Spec, Num agreement, as in Quantifier+Noun combinations: \textit{alle boeken} (‘all books’)
- Spec, Det agreement, as in Genitive case marking: \textit{papa's boek} (‘daddy's book’) (Leemans, 1996).
In two recent publications, Eyer and Leonard (1995) and Leonard (1995) tested the assumption that the problems associated with SLI can all be traced back to a delay in the acquisition of functional categories. This assumption originates in the argument of Radford (1988) that early stages of acquisition express a gradual development of functional categories. In the first stage of syntactic development it is not necessary, in his opinion, to appeal to functional projections to describe the child's grammar. Early verb use can be satisfactorily explained by assuming that only a lexical category V is available to the child. In a later stage, the inflected verb makes it necessary to assume an INFL projection in the child's grammar. In an earlier effort Loeb and Leonard (1991) explored the reflexes of a delayed appearance of the functional category INFL in the grammar of children with SLI, which would also predict delay of correct case marking of the subject in preverbal position (because INFL takes care of that as well). They did find a correlation between the problems that children with SLI showed with inflection and their subject case marking (illustrated by utterances like him go).

Problems with the D-system were described by Rice and Oetting (1993; see also Leemans, 1996) and the C-system was explored by Hadley & Rice (1996) who found problems there as well. Because the functional categories are interrelated (C, in English, is the landing site for auxiliaries originating in V; the D-system is required for case marking assigned by I) there is, according Eyer and Leonard (1995), reason to test the hypothesis that children with SLI lack all three systems. The authors reported on a case study of a boy with SLI, whose language was recorded between 3;9 and 5;2 years of age. In his output they found a marked delay in the development of all functional categories. Their findings, however, could not be accounted for by claiming that the child had a grammar without functional categories. Leonard (1995) extended the hypothesis to a group of 20 SLI children and similarly found that the children revealed evidence of all functional categories but produced lower percentages of the relevant morphemes when compared to matched normals.

An earlier explanation along the same lines was proposed in an unpublished paper by Guilfoyle (1993). In what she called a structure-building approach she related the symptoms of SLI to a slower maturation of functional categories (cf. Guilfoyle & Noonan, 1992). Morphological markers are at the current stage of linguistic theory syntactic entities with phrasal projections. Therefore, the problem in SLI can, according to Guilfoyle, not be characterised as a morphological problem with affixing, but resides in syntax. Slow development of functional heads would explain the initial lack of V2 movement in German (because the landing sites for the finite verb are not yet available). On the other hand, it would predict the absence of problems with theta-role assignment, because functional categories are not assigned theta roles. This explanation would not, Guilfoyle stressed, signify that part of the Universal Grammar is missing in SLI. The children's grammar would still constitute a subset of the adult grammar.

A study that concerned functional categories, but first of all appealed to typological differences between languages, was carried out by Loeb and Leonard (1988). They investigated the hypothesis that English-speaking language-impaired children, who learn a non-pro-drop language (in which morphology is not uniform), will persist in the Pro-Drop Parameter setting and thus will be late in inflecting the verb. Loeb and
Leonard tried to establish a synchronous delay of the various linguistic phenomena that are associated with the Pro-Drop Parameter. They failed to find a correlation between the anticipated symptoms and therefore rejected the hypothesis that a delayed resetting of the parameter was a valid way of explaining the early morphosyntax of their language-impaired children.

### 2.6.9 Extended Optional Infinitive Stage

An Optional Infinitive (OI) stage was first proposed by Wexler (1994) in an attempt to explain the use of infinitives in early child language alongside the appearance of finite forms. The optionality of either form means that in a child's grammar at that stage, both forms are considered grammatical. Finiteness is not yet obligatory. There are, however, restrictions on the use of infinitival and finite forms that become clear from the predictions the OI proposal involves. The English inflections -s and -ed on lexical verbs may be replaced by unmarked verb forms. However, -s, if it is used, will be restricted to the correct third person singular context. Similarly, -ed will only be used in a past tense context. The same goes for be and do: they may optionally be omitted, but their finite forms can only be inserted in a correct context (Rice et al., 1995). Rice et al.'s adaptation of this theory for impaired acquisition predicts that children with SLI will need more time to abandon the OI stage; they persever in an (Extended) Optional Infinitive Stage in which they fail to recognise the obligatoriness of finite forms in matrix sentences.

In summary, though children fail to mark verbs consistently for tense, they are aware of the finite-infinitive distinction. They know that a finite form must be marked for tense and agreement and they have control of subject-verb agreement (Rice & Wexler, 1996b).

The proviso that, under an OI account, children will not consistently mark finiteness, but will correctly mark agreement, is not explained by the authors in a satisfactory way. For Dutch child language the OI stage is about finiteness, not about agreement. In chapter 5 I will explore the Dutch context for an Extended OI stage.

The Extended OI hypothesis was characterised by Rice and Wexler as an Extended Development Theory. In other words, a theory of delay. Nevertheless, by pinpointing the linguistic constellation of the OI stage (the elements which are involved in it) the general delay is raised to the status of a qualified delay. Because the claim is that a normal stage of acquisition lasts longer, this theory runs the risk of not focusing enough on what is different in language-impaired children.

A significant observation was done by Leonard (1995) in his investigation into the appearance of functional categories. He tested the EOI hypothesis in his subjects. While the normal children showed higher percentages of finite forms in an obligatory context, they were still in a stage in which finiteness was optional, witness the percentage of use of the affix -s on verbs (59%, versus 34% in the SLI children; taken from Leonard et al., 1992). This means that finiteness did not serve to distinguish the
language-impaired and the typically developing children in a reliable way\textsuperscript{12}. The subjects that Leonard included were only slightly younger than in Rice and Wexler's study (the ages of the children with SLI were between 3;8 and 5;7 in Leonard's case; between 4;4 and 5;8 in Rice and Wexler's (1996b) article). The significant overlap between children with SLI and controls makes the claim that tense could be a valid clinical marker (Rice & Wexler, 1996b) debatable. After all, the marker is not bimodal in the sense that Pennington (1986) required for it to count as a phenotype marker: the difference between affected and nonaffected (groups of) individuals is proportional.

\textbf{2.7 Linguistic explanations of specific language impairment - general remarks}

Table 2.1 listed the theories that have arisen so far. Having discussed the nature of each explanation, as well as their merits and weaknesses, a number of general caveats are called for that concern the restricted applicability of some of these explanations. First of all, theories differ with regard to the developmental stage they are relevant for. Some of them only apply to early stages, others remain relevant for older children with persistent SLI. The Surface Theory, as it deals with the processing load that burdens children who are building up an inflectional paradigm, appeals primarily to the stage in which children are in the process of filling such a paradigm. Surface characteristics will mainly impede their morphological growth before a general paradigm is formed. Theories that explain symptoms that belong to later stages do so under the (sometimes silent) assumption that a genuinely specific disorder can be diagnosed more reliably after toddlerhood (Bishop & Edmundson, 1987). This is particularly true for research efforts such as that by Claesen (1989), who specifically recruited SLI children with severe grammatical problems. Moreover, theories are sometimes inspired by an observation in a particular language. Theories may not always apply to other languages. Take an explanation that attributes a central role to subject-verb agreement (Claesen, 1989). This account will by definition have less to say about languages that do not have subject-verb agreement, like Swedish (Hansson & Nettelbladt, 1995). On the other hand, a language that lacks agreement marking may be relevant in cross-linguistic research: one might want to show that children's performance is dependent on whether or not their native language has subject-verb agreement. Cross-linguistic differences also inspire researchers to modify explanations. An example would be Rice's (1994) differential analysis of Subject-Verb agreement and Determiner-Noun agreement, in which she proposes separate analyses for German and English. Rice challenges Claesen's account of SLI in terms of a dysfunctioning Control Agreement Principle by claiming that German has qualitatively different agreement relations from English. She restricts the applicability of Claesen's account

\textsuperscript{12}While true optionality suggests a chance (50%) realisation of an obligatory morpheme, measures of optionality are sometimes taken in a more off-hand way, but anywhere between 50 and 90\% (Crago, 1997).
to Spec, Head agreement, and thereby is able to make different predictions for German and English. This is where typology and language pathology meet. It is clear that in the present book the symptoms predicted by the assorted theories should be reinterpreted, taking into account the language that is the topic of this research. In Chapter 5 the different explanations will be operationalised in order to derive language-specific predictions, given the structure and surface characteristics of Dutch.

A major issue is whether the disorder is conceived of as a deficit in representation or as a processing deficit. Quite often, Leonard's (1989) Surface hypothesis is mentioned as a prototypical theory of processing (Clahsen, 1992; Bishop, 1992a; Bishop, 1997b). There is a clear relationship between a perceptual deficit and the processing of language, although Leonard takes care to keep the two apart. The Surface hypothesis is not a simple explanation in terms of diminished perception.

There are other researchers who explore language processing in children with SLI. In several case studies children’s performance has been investigated on a number of linguistic levels. Trade-off of linguistic components has been established in individual cases (Chiat & Hirson, 1987; Crystal, 1987; Fletcher, 1987; Chiat & Hunt, 1991; Fletcher, 1992; for a review, see Masterson, 1997). Interaction between linguistic levels is best probed in case studies. What this type of research will contribute to explanations for SLI in general is not yet clear. A complicating factor is that models in which the interference is unidirectional (e.g. a disorder in phonology leads to a disorder in syntax: Chiat & Hirson, 1987) do not work very well with children. After all, in a developing language system bottom-up and top-down influences are hard to disentangle. This objection echoes Bishop’s dispute with cognitive neuropsychology as a diagnostic tool for language impairment in children (Bishop, 1997b).

The opposite position is that of a deficit in representation. Several of the theories reviewed in this chapter consider grammatical components or relationships to be ‘missing’. This view amounts to claiming that the language acquisition device is not intact (Fletcher, 1999). This position has serious consequences for our thinking about the nature of the Universal Grammar. The weak point in modular theories so far is that they fail to confront the empirical fact that children with SLI not only make errors, they also produce correct forms, and the relative share of each is variable. Bishop's (1994) proposal of a vulnerable markers hypothesis is a welcome one. Bishop fully acknowledges the inconsistency of morphological marking by SLI children. Her research agenda is directed at finding the sources of this particular vulnerability. One influence, she suggests, is the phonological processing load of the sentence in which the marker occurs (or should occur). The more phonologically complex the utterance, the more prone to omission the marker. In her recent book, Bishop (1997b) confronts the modular view that holds that children cannot process morphosyntactic information:

"I would argue that the deficits that are seen in SLI, although undoubtedly severe, are not fully compatible with any hypothesis arguing that these children are unable to use certain kinds of syntactic information. Performance on critical constructions is typically above chance level, even when it is not possible to

13Crystal’s article was not just about trade-offs in language impairment. He argued for the importance of interaction between linguistic levels in models of language and language acquisition.
identify any plausible nonsyntactic strategy that a child could use to perform correctly.

(...) if errors by normally developing children are attributable to performance factors, then couldn't the errors of children with SLI be explained in a similar fashion?" (Bishop, 1997b:148).

The last part of this quote fits in with research by Lahey et al. (1992), who found that there is a considerable overlap between normal and language-impaired populations, to the extent that it is hard to identify individuals as members of either population.

Bishop's point is an important one. However, I think theories with competence claims can still be useful. They help trace the linguistic constraints on SLI symptoms. While it is true that performance on grammatical morphology in children with SLI is inconsistent, the error pattern is not haphazard. Linguistic studies have profiled regularities in the children's language output. Claims about absence of (sub)modules do not survive scrutiny. In this study I will estimate the contribution of each explanation, even if the explanation is a partial one, for the grammatical symptoms that are found in the data.

2.8 Conclusion

In reviewing the linguistic explanations, none has proven to be conclusive. The field continues to be in motion. An important finding is that the appearance of SLI depends on the target language of the impaired child. The cross-linguistic differences in the profile of grammatical SLI have implications for a study that addresses a language for which the morphosyntactic symptoms have not yet been fully described. They support the first important research question: what are the characteristics of specific language impairment in Dutch? After all, no study of SLI can disregard the language-specific symptoms of the disorder. Put differently, findings from any language contribute to our conception of SLI. Each theory is an attempt to reveal the nature of SLI (or of the grammatical symptoms that testify to the disorder) in ways that encompass its reflexes in all languages. This means that a derivative question is whether current theories can inform our understanding of the Dutch symptoms and whether these symptoms are consistent with current accounts of SLI.

A second issue that has surfaced in this chapter concerns modularity and dissociation (Eisele & Aram, 1995). Behind all the theories on grammatical deficit there is a conviction that language impairment does not happen across the board. The impairment is selective in the language components it affects. This is often called dissociation. An example is the differential performance on the plural morpheme in nouns and the verb affixes, respectively. This pattern, in turn, supports the relative autonomy of either morphological process and thus promotes modularity claims. The dissociation between grammatical morphology and argument structure, however, is not beyond dispute. Many linguistic accounts predict that argument structure is intact in SLI. The locus of the linguistic problem as they describe it (see Table 2.1)
Specific Language Impairment

does not accommodate problems with argument structure. Clahsen (1989), Gopnik (1990a) and Guilfoyle (1993) predict, on theoretical grounds, that problems with verb argument structure will not occur. Guilfoyle's explanation (that is not included in the table), for example, situates the symptoms of SLI firmly within the realm of functional categories, so thematic information is by definition not affected. On the other hand, Van der Lely (1994) regards argument structure as affected by the impairment, because it involves a dependency relation and she indicates that dependency relations are deficient in SLI. Meanwhile, empirical evidence has gathered that undermines a dissociation as well. Children with SLI seem to have difficulties in recovering verbs’ argument structures and expressing them correctly. This evidence, added to the controversy in the literature, leads to a second and third research question: is argument structure intact in SLI and, if not, does it appear as a separate symptom area or does it correlate with the occurrence of morphological errors? The first half of the question leads to an inventory of evidence for difficulties with verb argument structure. The second half raises the issue of potential overlap of two symptom areas. Both questions are included to probe the claim of a disorder that uniquely affects functional categories.

In this chapter I have sketched the SLI research tradition and the theories that are en vogue, or have been. Of all the theories that have been reviewed, some will prove irrelevant, others can be tested. One crucial a priori limitation is that the research to be reported here is cross-sectional, so any theory that makes claims that concern the longitudinal development of children with SLI cannot be adequately tested, although surface characteristics can be compared with the predictions of this theory. Finally, only the linguistic explanations outlined in section 2.6 will be applied to the results of the present study. The research questions do not fit the theories that have evolved from research into the so-called underlying processes. While the processes concerned - like auditory memory and auditory temporal processing - may influence task performance in any investigation of SLI, no dependent variables have been included here that probe them.

In the next chapter, the formulation of the research questions will be refined and made operational and the connection between them will be made explicit.